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Export Research

MANY things are important in operating a business successfully. In technical arts, such as that of chemical manufacture, the technical men are prone to consider that theirs is the most essential part of the undertaking. It is true, of course, that unless production is efficient, the undertaking cannot prosper. Technical skill is the first essential, without which no undertaking can even hope to start in the chemical field and in many other fields—it is almost accurate to state that as a universal truth in to-day's conditions. But there is another partner whose work is complementary and equally important—that of the salesman. The modern scientific salesman must not be confused with the old-time carpet-bagger. Sales technique is specialised and employs many weapons. One of these is advertising; another is market research; a third is that somewhat indefinable asset of personal contact between buyer and seller on which is built up an edifice of mutual respect and reliance. These tools, as we may term them, are of importance in the home trade and are essential in the export market. Unfortunately, distance has too often prevented sufficiently intimate personal contact and likewise has made market research difficult and uncertain. British trade has thereby lost heavily.

A move is announced which will bring about a change if it operates as its sponsors intend. After several months of negotiation a project is taking shape for setting up a self-supporting, non-profit-making Export Research Association. The project is still in the embryo stage, but it has been developed far enough for the sponsors to feel able to ask business firms whether or not they are prepared to act as godparents to such an association. The project in question has been fathered by the Advertising Association; and it is linked with a plan for the creation at the same time of a National Overseas Advertising Service. This is the first real intimation that there is beginning to be an appreciation of the vital connection between market research and commercial efficiency. In 1941 the Government set up Export Groups in most industries, which were intended to be the spearhead of a great drive to obtain more exports in order to provide currency for the purchase of munitions. The Lease-Lend arrangement removed the necessity for this drive and permitted us to put our whole indus-

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essential before making any connection with equipment where the gas is to be used. Moreover, develop the habit of opening and closing all valves slowly.

Bear in mind the particular properties of the gases which are in use. Among inflammable gases are ammonia, acetylene, butane, ethylene, ethyl chloride, hydrogen, methyl chloride, and propane; those which are non-inflammable include carbon dioxide, chlorine, nitrogen, nitrous oxide, oxygen, and sulphur dioxide. Anæsthetic effects are produced on breathing acetylene, butane, ethylene, ethyl chloride, methyl chloride, nitrous oxide, and propane; irritant gases include ammonia, chlorine, and sulphur dioxide. The inflammable range, in admixture with air, varies considerably; it lies between 2.5 and 80 per cent. in the case of acetylene, is from 4.1 to 75 per cent. in the case of hydrogen, and from 16 to 26 per cent. with ammonia.

Industrial Dusts

The Prevention of Pneumoconiosis

A RECENT issue of the Bulletin of the National Association for the Prevention of Tuberculosis (December, 1943) was largely devoted to articles on the various aspects of pneumoconiosis, or lung disease caused by dust particles. The prevension of pneumoconiosis was dealt with by Dr. Thomas Bedford, of the Industrial Health Research Board, Medical Research Council. "Pneumoconiosis" is a group name covering such diseases as siliconis and asbestosis.

Silicosis is caused by the inhalation of siliceous dusts such as those of sandstone and quartz. It occurs, writes Dr. Bedford, in workers following a variety of occupations, principal among which are sandblasting, metal grinding, sandstone quarrying and working, slate quarrying, pottery manufacture, the manufacture of abrasive soap powders, metalliferous mining, and the driving of hard headings in coal mines.

The breathing of asbestos dust, usually over a long period, causes the disease known as asbestosis. Many coalminers engaged in hewing coal contract a disease somewhat similar.

Clearly, any measures designed to reduce or abolish the incidence of pneumoconiosis must aim at preventing the worker from breathing air laden with harmful dust. The methods by which protection from noxious air contaminants, including pneumoconiosis-producing dusts, may be achieved are, in order of preference: (i) substitution of the noxious substance by a harmless one; (ii) prevention of the escape of dangerous dust into the general atmosphere; (iii) copious general ventilation; and (iv) personal protection of the worker.

An example of substitution can be taken from the pottery industry. Powdered flint has long been used for the firing of china ware, and the workers who removed the ware after firing were exposed to flint dust which is a potent cause of silicosis. Manufacturers experimented to find a safe substitute and it appeared that alumina could be used satisfactorily in place of flint. In an investigation carried out by the Medical Research Council among men who had been exposed to alumina dust for many years no evidence of pneumoconiosis was found. Thus by using alumina in place of flint in this pottery process the risk of pneumoconiosis can at any rate be greatly reduced. Another instance of substitution is the extensive change-over from grindstones made of sandstone to artificial abrasive wheels in the grinding of metals.

