

not only by experience gained but in addition by "kudos." There has never been any lack of persons who will take the honorary appointments, and I doubt if any chemist seeks payment for the original articles published under his name, and I believe many members would undertake voluntarily the work of local correspondents, indexers, contributors to a lexicon or bibliographers if the opportunity were given them. Purely clerical work, which must be done on the spot, editorial and journalistic work at which the amateur cannot hope to vie with the professional, and advertising (which is a profession by itself) must obviously be paid for, but much more voluntary work can be done than at present.

Since I wrote this Sir William Pope has sent me a letter which the Federal Council has addressed to both the Chemical Society and Society of Chemical Industry, and has given me permission to make use of it. Of the six publications suggested, the first three are obvious, and the fifth is one that I have already advocated in an even more extended form; I would only advocate that an editor with full powers should be appointed, who should have complete control of the journals, and that the publication committee should act only as consultant on questions of policy, leaving questions of detail to the editorial staff. About the annual reports I am not quite so convinced. Those of the Society of Chemical Industry are not in sufficient demand to make them pay, and I think the question as to their necessity should be considered very carefully. Personally, I read them with a very great interest, but I make no practical use of them. As to the weekly journal, this must be run on journalistic lines by a chemist and journalist combined and would compete with existing journals. My opinion is that it would be better to enter into an arrangement with one or more of the weekly trade journals rather than fight them.

The letter referred to modifies the propositions that I intended to make, and therefore I propose: (1) That the Society of Chemical Industry should forthwith accept the invitation of the Federal Council and nominate a representative of each of the Sections to consider the publication question; (2) that the representatives be empowered to offer the sectional organisations to other societies with a view to giving provincial members a more active part in the advancement of chemical knowledge; (3) that until joint publication is adopted the Society should purge its journal of the weak matter now published, include far more of the sectional proceedings, and strengthen the Publication Committee by adding elected representatives of every Section.

THE BRITISH SCIENTIFIC GLASS INDUSTRY.

EDWARD QUINE.

The Committee on Commercial and Industrial Policy, under the chairmanship of Lord Balfour of Burleigh, in its Interim Report on Certain Essential Industries stated that:—"There are certain special commodities which are essential to national safety as being absolutely indispensable to important British industries, and were supplied before the war entirely or mainly from enemy sources or from sources under present enemy control"; and in submitting recommendations in connexion with these industries the Committee further stated that:—"A group of industries in the case of which very special treatment is necessary is that of the optical glass and instruments and the

chemical and laboratory glassware trades. The types of manufacture dealt with lie in the higher grades of the glass industry. To be successful they require specially skilled operatives and a direction not only commercial but possessing considerable scientific attainments. They carry meagre possibilities in direct profits, and as a result have not hitherto interested manufacturers in a degree in any sense commensurate with their importance in the industrial progress of the nation. Although comparatively small as regards the amount of capital required to be invested and of the labour employed therein, these industries are of vital national importance both on naval and military grounds and for all purposes of applied science and scientific research."

Optical Glass and Scientific Instruments.—Prior to the work of Schott and Abbe, a large portion of the optical glass required by British scientific instrument makers was made in the country, but the impetus and lead given by the researches of those scientists, which were supported by the Prussian Government, placed the German optical glass industry in such a commanding position that in 1914 only Messrs. Chance Bros., of Smethwick, were manufacturing optical glass in this country, and 80 per cent. of the optical glass used by British instrument makers, whose production was exceedingly small, was supplied by Germany.

The dependence of the safety of the nation upon the production of optical glass is clearly evident when it is appreciated that upon such glass depends the supply of range-finders, directors for artillery dial sights, gun sights, telescopes and binoculars, aeroplane-sighting and photographic instruments, trench and submarine periscopes.

Our position at the commencement of the war was truly alarming, and our armies took the field seriously handicapped owing to the predominance of our enemies in all instruments which may be termed the "eyes of the army."

During the war, although handicapped by shortage of skilled labour, by lack of materials, and by lack of knowledge of the manufacture of certain types of optical glass, British manufacturers and scientists laboured so successfully that before its termination practically every requirement of the scientific instrument maker, whether his products were required for the Forces or the laboratory, could be met by British optical glass.

To-day England can supply optical glass to meet all requirements of the British Empire in addition to those of foreign countries, and is producing certain types of optical glasses superior to those made in any other part of the world. The credit of this achievement is mainly due to the efforts and sacrifices of Messrs. Chance Bros., Messrs. Derby Crown Glass Co., Ltd., the late Mr. A. S. Esslemont, Sir Herbert Jackson, and Dr. C. J. Peddle.

Chemical and Laboratory Glassware.—Chemical and laboratory glassware is that glassware which is used in laboratories for scientific purposes, and may be divided into two main classes:—(1) Hollow glassware, which is mainly manufactured at the glass furnace, e.g., flasks, beakers, petri dishes, etc.; (2) articles of glassware which are made mainly from tubing at the blow-lamp flame, e.g., thermometers, pipettes, X-ray tubes, etc.

It will be readily appreciated that the dyestuff, steel, chemical, explosive, gas, and metal industries require an adequate production of scientific glassware, as do also medical and research laboratories attached to hospitals, county and municipal laboratories devoted to public health and hygiene, and the various laboratories at universities, colleges, etc.; in fact, it may be fairly claimed that the scientific glass industry both in times of peace and war is the master "key" industry.

