ABSTRACT OF THE DISCLOSURE

A container for storing a tissue paper filter element usable in combination with a cylinder, as an oil cleaner housing, to load the element in the housing. The container has an inside wall with a transverse size and shape substantially equal to the transverse size and shape of the housing so that the housing can be telescoped into the container to place a tissue paper filter element in the housing. The method of loading the tissue paper filter element into the housing includes progressive feeding of the housing into the container and circumferentially compressing the tissue paper filter element as the housing telescopes over the element.

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation of U.S. application Ser. No. 818,981, filed Apr. 24, 1969 and now abandoned.

BACKGROUND OF THE INVENTION

Oil cleaners commonly use rolled tissue paper as filters. This filter must be periodically replaced by removing the filter from its covering housing and inserting a new filter into the housing.

The filter, being in a relatively tight fit in the housing, is not readily placed in the housing with a minimum of time and effort. The filter must be first reduced in size and then held and rotated to slide the filter into the housing. This distorts the layers of rolled paper and may not properly locate the filter in the housing. The tissue paper filters are not packaged in a manner which protects the paper filters from distortion and other damage. The present packaging methods, as wrappings and boxes, cannot be used to load the filters into housings.

SUMMARY OF INVENTION

The invention relates to a method and apparatus for placing an element into a housing. More particularly, the invention is characterized as a method of inserting a roll of tissue paper into a cylindrical housing of a fluid cleaner, as an oil cleaner. The tissue paper is a roll of paper wrapped about a tubular center core and packaged in a container to protect and prevent distortion of the paper. The container has a transverse size and shape similar to the size and shape of the end of the tissue paper. The housing has an open end and telescopingly fitting into the container over the tissue paper in sliding contact with the inside wall of the container. As the housing is moved into the container, the tissue paper is circumferentially compressed inwardly with air pressure and evenly feeds through the housing open end into the housing chamber. The apparatus has a packaging container coordinated with the size and shape of the tissue paper and housing so that the housing can be readily telescoped into the container and telescoped over the tissue paper.

In the drawings:

FIG. 2 is a side elevational view of a rolled tissue paper packaging container of the invention;

FIG. 3 is a cross sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is a longitudinal sectional view of the packaging container storing rolls of tissue paper showing the process of telescoping the housing into the container and over one roll of tissue paper;

FIG. 5 is an enlarged fragmentary sectional view of one side of the container showing the tissue paper being fed into the housing; and

FIG. 6 is a perspective view of the housing loaded with a roll of tissue paper.

Referring to the drawings, there is shown in FIG. 1 an oil cleaner, indicated generally at 10, for use in the oil circulatory system of an internal combustion engine operable to remove water, sulfur, carbon, gum residues, abrasives, sludge, and like foreign materials from the oil. Cleaner 10 comprises a removable housing or cylinder 11 carrying a replaceable cartridge or filter element 12. The filter element 12 is a paper filter comprising a roll of top quality of facial quality doubly ply toilet tissue. Preferably, the roll of tissue is about 4¼ inches wide and tightly wound around the center tubular core and contains at least 500 sheets of paper. This roll has approximately 40,000 square inches of compressed tissue paper. Other types and grades of paper as well as other filtering materials can be used as the sheet material of the filtering element 12.

The housing 11 is a cylindrical member having a closed top and an open bottom leading directly to the housing chamber.

The housing 11 is removably mounted on a base 13 attached to the engine or frame with a support 14. The base 13 has an outwardly directed flange 16 having a peripheral top groove carrying an annular seal or gasket 17. The housing 11 has an outwardly curved lower circular lip 18 around the open end thereof in engagement with the seal 17. A clip 19, having a generally U-shaped cross section, holds the lip 18 on seal 17. The clip 19 has a fastening device, as a locking clamp lever (not shown), to hold the lip 18 around the base 13 in sealing engagement with the seal 17.

Integral with the center portion of base 13 is an upright tubular member 21 having a central passage 22 open to the top of the housing 11. An oil line 23 leading from the engine directs oil under pressure through a bore 24 in the base 13 to the bottom of the passage 22. The oil flows upwardly through passage 22 to the top of the housing 11 and adjacent the upper end of the filter element 12.

