certain dispersoids smaller than the meshes pass through but which retains and collects larger particles. In this method collection by contact and adhesion plays a large part. In addition, the medium of filtration itself becomes greatly dependent upon the particles rather than on the filter.

The ability of dust particles to adhere to cloth and other baffles is very difficult to formulate and it seems that in the design of equipment of this nature, experience and empirical formulæ, determined by testing and research, remain the only guides to the problems of dust elimination by this method.

Inertial Separation

Dia. of particle	Separating distance	Tangential gas velocity, ft.p.s. $U = \pi$ radians	Tangential gas velocity, ft.p.s. $U = 4\pi$ radians
50	0·5	6·8	1·7
20	0·5	42	10·6
10	0·5	170	43
1	0·5	17,000	4,300
100	1·0	3·4	0·8
50	1·0	13·5	3·2
20	1·0	85	20
10	1·0	340	80
1	1·0	34,000	8,000
100	2·0	6·8	1·6
50	2·0	27	6
20	2·0	170	40
10	2·0	680	160
1	2·0	68,000	16,000
100	3·0	10	2·3
50	3·0	41	9·6
20	3·0	255	60
10	3·0	1,020	240
1	3·0	102,000	24,000
100	6·0	20	48
50	6·0	81	19
20	6·0	510	120
10	6·0	2,040	480
1	6·0	204,000	48,000

A filter with zig-zag passages has also been designed. These passages are covered with a very viscous non-drying oil and the change of direction of the gaseous medium of suspension results in the dust particles impinging and being retained by the oil. Again we have the problem of formulating mathematically the theory of this action and realise that testing and experience are the main factors of successful design.

Particles of silica rock × 79

Spray or Scrubbing Method

In this method the principle of operation is that the dust particles are caught by water droplets from sprays which hold the particle by means of their surface tension, and so, having a greater mass than the particle itself, settle, depositing the dust into special hoppers or similar receivers. The main factor in the selection of this type of equipment is the nature of the dust to be collected. Any material which would be damaged or rendered unfit commercially cannot be collected by this means. This method of elimination and collecting is usually used for flue gases and the like.

The effectiveness of the spray method does not depend entirely upon the contact between dust and water droplets. A great proportion of the collecting is due to impingement and contact on the wetted surface. By using labyrinth passages and so altering the direction of flow of the gaseous medium, the particles impinge on the wet surfaces of the passages by their own inertia. Passing gases through straight flues or towers fitted with sprays is very inefficient, because the dispersoids are usually surrounded by a gas film which tends to prevent their entrainment.

The spray chamber is particularly well suited to act as a second stage collector in combination with a cyclone or similar dry method of inertial separation.

Electrostatic Precipitation

This method, although investigated as long ago as 1819, is the most modern of all practical systems of collecting air-borne matter. The power of an electrified stick of sealing wax to attract dust is well known, and C. S. Rafinesque, Hohlfield, Guitard and Gaugain experimented with this and other apparatus, proving that precipitation was a scientific possibility. These pioneers were held up by inadequate high-tension apparatus and insulators, and the development of electrical technique was the factor which

Particles of gypsum × 79

halted the application of this principle until the researches of Cottrell, Lodge and Moller led to electrostatic precipitation becoming a commercial proposition.

In the operation of this means of collection, a unidirectional electrical potential difference is maintained and current set up between two electrodes insulated from each other and between which the gas is allowed to pass. In ordinary circumstances one of these, which is usually called the discharge electrode, is of small cross-section area and