

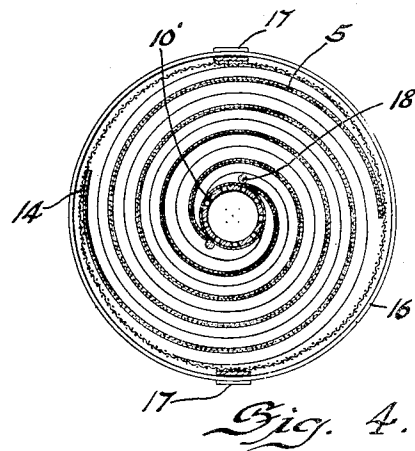
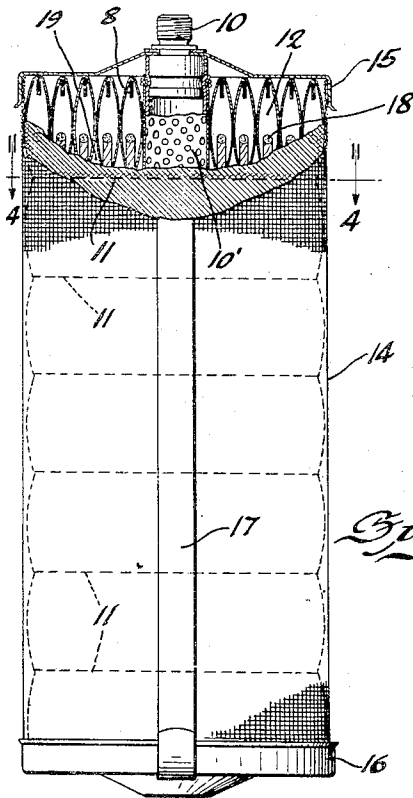
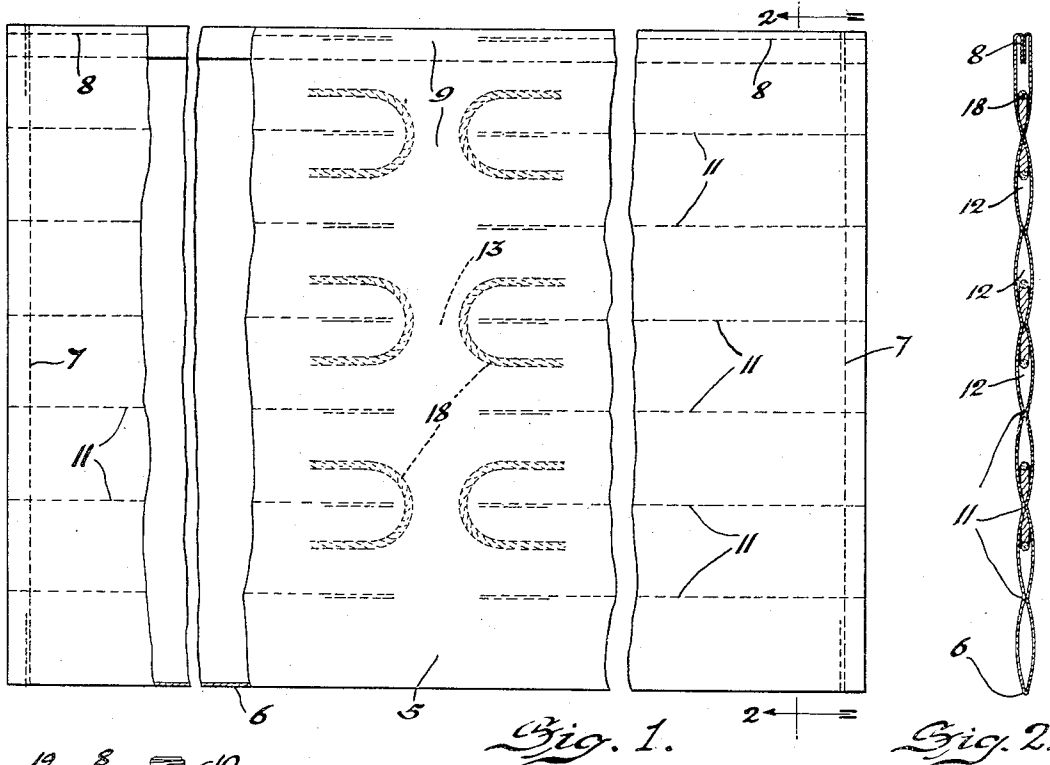
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FILTER

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UNITED STATES PATENT OFFICE.

