Feb. 20, 1940. A. E. SCHAAF ET AL 2,190,683

FILTER MEANS AND METHOD OF MAKING SAME

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FIG. 1



FIG. 2

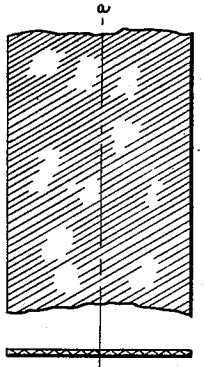


FIG. 3

FIG. 4

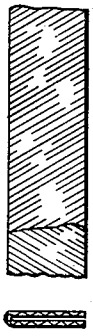


FIG. 5

FIG. 6

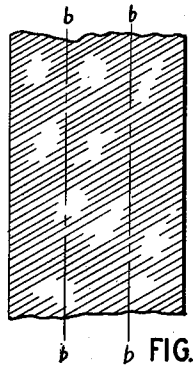


FIG. 7

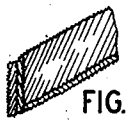


FIG. 8



FIG. 9

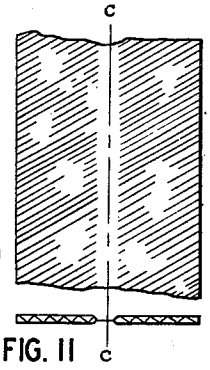


FIG. 10

FIG. 11

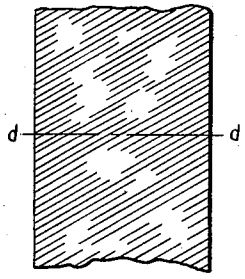


FIG. 12

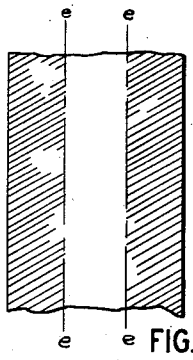


FIG. 13

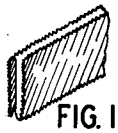


FIG. 14

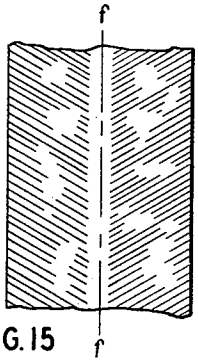


FIG. 15

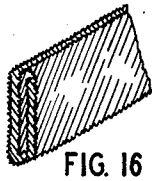


FIG. 16

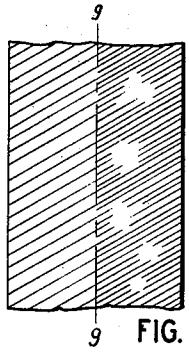


FIG. 17

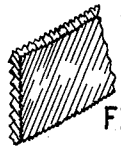


FIG. 18

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FILTER MEANS AND METHOD OF MAKING SAME

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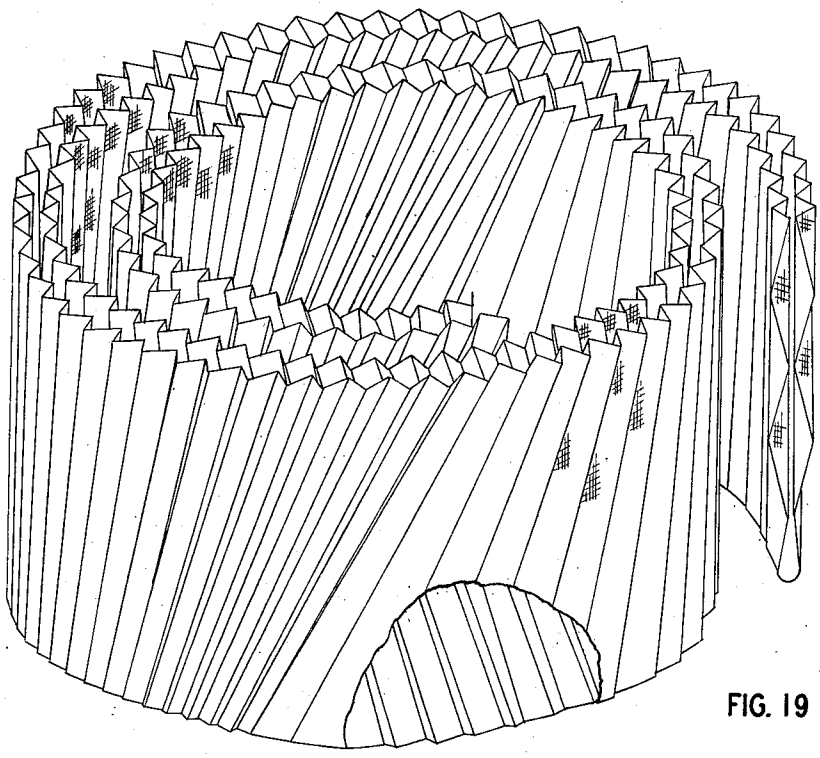


