

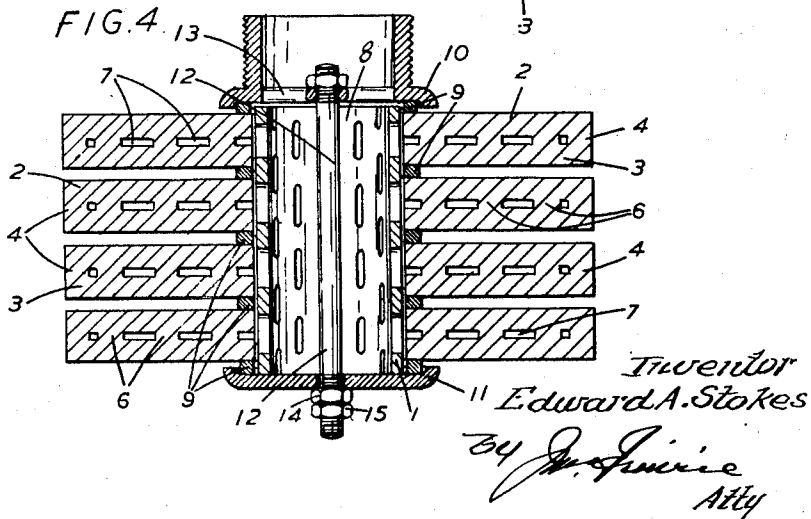
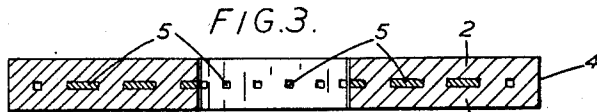
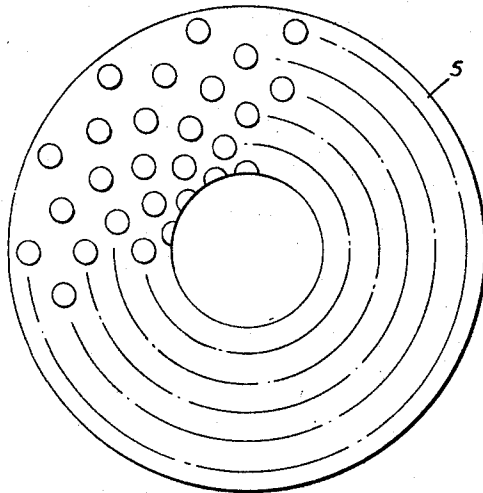
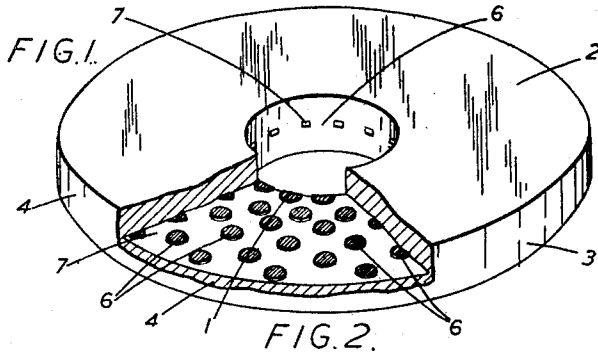
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POROUS FILTER

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2,448,930

POROUS FILTER

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3 Claims. (Cl. 210—205)

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Various filter units are given a large surface relatively to space occupied by the employment of deeply re-entrant forms of filtering screen, including screens formed with pockets, pleats, corrugations and so forth. The use of ceramic discs to make up a filter unit of hollow finned construction is quite well known. It is suggested in a copending specification Number 500,872, that the hollows in the fins or the spaces between fins or both could be filled with coarser material. This would limit the strain movement when a pack is compressed and so improve mechanical strength.

According to the present invention the unit includes a main porous filtering wall of deeply re-entrant form whereof the hollows or some of the hollows are filled or reinforced with the same material (including a material of sufficiently similar properties) in skeleton form and integral with the main porous wall. By skeleton is meant that the mass affords a large number of free passages, as will be understood from the specific example to be described later.

The invention arose from the idea that the ideal from the point of view of mechanical strength and making satisfactory joints in a pack of ceramic discs forming a hollow finned construction would be to have the hollows in the fins filled with a ceramic of coarse grain moulded integrally with the fine-grained filtering wall. In practice this is not easy, because ceramics of different porosity have different coefficients of expansion during processing and cracking of the fine wall is likely to result.