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FILTER.

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The invention relates to filters and more particularly to a filtering element formed of flexible material, such as cloth. The object of the invention is to provide a filter element or filter body in which are combined the features of a very large area of filtering surface in a relatively small volume together with a convenient shape for mounting in a receptacle or holder.

In the accompanying drawings illustrating one embodiment of the invention, Fig. 1 is a side view, partly broken away, showing the filtering element prior to its assembly in operative position.

Fig. 2 is a vertical section on line 2—2 of Fig. 1.

Fig. 3 is an elevation, with parts broken away, showing the filter body assembled in a holder, and

Fig. 4 is a horizontal section on line 4—4 of Fig. 3.

Referring to the drawings, 5 indicates a filter element which has somewhat of the characteristics of a bag and to which, therefore, such term may, for convenience, be hereinafter applied. This bag is constituted, in the form shown, of a sheet of fabric, folded at the lower edge, as at 6, and having its ends closed by sewing the two layers of fabric together, as at 7. The top of the bag is also closed by sewing the edges together, as at 8, except for a restricted opening at 9 of such size as to engage closely around the neck of a suitable fitting 10 whereby fluid to be filtered may be introduced into the bag. The inlet opening 9, in accordance with the present invention, is positioned at a point somewhat removed from the ends of the bag, preferably near the longitudinal center thereof, thereby providing a filtering area on each side of the inlet.

The bag is preferably divided into a plurality of parallel channels or pockets, as by longitudinal and parallel rows of stitches 11, extending from the ends of the bag to points approximately below the inner ends of the top seams 8. The pockets 12 thus formed, therefore, terminate approximately in registry with the opening 9 and communicate at

their inner ends with a central open passage 13 extending downward from the said opening. Lubricating oil or other material to be filtered, if introduced at the opening 9 under pressure, will accordingly be free to flow downward through the central passage between the inner ends of the seams 11, and thence outward in the pockets 12 toward the ends of the bag.

In practice, the filtering element, after being made in substantially flat form as shown in Fig. 1, will be secured around the opening 9 to the inlet fitting 10, which latter may, if desired, be provided with a perforated outlet pipe 10' extending downwardly to any suitable distance in the passage 9. The bag is then folded over transversely in line with the point where the fitting 10 is attached and rolled from the folded portion toward the ends. The filter body thus assumes the form of a cylinder comprising two interleaved spirals, with the opening approximately at the axis as shown in Fig. 4. It may be held in this form by any suitable binding means or may be inserted in a holder such as is illustrated in Figs. 3 and 4. The holder shown comprises a cylindrical cage 14 of wire cloth, the ends of which are covered and enclosed by caps 15, 16, fitting over the ends of the cage and held together by straps 17. The fitting 10 extends beyond the end cap 15 in position to be connected to a conduit leading from a source of material to be filtered, for example, the lubricant pump of an internal combustion engine. The filter body will, of course, be positioned in a receptacle whereby the purified material discharged through the walls of the bag may be collected and returned to a place of use.

In order to assist in maintaining the passage 13 and the adjacent portions of the pockets 12 slightly distended and thereby facilitate the entry of fluid into the pockets and prevent collapse of the inlet portions of the passages I prefer to place pieces of flexible material, such as relatively stiff cord, in the inlet ends of the pockets, as indicated at 18. The pieces of cord, curved in the shape of a loop or hairpin, are positioned with their

free ends extending into adjacent channels 12 and with their loop portions lying in the passage 13.

It will be noted that the structure described provides a filtering element or bag having a very large area of filtering surface in a relatively small space, and that, by the use of a bag having pockets or channels extending in both directions from the inlet, the maximum area of filtering surface is provided within a given distance from the inlet. Thus, notwithstanding the relatively large surface of the bag, all of the oil or other material being filtered is forced to pass through the walls without having to flow very far through the interior passages or channels. Thus a maximum filtering capacity is maintained with a minimum resistance to flow interiorly of the bag.