FIG. 19

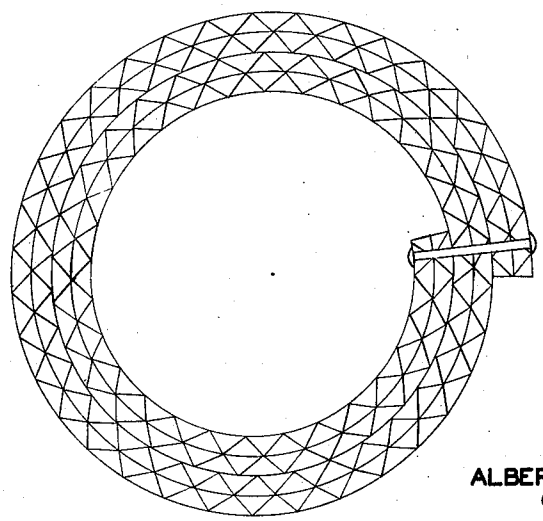


FIG. 20

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UNITED STATES PATENT OFFICE

2,190,683

FILTER MEANS AND METHOD OF MAKING SAME

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Application March 27, 1937, Serial No. 133,428

5 Claims. (Cl. 183—71)

This invention relates to elements for filtering. The invention embraces both a novel element for the purpose and novel means of producing such element.

More particularly the type of filter element contemplated is one of foraminous material such as wire screening, which may be disposed in a number of layers, either flat, or rolled upon itself in cylindrical form to provide a unit such as disclosed in Patent No. 1,918,006, issued July 11, 1933, to George M. Walton, which unit may serve either dry, or wet with oil or other liquid as contemplated in the structure of said patent.

Objects of the invention are to provide an element, the layers of which are insofar as possible integral with each other, wherein adjacent layers have minimum areas of bearing between them, wherein draining and cleaning characteristics are improved, and wherein raw edges are avoided so far as possible.

The exact nature of this invention together with further objects and advantages thereof, will be apparent from the following description taken in connection with the accompanying conventionalized drawings, in which Figs. 1 and 2 represent alternate arrangements of screening deformations; Figs. 3 and 4 are face and end views respectively of a piece of screening deformed according to the invention; Fig. 5 is a face view of an element produced from the piece of Figs. 3 and 4, part being broken away; Fig. 6 is an end view of the element appearing in Fig. 5; Fig. 7 illustrates a modification of Fig. 3; Fig. 8 is a perspective view illustrating an element produced from the modification of Fig. 7; Fig. 9 is a view similar to Fig. 8 but showing another modification; Figs. 10 and 11 are face and end views corresponding to Figs. 3 and 4 but showing a modified form of deformation; Fig. 12 is a face view illustrating still another modification; Fig. 13 is a view corresponding to Fig. 7 but showing a modification thereof; Fig. 14 is a view corresponding to Fig. 8 but showing an element resultant from the modification of Fig. 13; Fig. 15 is a face view illustrating another modification; Fig. 16 is a perspective view illustrating a composite element employing the form of sheet of Fig. 15; Figs. 17 and 18 are views corresponding to Figs. 15 and 16 but showing a further modification; Fig. 19 is a perspective view showing a cylindrical unit in an intermediate stage of its production; and Fig. 20 is an end view of the completed unit of Fig. 19.

With reference now to the drawings, the invention employs a piece of foraminous material which may be of wire screening of strip form as indicated in Fig. 3.

The strip is deformed as by passing between a cooperative pair of rolls, such deformations being either indicated as flutes, corrugations or the like, extending obliquely across the piece of material as indicated in Figs. 3 and 4. The deformations may impart to the material a characteristic section such as illustrated in Fig. 1, in Fig. 2, or various modifications thereof.

The piece is next folded upon itself, as upon the longitudinal center line of *a—a* of the strip, to provide a pair of layers integrally connected by a bend as indicated in Figs. 5 and 6, so that the deformations of the layers will limit the bearing between the layers to a very small portion of their entire area. Where the piece has corrugated deformations as in Figs. 1 and 2, and disposed obliquely as in Fig. 3, the corrugations of the two layers of the folded element will cross each other, both running obliquely from the bend, and the layers will contact only at the occasional points of intersection of the near edges of the corrugations, in a diamond-shaped pattern. Although in Fig. 6 the two layers appear as slightly separated, it will be appreciated that in practice they will be in contacting relation throughout their areas insofar as permitted by their deformations.

