

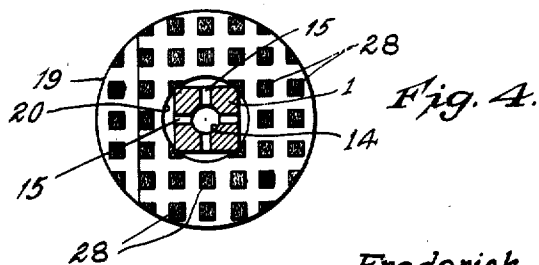
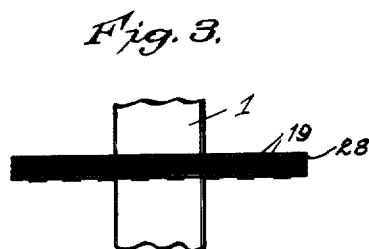
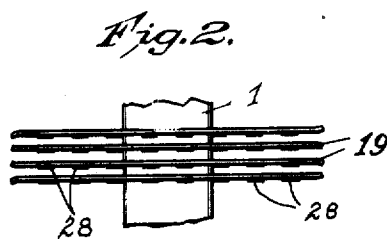
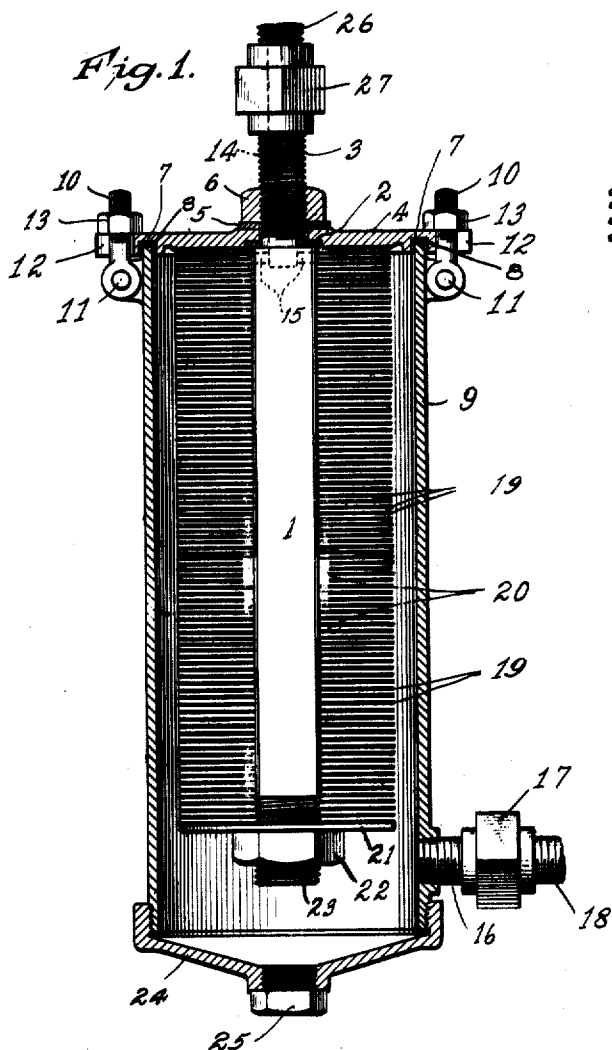
Oct. 25, 1927.

F. D. HERBERT

1,646,404

FILTER

Filed June 19, 1925



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UNITED STATES PATENT OFFICE.

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FILTER.

Application filed June 19, 1925. Serial No. 38,160.

This invention relates to filters and particularly to the type known as edge filters in which the filtration occurs at the edges of abutting surfaces, with the filtrate passing between said abutting surfaces.

Such filters comprise a stack of superposed sheets or elements which are spaced apart slightly in a suitable manner. The number of sheets comprising a filter of any appreciable capacity is relatively high, and considerable difficulty has been experienced in finding a suitable and relatively inexpensive filtering element or sheet.

An object of the present invention is to provide an improved edge filter element and method of making the same, which will be sufficiently durable to withstand contact with moisture; which will withstand high pressures; which will remain chemically inert in the fluids being filtered; which will permit of very close approach of the abutting faces of the sheets forming the filter pack; and which will be sufficiently inexpensive to be commercially feasible.

A further object is to provide an improved method of providing the spacing projections upon filtering sheets which may be carried out in quantity production in a simple and inexpensive manner, with accurate control of the thickness of the spacing projections; and with which the thickness of the spacing projections may be varied to vary the degree of filtration.

Various other objects and advantages will be apparent from the following description of a filter constructed in accordance with the invention, and the novel features will be particularly pointed out in connection with the appended claims.

