A cup-shaped inner support shell was fabricated from a dry, fluffy fibrous web having a basis weight of about 200 g/m^2 which was made on a "Rando Webber" air-laying machine. The web was a mixture of 60 weight percent crimped drawn polyethylene terephthalate (PET) staple fibers, 6.5 denier and 5.1 cm (2 inches) in length, and 40 weight percent undrawn polyester staple fiber, 5.0 denier and 3.8 cm (1½ inches) in length, which functions as a binder fiber. An approximately 25 cm×25 cm piece of the web was then placed over a heated, rubber coated steel cup shaped male mold and subjected to a uniform molding pressure by a female rubber coated mold having a complementary contour to the male mold. Both mold members were heated to approximately 185° C. and pressure was maintained on the web for approximately 15–30 seconds. The inner support was then sprayed with an acrylic latex (Rhoplex HA-16 available from Rohm and Haas) to an add-on of about 30 weight percent and dried in a circulating air oven at about 100°–145° C. for about 2 minutes.

The masks of the present invention were formed from the center blank portion and the inner support shell by placing the opened center blank portion over the inner support shell with the filter layer adjacent to the support shell. The open edge of the blank was mated with the edge of the support shell by putting this assembly into a female mold, placing a Kraton ring, a butylene-styrene copolymer elastomeric material commercially available from Shell Oil, Co., (17 mils thick) over the blank/shell assembly and ultrasonically welding the three components together by means of a full perimeter seal at the annular base. The tabs were trimmed from the face mask concurrent with the seal formation.

An exhalation valve was then fitted to the face mask at the apex of the inner support shell, immediately in front of the nose and mouth area, by forming the valve pre-weld and punching an opening. Assembly of the mask was completed by attaching a malleable aluminum nose clip and buckles for the head straps. By tightening the straps about the head of a wearer the mask is opened uniformly to provide an expanded filter surface area. The filter members of the mask corresponding to the member **11** in FIGS. **1–3** had an interior surface area of about 220 cm^2.

Performance of the mask of the present invention was evaluated by testing for penetration of dioctyl phthalate (DOP) and paraffin oil aerosols through the mask. DOP penetration data was obtained using an Air Techniques, Inc., Model Q127 DOP Penetrometer set at a flow rate of 85 liters per minute and generating an aerosol of 0.3 micron DOP particles at a mass concentration of 100 mg/m^3. The DOP penetration was measured by comparison of upstream and downstream aerosol concentrations using light scattering photometry. Paraffin oil penetration data was obtained according to DIN Standard 58645—Filtering Face Piece, Part III at a flow rate of 95 liters per minute at a mass concentration of 20 mg/m^2.

DOP Data		Paraffin Oil Data	
% Penetration	Flow Resistance, mmH$_2$O	% Penetration	Flow Resistance, mmH$_2$O
0.003	16.5	0.062	21.3

Examples 2–6

Masks of the invention wre made by following the procedure described above except that the number of layers of approximately 50 g/m^2 basis weight charged polypropylene BMF were varied and the spacing of the opposing sine wave pattern was reduced to about 3.8 cm, with the following results.

		DOP Data		Paraffin Oil Data	
Ex.	# Layers	% Penetration	Flow Resistance mmH$_2$O	% Penetration	Flow Resistance mmH$_2$O
2	1	—	—	24	3.5
3	2	—	—	5.3	6.7
4	4	0.085	11.9	0.37	14.5
5	6	0.004	18.3	0.055	25.0
6	8	<0.001	30.0	0.005	36.0

Example 7

A mask of the present invention was made by again repeating the procedure of Example 1 with the construction of Example 5 except that the inner support shell was not included in the assembly of the mask. The mask had a parrafin oil percent penetration of 0.050 and flow resistance of 22.4 mm H$_2$O at 95 liters/minute of air flow.

I claim:

1. An expanded area filtration face mask adapted to cover the mouth and nose of a wearer of the mask comprising:

a filter member including at least one layer of filter material, said filter member having,

a shape-retaining annular base adapted to fit confomingly against the face of a wearer of the mask and tending to hold said filter member in the opened position;

at least two sidewall portions generally extending away from said annular base;

a frontal portion bridging said sidewall portions; and

at least two supporting arch structures disposed at the junction of said sidewall and frontal portions, and intersecting said annular base;

the interior surface area of said filter member defined by said sidewall and frontal portions being greater than that of the segment of a sphere defined by a plane having the same area as enclosed by said annular base and a height equal to that of the interior of the filter member, whereby the pressure drop through said filter member is no more than 40 mm H$_2$O at a flow rate of 85 liters/minute;

said filter member being constituted such that upon removal of said annular base, said sidewall portion can be folded along with supporting arch, in face-to-face contact with said frontal portion to form a flat structure having an at least partially curved perimeter.

2. The mask of claim **1** wherein a portion of said at least two supporting arches run in the direction generally parallel to the height of the wearer.

3. The mask of claim **2** having only two supporting arches.

4. The mask of claim **3** wherein said pair of support arches are oppositely disposed, opening towards each other.