This difficulty can be avoided by a method which forms an important part of the invention—namely inserting a suitable foraminated spacing layer between two layers of ceramic material in plastic state, moulding the element with the spacing layer in position so as to produce a filling of the interstices in the spacing layer of the plastic ceramic material integral with that of the two layers and removing the filling layer by heat. The word "moulding" is used in a wide sense to include forming by the use of moulds, or the like of any appropriate form. Once the underlying idea of the method is understood it is clear that it will lend itself to the use of a variety of materials and forms for the spacing layer. For example, a cellulosic mesh material such as cotton gauze, with intermeshed threads of suitable size—probably not less than 22 and perhaps preferably 16 gauge with a mesh of 6 or 8 threads per inch—would be suitable for a wall $\frac{1}{4}$ inch thick. Or a gauze or perforated sheet of low melting point

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metal or plastic could be used. The cellulosic material would be carbonised to remove it; and the metal or plastic would be melted out and the material could be recovered. The preferred material of those tried up to the present is thick perforated filter paper or blotting paper which will eventually leave a skeleton filling or reinforcement in the form of a series of pillars or ribs of any desired shape and arrangement. Felts and the like suitably foraminated could also be used: in fact a great variety of materials combustible below the processing temperatures of the ceramic or otherwise readily removable or capable of leaving sufficiently free passage in due course.

The parts of the invention for which a monopoly is desired are those delimited by the claims.

A typical form of the invention is illustrated by the accompanying drawings in which—

Fig. 1 is a perspective view of a disc or fin partly broken away.

Fig. 2 shows a foraminated spacing layer in the form of a disc of blotting paper.

Fig. 3 is a central section of the disc of Fig. 1 in process of manufacture, and

Fig. 4 is a central section showing how completed discs are assembled as fins of a filter unit.

The disc illustrated comprises an annulus with a central hole 1 and upper, lower and outer walls 2, 3 and 4. The material for the lower half in its plastic state is first placed in the mould, the rather smaller perforated disc 5 laid on it, the material for the upper half placed on top and sufficient moulding pressure applied to integrate the two halves of the outer wall 4 and form the integral skeleton reinforcement in the form of pillars 6 in the perforations of the disc 5, to produce the complete disc in its plastic state (Fig. 3).

The processing of the disc then proceeds conventionally according to the particular ceramic employed and during the kilning the temperature is sufficient to cause the material of the disc 5 to decompose and leave the space 7 traversed by the pillars 6. It will be observed that the space 7 can be a mere fraction of the thickness of the walls, economising space and making an extremely compact, simple and convenient component. It is desirable, as is shown, to ensure that there is sufficient reinforcement where the assembly pressure is to be applied—in this case near the inner periphery of the annulus—at the same time allowing ample passage space for the filtered liquid.

Figure 4 illustrates a typical assembly of the discs which are threaded on to a perforated tube 8 between packing rings 9 which also serve to set

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the spacing of the hollow fins thus formed. The number of fins can be readily varied to provide units of different capacity and the assembly completed by suitable end pieces 10, 11 and clamping means shown as a central assembly rod 12 attached to a spider 13 formed in the end piece 10 and provided with a tightening nut 14 and lock nut 15. The component shown is intended for filtration from outside to in, the dirty liquid being fed to a conventional surrounding casing and the clean liquid delivered through the end piece 10. Flow from inside to out can equally readily be arranged for by having an inner wall to the annulus and access from the space 7 to the outer periphery, near which the clamping would then take place with the discs preferably spaced and assembled in an external perforated tube, as will be apparent to skilled persons without further illustration. The ideas underlying the invention can also be applied to more complicated components when found desirable, or to plates or discs of various flat or curved forms according to the assembly required, as will be apparent.

I claim:

1. A method of forming a hollow filtering element which includes inserting a suitable foraminated spacing layer between two layers of ceramic material in plastic state, moulding the element with the spacing layer in position so as to produce a filling of the interstices in the spacing layer of the plastic ceramic material integral with that of the two layers and removing the filling layer by heat.

2. A method of forming a hollow filtering element which includes inserting between two layers

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of ceramic material in plastic state a foraminated spacing layer of material carbonizing at a temperature not greater than is later employed for kilning the ceramic material, moulding the element with the spacing layer in position so as to produce a filling of the interstices in the spacing layer of the plastic ceramic material integral with that of the two layers and removing the filling layer by heat.

3. A method of forming a hollow filtering element which includes inserting between two layers of ceramic material in plastic state a foraminated layer of spacing material having a melting point below that which can be withstood without damage by the ceramic material, moulding the element with the spacing layer in position so as to produce a filling of the interstices in the spacing layer of the plastic ceramic material integral with that of the two layers and removing the filling layer by heat.

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