If it be desired to form a cylindrical unit, the initial strip being properly dimensioned for the purpose, the folded element of Fig. 5 is rolled upon itself as in Fig. 19 and its end edges secured together as by stapling as indicated in Fig. 20, and the unit is complete having raw edges of the original piece of material only at one cylindrical end. It is to be noted that when the element of Fig. 5 has been rolled to the form of Fig. 20, the deformations of each adjacent pair of layers are in crossing relation with each other. In Fig. 19 the deformations are illustrated as along straight lines, whereas actually each will of course run helically. The function of the drawings being principally to illustrate the relation of deformations in adjacent layers. It will be apparent that by the arrangement described a substantial spacing effect is had between adjacent layers, the deformations providing clearance channels running generally longitudinally of the cylinder; so that when the cylinder has upright disposition these clearances will run generally up and down so that material retained by the filter will tend to fall from the latter under the action of gravity.

In practice the cylinder is preferably disposed

invertedly from its arrangement illustrated in Fig. 19 so that the channels provided by the deformations are open at their lower ends.

Numerous modifications of the arrangement described are possible within the invention.

As illustrated in Fig. 7, the strip may be folded in opposite directions along two parallel lines *b—b*, to form an element having three layers as in Fig. 8. If the deformations extend across the entire piece of material as indicated in Fig. 7, they will be oppositely disposed in adjacent layers as indicated in Fig. 8. Preferably the location and spacing of the fold lines *b—b* are such that the raw edges of the original piece of material lie within the extremities of the element as indicated in Fig. 8, so that they are overhung by their adjacent bends and thus protected by the latter. It will be appreciated that the layers may be in such contacting relation as permitted by their deformations although in the conventionalized view of Fig. 8 they are shown as separated from each other.

Or the deformed piece of material might be bent upon three parallel lines to provide an element such as indicated in Fig. 9 wherein no raw edges of the original piece are exposed.

In the modification of Figs. 10 and 11 the piece of material is corrugated as in Figs. 3 and 7 but the corrugations are interrupted adjacent the line *c—c* along which the bend is to be made, so that the latter is more easily accomplished.

In the modification of Fig. 12 the bend is made along the line *d—d*, transversely of the strip, if the material piece be of strip form. Such arrangement has the advantage, where a cylindrical unit is to be formed, in that the rolling operation is more easily accomplished, it being understood that the bend line *d—d* is located approximately midway of the length of the strip so that the element of which the unit is rolled, is of two layers, each having raw lateral edges, and the clearance channels in the resultant unit are in crossing relation as before, but open at each end.

In the modification of Fig. 13 the deformations are interrupted between bend lines *e—e*, so that the resultant element as illustrated in Fig. 14 will comprise a pair of outer deformed layers interconnected by an undeformed layer disposed therebetween.

In the modification of Fig. 15 the deformations are of fluted form but disposed in herring-bone relation on opposite portions of the material piece. Thus if two such pieces are provided, folded upon their lines *f—f* and assembled as in Fig. 16, a four-layer element will result wherein adjacent layers have deformations in crossing relation generally as before. This arrangement has the advantage of permitting employment of material pieces of different foraminous fineness or mesh, or of different depth or pitch of deformation.

In Fig. 17 the material is corrugated but of finer pitch on one side of the bend line *g—g* than on the other so that the resultant element will be as indicated in Fig. 18, the corrugations of the two layers being in crossing relation but of different pitch.

It will be apparent that numerous further modifications may be employed without departing from the spirit of this invention, as desired to meet varying conditions of design, production, or service.

What we claim is:

1. A filter element comprising a strip of foraminous material folded upon itself to provide a pair of layers integrally connected by a bend, and rolled upon itself to provide an endless unit with overlapping portions, said strip having corrugations disposed obliquely to said bend and terminating short thereof.

2. A filter unit comprising a strip of screen material having parallel corrugations impressed therein, and said strip being bent over on itself along a line other than normal to said parallel corrugations, whereby to form a pair of continuous layers of screen material having substantially point contact only where said corrugations cross each other.

3. A filter unit comprising a strip of screen material folded as in claim 2 and rolled upon itself to provide a plurality of contiguous pairs of layers, whereby the contiguous parallel corrugations between adjacent pairs have substantially point contact only where said corrugations cross each other.

4. The method of making a filter element comprising corrugating a piece of screen material along parallel lines, and folding said piece upon itself along a line other than normal to said parallel lines, whereby to form two layers of screen material having substantially point contact at the points where said corrugations cross each other.

5. The method of making a filter element comprising corrugating a piece of screen material along parallel lines, folding said piece upon itself along a line other than normal to said parallel lines to form a pair of screen layers, and rolling said piece upon itself to provide a plurality of pairs of layers, whereby to form an element having a plurality of screen layers in which the corrugations of every layer are in crossed relation with the corrugations of adjacent layers.

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CLARENCE J. GLANZER.

CERTIFICATE OF CORRECTION.

Patent No. 2,190,683. February 20, 1940.

ALBERT E. SCHAAF, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 27-28, claim 2, for the word "continuous" read contiguous; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 26th day of March, A. D. 1940.

Henry Van Arsdale,

(Seal) Acting Commissioner of Patents.