The oil filters downwardly through the element 12 and is collected in an annular base chamber 25. Base 13 has a downwardly extended bore 26 in fluid communication with an oil outlet line 27 secured to the base. Outlet line 27 returns the oil to the engine oil pan. Collection chamber 25 is surrounded by an upwardly directed rib 28 which engages a circular snap ring 29 holding the filter element 12 in assembled relation with the housing 11.

The filter element 12 has a central axial tubular paper core 31 carrying the tissue paper. Core 31 is located in snug or tight slip fit relationship with respect to the outer peripheral surface of the tubular member 21 so that the oil must filter through the tissue paper toward the collection chamber 25.

After a period of use, it is necessary to remove the filter element 12 from the housing 11 and insert a new filter into the housing. The apparatus and method of the present invention is usable to provide effective and efficient loading of the filter element 12 into the housing 11.

As shown in FIG. 2, the plurality of rolls of tissue paper are stored in a cylindrical packaging container 32.
having a top cover 33 and a bottom cover 34. The container 32 and covers 33 and 34 can be made of heavy paper, plastic, or other familiar packaging materials. Covers 33 and 34 can fit over the ends of the container or fit into the ends of the container. As shown in FIG. 3, the container 32 has an internal diameter which is approximately the same shape, size and diameter as the outer peripheral surface of the roll of tissue paper.

The tissue paper freely slides within the container 32 whereby the container protects and maintains the cylindrical shapes of the rolls of tissue paper.

The filter element 12 is extracted from the cylinder 11 with the use of a filter element remover 36. Remover 36 is a wire having a generally right-angle 12 with an upright portion 37 located axially in the core 31 and outwardly directed legs 38 and 39 extended over the top end of the filter element 12. As shown in FIG. 1, the filter element remover 36 is located within the passage 22 when the housing 11 is mounted on the base 13. After the housing 11 has been removed from the base 13, the tissue element 13 is removed by first removing the snap ring 29 from the cylinder and then pulling the filter element remover 36 to slide the used filter element 12 from the housing 11.

As shown in FIG. 4, a new tissue element 12 is loaded into the cylinder 11 by removing the top cover 33 from the container 32. The tissue element 12 is placed within the core 31 with the legs 38 and 39 resting on the top of the filter element 12. With the bottom cover 34 of the container 32 resting on a firm support, the housing 11 is moved downwardly in the direction of the arrow 41 into the container.

The housing 11 has a transverse size and shape to telescope into the container 32. The housing 11 telescopes over the filter element 12 which freely moves through the open end into the chamber of the housing 11.

As shown in FIG. 5, the outer peripheral edge 42 of the lip 18 is in sliding contact with the inner cylindrical surface 43 of the container 32. The lower side of the lip 18 has an outwardly convex surface 44 which functions as a plow or gathering surface to feed the outside layers of tissue paper into the housing 11. As the cylinder 11 is moved downwardly into the container 32, the outer peripheral edge of the housing remains in sliding contact with the inner cylindrical surface 43 of the container core. The tissue paper is directed by the upwardly convex surface 44 into the housing. The peripheral portion of the paper in front of the lip 18, indicated at 46, flows or bulges outwardly into firm contact with the container wall 32. The air in the annular space 47 immediately under the lip 18 is trapped and increased in pressure on movement of the housing into the container to circumferentially compress inwardly the outer layers of tissue paper. The annular ring of air in chamber 47 cooperates with the convex surface 44 to size and deliver the filter element to the open end of housing 11. After the tissue element 12 is pressed all the way into the housing, the housing is removed from the container 32. The tissue element 12 is then pressed fully into the housing 11. This can be done with a quart oil can until the top of the filter element 12 abuts against the top of the housing 11. When the filter element 12 is in the inserted or loaded position, the snap ring 29 is placed in the bottom end of the housing adjacent the bottom of the filter element. As shown in FIG. 6, the filter element 12 has been fully inserted in the cylinder 11. The snap ring 29 is placed in the bottom of the housing. The filter element remover 36 is located within the core 31. The loaded housing 11 is now ready to be placed on the base 13 with the lip 18 resting on the base 13.

