The hyperfine purification of air from suspended particles present in it (aerosols) is a necessary condition for carrying out a number of technological operations in the process of obtaining pharmaceutical, bacterial, and other materials. Without fine purification of the air from atmospheric microflora it is impossible to carry out processes of deep fermentation, to ensure the proper purity of the air in operating theatres, etc. One milliliter of ordinary atmospheric air contains about 500 dust particles of different dimensions, both of natural (vegetable, volcanic, cosmic, etc) origin and connected with human activity (industrial wastes). In addition to this air always contains microorganisms (bacteria, viruses, moulds, yeasts, etc.) the entry of which into the producing rooms or apparatus make the carrying out of the operations difficult or impossible. In these cases means are used for freeing the air from the microorganisms suspended in it. Since these can be found in the air both in the free state and in combination with foreign particles, the problem is of purifying the air from all the particles present in it.

A number of devices for purifying air have been developed and used: precipitators, cyclones, fabric hose filters, scrubbers, self-cleansing oil filters, electrofilters, coarse fiber filters, etc. However, the attempt to use these devices shows that they are effective only for coarse particles. Thus, precipitating chambers cleanse the air satisfactorily if the dimensions of the particles are 50 μ and above, cyclones 10 μ and above, fabric and coarse fiber filters 2 μ and above, and electrofilters 0.5 μ and above, and so on.

It has been established by theory and practice that the most complete purification of air from aerosols of any dimensions can be effected by means of fine fibrous filter materials. In Russia, filters based on the highly effective filtering material FP (Petryanov's filter) have been used to the greatest extent. This material consists of a layer of ultrafine fibers prepared from various polymers. The FP material is marked
TABLE 1. Main Characteristics of LAIK Filters Produced by the ÉMA Factory

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<td>SP-3/15 and SP-6/15 F-15 m²</td>
<td>SP-3/17 and SP6/17 F-17 m²</td>
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<td>36 72 108 150</td>
<td>36 72 108 150</td>
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*At resistances of the filter material of 1.5, 3, and 6 mm water, respectively.

according to the nature of the polymer, the diameter of the fibers, and the resistance of the filtering layer. For example, material marked FPP-15-1.5 means that this layer of FP material was prepared from perchlorovinyl resin, the diameter of the fibers is 1.5 µ (15 in tenth-units) and the resistance is 1.5 mm of water when air is passed through it at the rate of 1 cm²/sec. (1 ml/sec · cm² or 36 m³/h · m²).

In experiments it has been found that the filtration material FPP-15-3.0 at a load of 150 m³/h (4 cm/sec) ensures the practically complete elimination of all aerosols suspended in the air, including bacterial particles, i.e., it makes the air free from dust and sterile.

On this basis, in the ÉMA factory the industrial production of filters with FP material has been mastered specially for the requirements of the medicinal industry. As compared with filters provided with filtering board, mica paper, Alignin, etc., it has the following advantages: a longer working life—up to 2500 h at an initial dust content of 0.25 mg/m³, lower initial aerodynamic resistance—about 25 mm water at a load of about 150 m³/h · m², resistance to chemically aggressive media (acids, alkalis, etc.), hydrophilic properties (the filter can work at a relative humidity of up to 100%), and smaller dimensions for the same throughput.

All this justifies the recommendation of filters based on FP material for use in industries where the hyperfine purification of air is required.

In addition to this, the introduction of filters of FP material requires great attention to be devoted to their assembly, mounting, and use. The presence of even a practically invisible hole in the filter leads to a sharp fall in its efficiency and makes its use undesirable. Consequently, the question of checking the quality of the filter after its assembly is important. It is impermissible to bring filters into use without carefully checking their efficiency in a special stand.