

of some of its unfair burden. We already have a precedent for such action; children are considered to constitute a valuable asset to the State, and in principle, though to a very slight extent, taxation relief is granted to the producer. Why, therefore, should not similar action be taken in regard to gold?

Lead. In the metallurgy of lead, also, recent advances seem to be in detail rather than in fundamental improvements. In the stress of recent years there has been small opportunity of developing new processes in industries that are well established on recognized lines, such efforts being rather devoted to specialties called for by the War. Mention, however, may be made to progress in hydro-metallurgy, as applied to oxidized lead ores. This has been limited to brine treatment with or without the addition of sulphuric acid to carbonate and sulphate ores. This process has been tested in America as well as in North Wales, where a small plant was working until the difficulties of obtaining supplies caused a temporary cessation of operations. In this case the material to be treated consisted of an extensive dump of blende and lead sulphate slimes. Vanner concentration yields a mixed product of no value until further separated. This is effected by agitating the concentrates with hot saturated brine at 70°C., whereby the lead sulphate is completely dissolved, with, of course, the equivalent formation of sodium sulphate. The presence of this salt in growing proportions interferes with the solubility of the lead sulphate, and must therefore be removed by the addition of the equivalent amount of calcium chloride. The lead solution is filtered from the blende-calcium sulphate residues, and precipitated with slaked lime, reforming a portion of calcium chloride; about 50 per cent of the chloride is regenerated, the balance of the chlorine being precipitated with the lead as oxy-chloride. The blende-calcium sulphate residues are then re-treated on a vanner, which effects perfect separation of the easily removed flocculent sulphate, leaving a saleable blend concentrate. The chief objection to the process lies in the chloride present in the lead precipitate involving volatilization loss in smelting, but this may be overcome by precipitating the lead by electrolysis, using soluble iron anodes. This process is limited in its usefulness by the relatively small quantity of material available and by its inapplicability to silver or gold contents. It may, however, develop in the direction of the treatment of low-grade sulphide ores, after a sulphating or chloridizing roast at a temperature low enough to prevent the volatilization of the lead chloride.

In the province of general metallurgy the increasing use of the Cottrell process deserves special mention. As an example of painstaking research in developing a practical process from a long-known but unused scientific fact it has few equals. We have to go back to 1870 to the work of Dr. Tyndall for the first disclosure of the phenomenon on which the process is based. This was further examined by Frankland, Lord Rayleigh, and Oliver Lodge; but for the useful application of the principles involved, we had to wait for Dr. Cottrell. He first applied the method to depositing sulphuric acid mist produced in the contact process, and is still being used for this purpose. It is satisfactory to report that the merits of the invention have been recognized in this country, the first plant to be erected here in 1917 being at one of the Government acid-plants. It is also in use here for the precipitation of fumes from metallurgical works, following established practice in

America; its further extension in this country seems certain. The advantages of the process are far-reaching; not only are valuable products recovered, but agriculture in the neighborhood of the operations is saved from serious damage. We are glad to congratulate Dr. Cottrell on receiving the Perkin medal as a recognition of his valuable services to industry.

The Metal Industry. In considering the position of the metal-producing industry before the war, one cannot but be struck with the apathy of the Government in regard to a matter of such vital importance to our security. It is true that as soon as the seriousness of the position was realized, energetic steps were taken to meet the situation. That within such a comparatively short time the difficulties were overcome is a striking tribute to the ability and energy of the technical men in this country. Industries were created and developed in a period of months which had been the subject of many year's growth on the part of foreign producers; not only were we able to produce articles equal to those obtained from abroad, but in many cases higher standards of purity and efficiency were achieved. The production of high-grade tungsten already referred to is an example of this, while in other directions the manufacture of magnetos and optical glass has reached a state of perfection unsurpassed by makers possessing prolonged experience.

These facts demonstrate that our position in pre-war days was in no sense brought about by lack of technical knowledge or skill, though it has been usual to refer to our inferiority in this direction, as well as to lack of initiative and energy, as being the true cause. The experience of the war shows this view to be unfounded, and that given reasonable facilities and the absence of official and fiscal discouragement we can, so far as technical knowledge is concerned, place ourselves in the front rank as producers of all essential materials. This charge having been proved to be baseless, it is clear that in order to maintain our position as producers some protective steps must be adopted; failing this, there is every reason to suppose that our new or revived industries will relapse into their pre-war inefficiency. It is reported, for instance, that efforts are being made to re-introduce foreign glass into this country, which if successful (unless effected under conditions which will protect our own manufacturers) cannot but tend to harm, if not to destroy, an industry which, under war conditions, has succeeded in re-establishing itself.

I am, of course, referring here only to such industries as were either non-existent or were in a struggling state, and this condition obtained largely in the production of certain essential metals. This possibility has been officially recognized, and committees have been formed to examine into the problems and make recommendations. Lord Balfour of Burleigh's committee on commercial and industrial policy after the war has made an exhaustive inquiry into the subjects covered by the Terms of Reference. A study of the committee's final report reveals the complexity of the subject. The departmental committee's report on the iron and steel trades ascribes the relatively stationary condition of this industry in part to deficiency of our iron-ore resources, but primarily to greater efficiency of German and American methods.

A point is made of the individualism of the British character which prevents the manufacturer from "pooling his brains and capital to the greater ultimate ad-