When the bag has been rolled into the form of the double spiral, as described, and the spirally extending pockets 12 become filled with liquid under pressure, there will obviously be a tendency for the pockets to expand into an approximately elliptical cross-section. Thus the distended portion of each pocket in one spiral end section will lie in contact with corresponding portions of the similar pocket in the other end section. The portions adjacent to the seams 11, however, since they cannot be distended, will leave spiral channels on the outside of the bag between successive turns of the spiral, as indicated at 19, whereby the filtered material may escape freely from any portion of the filtering surface to the outside of the filter body.

Another advantage which is inherent in the filter comprising a spirally rolled flexible bag with spiral pockets or channels is that a fresh filtering surface is automatically provided over an extended period as the surface already in use becomes clogged. This is due to the fact that, as the bag is somewhat tightly rolled, a certain degree of pressure is required to cause the distention of the channels 12 throughout their length. When the bag is new the portions adjacent the central passage 13 provide all the filtering capacity necessary and the portions more remote from the inlet remain inactive. However, as the used portions become clogged with impurities, the slight increase in pressure causes the more remote portions of the pockets 12 to be opened up and fresh filtering areas are brought into operation. Thus the filter may be made to operate with practically unreduced efficiency over an extended time and, furthermore, the pressure required to force the material through the filter remains relatively uniform throughout the entire effective life of the filtering element.

It will be understood that various changes and modifications may be made by one skilled in the art without departing from the spirit and scope of the invention, and therefore, I

do not wish to be restricted to the details above described except as required by the language of the appended claims in view of the prior art.

I claim:

1. A filtering element comprising a substantially flat fabric bag having an opening intermediate the ends the walls of the bag intermediate the edges being connected at intervals to form passages extending in opposite directions toward the ends from the vicinity of said opening.

2. A filtering element comprising a substantially flat fabric bag having an opening intermediate the ends, a passage communicating with said opening and extending across the bag, and pockets opening from said passage and extending therefrom toward the ends of the bag.

3. Structure as set forth in claim 2, including distending means in the inlet ends of said pockets.

4. A filtering element comprising a substantially flat fabric bag of substantially rectangular outline having an opening intermediate the ends on one edge, and means connecting the two walls of the bag in parallel lines endwise of the bag and on opposite sides of said opening, thereby forming a plurality of pockets or channels communicating with said opening and extending to the ends of the bag.

5. A filtering element comprising a substantially flat fabric bag having the interior of the bag divided into a series of passages, and distending means positioned in the inlet ends of said passages.

6. Structure as set forth in claim 5, said means including flexible loops having their ends positioned in adjacent passages.

7. A filter body comprising a substantially flat fabric bag having an opening intermediate the ends and a series of substantially parallel pockets extending in opposite directions from the vicinity of said opening to the ends, said bag being folded transversely in the vicinity of said opening and rolled into a double spiral with the opening at the center.

8. Structure as set forth in claim 7, the opening being on one edge of the bag and the bag having a transverse passage communicating with the said opening and with which each of said pockets communicates.

9. A filter comprising, as a unit, a spirally wound bag having an inlet fitting at one end and a holder therefor, said holder comprising end caps through one of which said fitting extends, a cage whose ends are covered by said caps, and straps connecting said caps.

10. A filter comprising, as a unit, a filtering element having a pipe fitting at one end, and a holder therefor, said holder comprising end caps through one of which said fittings extend, a perforate cage held between said caps,

and straps connecting said caps and retaining said parts in assembled relation.

11. The assembly with a bag-like filtering element of a holder therefor comprising a
5 perforate cage, caps closing the ends of said cage, and straps securing said caps and cage together, means being provided communicating with the interior of said element and ex-

tending to the exterior of said holder whereby said element may be connected to an external 10 conduit, said assembly constituting a unit adapted for insertion into or removal from a filter receptacle.

In testimony whereof I affix my signature.

CHARLES W. McKINLEY.