Where the harmful substance must necessarily be used the escape of dust into the general atmosphere should be prevented if at all possible. As near as possible to the point of origin of the dust a suitably designed hood is placed, and from the hood a metal duct leads to a pressure fan which is made to pull air into the hood. The shape and location of the hood, the size of the duct, and the power of the fan are so arranged that the air-flow over the point at which the dust is generated is such as will ensure that the dust is drawn straight into the duct and transported to a suitable collecting device. Local exhaust hoods are commonly used with many types of rotary machinery, such as grindstones; they are also used in a variety of other processes such as, for example, stone dressing, rock crushing, and some operations in the pottery industry.

Sometimes it is practicable for the process to be completely enclosed. Often, as in rock-drilling and some metal grinding processes, the formation or dispersion of dust can be much reduced by the use of water.

In spite of precautions such as those described, it often happens that enough dust to constitute a hazard to health escapes into the air. In such cases generous ventilation must be provided, so that the suspended dust is dispersed in a large enough volume of air to ensure that its concentration does not reach a harmful level. There are other processes in which none of the methods will

suffice to maintain a safe atmosphere, and then respirators or other breathing apparatus must be worn by the operators, and the process must be segregated in special compartments. Sandblasting is such a process.

Statutory Requirements

There are statutory requirements concerning dust control in industry. The Factories Act, 1937, requires that provision shall be made for rendering harmless so far as practicable all dust, etc., that may be injurious to health; another section requires that means shall be taken for preventing the inhalation of dust, and a further section requires the exclusion of persons from workrooms in which siliceous dust is produced during the intervals allowed for meals or rest. In addition, various regulations have been made for the control of special industries or processes. Thus, briefly, sandblasting may only be done in an enclosed chamber in which no other work is ordinarily performed, and in which efficient means are provided to prevent the escape of dust outside the chamber; the sandblaster working in the chamber must wear overalls and a suitable protective helmet and gauntlets; the helmet must be provided with a supply of pure air and a way of escape for exhaust air, and must bear the mark of the person using it. Another set of regulations applies to processes carried out in quarries in which the stone contains at least 80 per cent. of silica. Machines used for the crushing and grinding of stone must be entirely enclosed, or be provided with efficient arrangements to prevent the escape of dust.

These examples of official regulations are enough to indicate the care that is required to protect industrial workers.

Dust Sampling

If one is to assess the risk of pneumoconiosis, or to decide on the efficacy of dust control measures, one must know something about the nature and quantity of the dust present in the air. In order to define an air-borne dust completely it is necessary to know the chemical and mineralogical nature of the dust, its concentration, and other physical characteristics. These physical characteristics include: the mass concentration *i.e.*, the weight of dust in unit volume of the dust cloud; the number of particles per unit volume; and the size distribution of the particles. Information about the size of the dust particles is very necessary because it is unlikely that many particles larger than about 10 microns (1 micron equals one-thousandth of a millimetre, or about 1/25,000th of an inch) reach the deeper parts of the lungs. The smaller dust particles are regarded as the more dangerous. Generally, in industrial dust clouds practically all the particles are much smaller than 10 microns. Thus, for example, the average size distribution for a large group of samples taken in one anthracite mine showed that 94 per cent. of the dust particles were below 5 microns in size, 75 per cent. were less than 2 microns and roughly 55 per cent. were smaller than 1 micron.

Various instruments have been devised for sampling air-borne dusts. Generally, those used for sampling pneumoconiosis-producing dusts are designed to entrap the dust particles from a known volume of air on a glass surface or in a liquid. The particles are then counted under the microscope, and in some cases the particle dimensions are also measured and the particle size distribution thus ascertained.

Sampling Instruments

Dr. Bedford considers it unfortunate that the various available dust sampling instruments differ considerably in their sampling efficiencies, so that for the same dust cloud different instruments may give substantially different results. (A discussion of the relative merits of such instruments was presented by Dr. S. C. Blacktin in THE CHEMICAL AGE, 1943, 48, p. 575.) Therefore, in considering a stated dust concentration one should have regard to the methods of sampling employed. One of the sampling instruments designed in Great Britain, the thermal precipitator, is highly efficient. The dust is deposited on two microscope cover slips which are subsequently mounted on slides. Counting and measurement of the dust particles are done later under a high-power microscope. While, as has been indicated, some of the dust-sampling instruments now in use do not give extremely accurate information concerning dust concentrations, they have nevertheless been of inestimable value in controlling the dust hazard in many industries.

RECOVERY OF TIN

As a result of special research work on tin recovery, induced by the loss of Malayan tin supplies, the Australian Council for Scientific and Industrial Research has developed a new process for extracting tin from lode ores. It is reported that the new process promises to make possible the separation, from "tailings," of a large proportion of the tin not previously recoverable. Flotation replaces the gravitation method now customarily employed. Laboratory tests have achieved the recovery of a high proportion of metallic tin from ores which were difficult to treat. It is now planned to establish an experimental plant, and Mr. W. H. Williams, director of the Tasmanian Mines Department, has offered his department's aid in the commercial development of the process. (*Industrial Australian and Mining Standard.*)