In the accompanying drawing:—

Fig. 1 is a sectional elevation of a filter constructed in accordance with the invention;

Fig. 2 is an elevation of a portion of the filter pack or unit of the same with the filter sheets slightly spaced apart as when first assembled and before they are clamped together;

Fig. 3 is a similar elevation after the sheets or filter elements have been clamped together and the filtering edges trued; and

Fig. 4 is a transverse section through the upper end of the pack, to show a face of one of the filter elements or sheets.

In the illustrated embodiment of the in-

vention, an elongated member or spindle 1 is provided with a shoulder 2 and a reduced threaded extension 3 which connects with the main spindle body at the shoulder 2. A flange or plate 4 is passed over the reduced extension 3, and secured against the shoulder 2 by suitable means, such as a washer 5 and a nut 6 which is threaded upon the reduced extension 3. The face of the flange 4, upon the side from which the main body of the spindle extends, is provided with an annular groove 7 in which a gasket 8 may be disposed, and a tubular casing 9 is fitted at its open end in the groove 7 and against the gasket 8.

The tubular casing may be secured to the flange in any suitable manner, but as a satisfactory method of attachment a plurality of swing bolts 10 may be hinged at 11 to the casing and adapted to enter slots 12 in the overhanging periphery of the flange 4. Nuts 13 threaded upon the ends of the bolt and acting against the flange will draw the casing tightly against the flange, the gasket 8 insuring a watertight connection between the flange and casing.

The reduced extension 3 may be provided with an internal passage 14 which extends from the free end of the extension 3 to a point within the body of the spindle 1, and the main body of the spindle 1 is provided with a plurality of passages 15 leading from its periphery to the passage 14. A pipe 16 leads from the casing 9 and may be connected by a union 17 to a pipe 18 which conducts to the casing under suitable pressures the liquid to be filtered.

A plurality of filter elements or sheets 19, such as in the form of metal sheets or discs, are provided with central apertures 20 and arranged in superposed relation face to face to form a pack, with the apertures of the sheets or discs aligned with one another. The filter elements or discs are fitted over the main body of the spindle 1 by passing the latter through the aligned apertures of the pack, and a plate 21 is fitted over the spindle and against the outer face of the last sheet or disc so as to confine the sheets or discs together in the pack. A nut 22 is threaded upon the projecting end 23 of the spindle, so as to abut against the plate 21 and force the latter toward the flange 4 and adjustably compress the pack of filter discs together and against the flange 4. The nut 22

and the plate 21 also serve to close the outer end of the passage formed by the aligned apertures 20 through which the spindle 1 passes.

6 The body part of the spindle 1 which is within the aligned apertures 20 is of different cross section from those of the apertures so that there will be one or more channels extending along the spindle 1 and within 10 the aligned apertures 20. The spindle thus serves as a locating, centering or confining base for the filter pack and since it does not entirely fill the passages 20 any fluid in the passages 20 may pass along the spindle 1, 13 through the passages 15, and thence into the passage 14 of the reduced extension 3 of the spindle. The casing, at the end opposite from the flange 4, may be closed by a removable cap 24 having a drain or cleaning plug 25. A pipe 26 may be connected by a union 27 to the end of the threaded extension 3 of the spindle 1 so as to conduct away from the passage 14 any liquid collecting along the portion of the periphery of the spindle 1 20 which is within the pack.

23 The filtering discs are preferably formed of metal so as to be capable of withstanding very high pressures while in the presence of a liquid, and suitable provision must be made for spacing the sheets or discs apart 30 sufficiently to provide very fine channels between the discs. In accordance with this invention, the discs or sheets are spaced apart by adhering projections formed by 35 printing spaced figures or designs upon at least one of each pair of abutting faces of the discs. These printed figures or designs are then treated to render them sufficiently hard or durable, and to form an adherent 40 part of the disc upon which they are printed.

43 As a specific example, a design of any desired type such as spaced dots 28 may be printed upon a face of a thin hardened brass sheet, the usual lithographing process 45 being suitable. The metal, however, should be thoroughly cleaned before the printing operation, and this cleaning may be accomplished by any well known method, such as by an acid bath, but preferably by electrolytic cleaning. The metal sheet is then 50 passed through a metal printing press of any one of a number of different types, such as the full roller, or half roller, for example, and while passing through the press, the 53 desired design will be printed upon a face of the sheet. A suitable ink for the purpose is one including mercuric oxide, linseed oil, a litho-varnish and paraffin.