In terms of a method of repacking a rolled tissue paper filter or filter element into a housing of an oil cleaner, the invention comprises the steps of providing a container for storing at least one filter element 12. The container 32 is supported on a stationary member or object in an upright position. The upper end of the container 32 is then opened if it is closed. The filter element removing member 36 is placed into the core of the filter element so that the filter element may be readily removed from the housing. The housing 11 is then placed on the base 13 with the open end thereof in telescopic relation within the top of the container. The outer peripheral edge 42 is in sliding light frictional contact with the inner cylindrical surface 43 of the container 32. The housing is then moved axially downwardly into the container in telescopic relation over the filter element 12. The outwardly convex surface 44 of the cylinder lip 18, together with the annular ring of air pressure in the annular recess 47, compresses and feeds the peripheral portion of the filter element 12 into the housing 11. Continued movement of the housing 11 places the entire filter removed with the open end thereof is forced fully into the cylinder with an object, as a quart oil can, to provide a bottom portion of the housing wall for the snap ring 29.

As shown in FIG. 6, the snap ring 29 is adjacent the end of the filter element 14. The cylinder 11 is then placed on the base 13 with the lip 18 in engagement with the seal 17. The clip 19 holds the lip 18 in sealing engagement with the seal 17.

The description and drawings are directed to the preferred embodiment of the apparatus and method of replacing or repacking a rolled paper filter element inside a housing of an oil cleaner and it is intended that various modifications, substitutions, changes in dimensions, size and materials can be made by those skilled in the art without departing from the invention. For example, the container 32 may be of a length to store from one to ten or more rolled paper filter elements. The filter elements can be made of numerous types of paper or other porous material. The container 32 can be moved relative to the housing to load a filter element into the housing.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method of placing a filter element located in a container into a housing having an open end of a size and shape to telescope into the container comprising:
   a. positioning the open end of the housing in telescopic relation within an open end of the container, moving the housing and the container relative to each other to position the housing in the container around the filter element until the entire filter element is located in the housing, and then removing the housing and filter element from the container.

2. The method of claim 1 including: placing a filter element remover below the housing so that the housing is placed in telescopic relation within the container.

3. The method of claim 1 including: forcing the filter element fully into the housing and holding the filter element in assembled relation within the housing.

4. The method of claim 1 including: progressively feeding and compressing peripheral portions of the filter element during movement of the housing into the container, whereby the filter element is positioned in the housing with a minimum of distortion of the shape of the filter element.

5. The method of claim 1 wherein: the housing is moved into the container and telescoped over the filter element.

6. The method of claim 1 including: circumferentially compressing the filter element with a ring of air in front of the open end of the housing during movement of the housing into the container.

7. In combination: a housing having a chamber and a side wall surrounding a housing open end, a filter element adapted to be inserted into the housing chamber through said housing open end, a container having an open end and a generally rigid and continuous inside wall of uniform diameter throughout its length, said inside wall surrounding a container chamber of a size to receive the entire housing and of a size to contact in a sliding relationship the side wall surrounding the hous-
ing open end, said filter element located in said container chamber with outer portions of the filter element located adjacent said inside wall, said housing having a portion thereof located in said container with said side wall of the housing adjacent the housing open end located in a sliding contact relationship with said inside wall, said housing being constructed to be insertable further into the container to telescope the entire housing over the filter element and to be removable from the container with said filter element positioned in the chamber of the housing.

8. The apparatus of claim 7 wherein: the container is a cylindrical tubular member and said housing is a cylindrical housing having an outwardly annular lip at the open end thereof engageable in sliding contact with the inside wall of the tubular member.

9. The apparatus of claim 8 wherein: the filter element is a roll of tissue paper having a tubular center.

10. The apparatus of claim 7 wherein: the filter element is a roll of tissue paper having a tubular center, and the container is a cylindrical tubular member.

11. The apparatus of claim 10 wherein: the container has a length to store a plurality of rolls of tissue paper.

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U.S. Cl. X.R.
210—439; 221—220