This industry was almost entirely in the hands of

Germany and Austria before the war, and practically the whole of the hollow-blown furnace-made glassware was obtained from these countries. It is almost equally true that the entire lamp-blown scientific glassware was obtained from foreign countries, although there existed in this country a small number of highly skilled workers at the blow-lamp flame who produced the unrivalled English clinical thermometer and a limited number of types of chemical thermometers. In addition to these workers, there was a number of lamp workers who repaired damaged foreign glass apparatus, produced special lamp-blown glass apparatus, and tidied over the difficulties of importers awaiting shipment of foreign-made glassware. These highly skilled glass workers could almost be counted on the fingers and belonged to the industrial class covered by the term "out-workers," whose premises were unpretentious and whose capital and apparatus were limited to a few pounds and a blow-lamp. It was fortunate that the dealers in laboratory glassware had large stocks when war broke out; otherwise the production of munitions would probably have come to a very sharp end, and it was soon apparent to those familiar with this industry that should the war be a long one the situation would become exceedingly critical. Steps were taken to produce scientific glassware in this country, but this was an exceedingly difficult task, for though it was possible for the chemist to analyse glassware and evolve formulae, the commercial manufacture of the glass presented enormous technical difficulties. With no previous experience of this industry to guide them except that of the domestic glassware and the bottle industry, our glass manufacturers tackled the problems. In their endeavours they met with reverse after reverse, for, apart from a lack of knowledge, inadequate materials and glasshouse equipment, there was no British labour trained to blow the light hollow ware required in laboratories. Stocks rapidly diminished, manufacturers were pressed for their production, and British-made scientific glassware was placed on the market in a condition which was as unsatisfactory to the manufacturers as to the users, and could only be termed "stop-gap." Steadily, however, and at the cost of great monetary loss, the production of scientific glassware was improved, and to-day our manufacturers are producing light hollow-blown scientific glassware which is superior in resistance to chemical reagents, and general utility, to that produced in any other country.

The lamp-blown section of the industry is dependent upon an adequate supply of glass tubing, and before the war there were few skilled tube-drawers in this country, and although efforts were made to train workers, this was an undertaking requiring time, for the operation is one requiring great physical endurance and manipulative skill; and in spite of exceedingly high wages, even at the close of the war the number of skilled tube-drawers in this country was lamentably small.

The skill required of the operator who manufactures a lamp-blown article from tubing varies from that required to make a simple article, such as an ampoule, to that required for making a high-grade thermometer or X-ray tube, and it was therefore possible to increase rapidly the number of workers engaged in the simpler operations; but the high degree of skill required, together with the demands of the recruiting authorities, prevented any large increase in the numbers of the highly skilled workers. Yet on this weak section of the industry, struggling against innumerable difficulties due to lack of adequate glass tubing, lack of manufacturing plant and lack of skilled labour, was thrown at one critical period of the war a responsibility in connexion with our anti-submarine campaign on the satisfactory discharge of which our national

safety depended; and the glass-tube drawers and lamp-workers did not fail.

The demand for scientific glassware in the future will exceed that in the past, for it is obvious that the industrial progress and health of a community is becoming increasingly dependent upon its laboratories. Our Empire cannot afford to allow its industries, its health, and its safety in time of war to be dependent upon a commodity, the manufacture of which is controlled by a foreign nation.

We are, however, swiftly drifting into that position, for, owing to the difficulties experienced by manufacturers in developing the scientific glass industry, the high costs of building and equipment, and the strength and reputation of the German and Austrian manufacturers, the industry was never in a position to stand unaided against continental competition, and the rate of exchange has now made the position, without protection, hopeless.

The Standing Committee on Trusts, in its interim report just issued, says:—"The manufacturers of scientific glassware have incurred considerable losses since they undertook to manufacture this class of glassware, and although we are not able to report as to the fairness or unfairness of past and present prices, we consider that such temporary support should be afforded to this new industry as is consistent with fairness to consumers. If this were done, probably within reasonable time the industry would be able both to hold its own against foreign competition and to sell its productions at prices acceptable to the public."

Unrestricted importation of scientific glassware, however, is to-day crushing the British industry, and some manufacturers have been forced to cease production, others have discharged labour trained at great expense in the time of the nation's need, and soon, unless help in the way of preventing unfair continental competition is given, the industry will pass to Germany and Austria, and once more the Empire will depend upon our late enemies for that production which is most essential to our industrial progress and national safety.

REPORT OF THE RAILWAY RATES ADVISORY COMMITTEE.

A. J. MALACRIDA.

(Transport Manager, Association of British Chemical Manufacturers.)

The Railway Rates Advisory Committee after sitting in public for forty days has now presented to the Minister of Transport its report (Cmd. 1098, 9d.) on the principles which should govern the fixing of tolls, rates and charges for the carriage of merchandise by freight and passenger train and by other services. As the report is very comprehensive, consisting of 54 foolscap pages, it is not possible to consider all the important points it raises, but as many of the proposals are of vital importance to the chemical industry, it is essential that these should be treated at some length.

The two main principles advocated by the Committee in respect of the fixing of future rates are:—

(1) The charge must in no case be less than the cost to the railway company of rendering the required services.

(2) The charge must in no case be more than the value of the services to the trader.

This seems a very sound policy, especially so far as the chemical industry is concerned, because at the present time the rates which are charged for the conveyance of chemical commodities are out of all proportion to the cost to the railway companies and