56 When the sheet is issued from the press with the design freshly printed thereon, the printed face is dusted with a suitable material, such as powdered asphaltum. The sheets are then placed in an oven and baked until the ink and asphaltum are thoroughly 60 dried. For example, the temperature of the

baking operation may be at approximately 350° F. During the baking process the asphaltum melts and unites with the ink which has been softened by the heat, and the two are finally dried into a hard compact adherent mass. The height of the projections or designs thus printed may be controlled by varying the amount of ink used or by varying the amount of asphaltum which is dusted upon the printed surface. 70 Various other paraffin base inks have also been found to be satisfactory. 75

The example illustrated provides very hard suitable spacing projections, which hold the filtering discs apart the desired distance. When the design is printed upon sheets of large area, the sheets are subsequently stamped or cut to the desired shape and size, but by reason of such stamping operations the edges will not be absolutely perfect, as shown in Fig. 2, and the slight ledges thus formed between the edges of abutting sheets are undesirable, since the retention of the separated particles at the edges of the discs causes an obstruction to the free flow of the fluid which is undesirable. In order to prevent this obstruction, the pack filter after being assembled and compressed as shown in Fig. 1 is trued up in a suitable manner, such as by turning off 85 the periphery of the pack, in which case a very smooth regular outer surface of the pack will be provided, to which the particles will not adhere in any appreciable quantity. Any such particles which do adhere may be readily removed by brushing, or by swishing the pack through a cleaning liquid. 100

The spaced dots or other figures hold the faces of the discs spaced sufficiently to provide minute channels through which the fluid only passes, while the particles in suspension and which are larger than the channel depths are mechanically retained at the outer peripheral surfaces of the pack. The formation of the spacing projections by the printing process described is relatively simple and inexpensive, and a very satisfactory and durable filter is obtained thereby. Such a process of providing the discs with projections greatly assists quantity production of the filter. 115

118 It will be understood that various changes in the details, materials, and various steps which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended 120 claims.

I claim:— 125

1. In an edge filter, a filter element of sheet metal having adherent non-metallic spacing projections formed thereon.
2. In an edge filter, a filter pack comprising a plurality of superposed filter ele- 130

ments of sheet metal, a plurality of said elements having adherent non-metallic spacing projections formed thereon for spacing slightly apart the elements of the pack.

5 3. In an edge filter, a filter element of sheet metal having small spacing projections upon a face thereof, said projections comprising an adherent printed and hardened design having channels between the figures
10 of the design.

4. In an edge filter, a filter element of sheet metal having a printed design of spaced figures upon a face thereof, the material of the printed design comprising a
15 paraffin base hardened thereon subsequent to the printing.

5. In an edge filter, a filter element of sheet heat resisting material having a fused printed design of spaced figures baked there-
20 on to form spacing projections.

6. In an edge filter, a filtering element of sheet heat resisting material having a fused printed design of spaced figures, containing a form of asphaltum, the design having
25 channels between the figures thereof to form closed channels between the superposed filtering sheets.

7. The process of producing filtering elements for edge filters which comprises printing upon a face of one of each pair of
30 abutting faces of the elements, a design of spaced figures, then treating the elements to harden the material forming the design.

8. The process of forming filtering elements for edge filters which comprises print-
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ing a design of spaced figures upon a face of a filtering element, dusting the freshly printed design with powdered asphaltum, and then heating the sheet with the dusted design until the asphaltum is fused and
40 hardened.

9. The process of forming filtering elements for edge filters which comprises printing a design having channels between the
45 figures thereof upon a face of a filter element, and then treating the printed element to harden the design.

10. The process of forming filtering elements for edge filters which comprises printing a design of spaced figures upon a face
50 of an element by a suitable lithographing process, and then treating the element to harden the design.

11. The process of forming filtering elements for edge filters which comprises printing a design of spaced figures upon a face of
55 an element by a suitable lithographing process, dusting the freshly printed design with powdered asphaltum, and then heating the element to fuse and harden the asphaltum
60 which adheres to the design.

12. In the manufacture of filtering elements for edge filters, the step which comprises lithographing a design of spaced
65 figures upon a face of a filter element to provide spacing projections.

In witness whereof, I hereunto subscribe my signature.

FREDERICK D. HERBERT.

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DISCLAIMER

1,646,404.—*Frederick D. Herbert*, Upper Montclair, N. J. FILTER. Patent dated October 25, 1927. Disclaimer filed May 13, 1930, by the assignee by mesne assignments, *Kearfott Engineering Company, Inc.*

Hereby enters this disclaimer to claim 12 of said patent, which is in the following words, to wit:

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[*Official Gazette June 3, 1930.*]

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