Aluminium

There is a considerable scrap recovery of aluminium and aluminium alloys. Process scrap is usually remelted in the works when it is produced. Engineering scrap (turnings, millings, filings, etc.), which may amount to 50–200 per cent of the weight of the finished article, requires special methods of melting to ensure both a good yield and quality and is usually returned to specialist firms, the secondary metal melters. The segregation and cleaning of the various types of scrap are of great importance.

Old scrap presents a more difficult problem, as it has to be separated into the different alloys, a skilled job requiring experience and the use of scientific methods.

United States statistics for 1929–38 show that out of a total production of one million tons of metal, one fifth came from scrap recovery. In addition, about 225,000 tons of aluminium were recovered in the form of various alloys, making the total contribution of scrap to consumption in this period about 35 per cent.

Export of Scrap

Nothing has been said yet about the export of scrap, but to secure maximum recovery there should be a flow back to metal-producing from non-producing countries. The statistics for iron and steel scrap, which are fairly complete, do show this in a few cases, such as Holland and Switzerland, but the bulk of the transfer of scrap, which averaged 5 million tons a year for 1933–38, actually took place between steel-making countries, owing largely to preparations for war. Under happier auspices the International Scrap Convention, established in 1937, might have done much to avoid this uneconomical transfer.

Conclusion

The absence of world statistics on the recovery of scrap makes it impossible to give a comprehensive picture of its full significance. However, it is clear from the data given above that scrap recovery will be of increasing importance as regards the conservation of our metal resources, and that as a major source of raw materials it must be brought into any general scheme affecting them under the Atlantic Charter.

Taking conservation first, the following measures would help towards a maximum scrap recovery and help to diminish wastage of metals: (1) The salvage of all new and as much old scrap as possible. (2) Improved methods for segregating engineering scrap of different kinds so as to avoid mixing different metals and alloys. (3) Improved methods for sorting and cleaning old scrap and identifying doubtful material by quick tests. (4) Improved methods for cleaning scrap and putting it into a suitable form for remelting. (5) Arrangements to avoid losses by corrosion when scrap, often finely divided, is kept for long periods. (6) Avoidance of the unnecessary use of alloys, which complicates scrap recovery, and the reduction of the number of alloy specifications to the minimum necessary. (7) Improved methods for protecting metals against corrosion. (8) The re-use of old scrap by fabrication and welding.

Turning now to the inclusion of scrap metals in any general scheme for metal supplies under the

Atlantic Charter, the first essential is the compilation of international statistics on an agreed basis. Even if these cannot be complete owing to the difficulty of including old scrap which is re-used by works internally, and so-called runaround scrap such as bearing metal, which circulates internally and therefore does not come into account, it should be possible to collect data for all process scrap, engineering scrap, or old scrap which reaches the market, so as to see to what extent consumption in each country can be met from virgin metal or from scrap.

The need for such statistics was emphasized in the following passage from the report of the National Resources Board of the United States appointed by President Roosevelt in 1934: "The subject of scrap is the great blind spot of the world's metal economy. Despite the importance of secondary metals no statistics of an international character can be had. The United States is the only Government compiling figures of secondary metal production. The present annual statistics of the Bureau of Mines should be established on a quarterly or monthly basis and expanded to include stocks and consumption as well as output. This is one of the most constructive steps that could be taken for stabilization of the metal industries. Until the importance of scrap is recognized, effective adjustment of supply and demand in the metal industries will remain difficult or impossible." This was written in 1935 with special reference to the United States; to-day, in the light of the Atlantic Charter, it has a much wider significance.

FAMILY SIZE AND SURVIVAL IN GREAT BRITAIN

By DR. PERCY STOCKS

THE Registrar-General's first report on fertility, based on the data obtained under the Population (Statistics) Act of 1938, shows that in 1938 the reproduction rate in England and Wales, adjusted for the anticipated rates of survival of women and girls, must have been between 16 and 20 per cent below the replacement level, and that if a serious decline in the native-born population of Great Britain is to be averted, the rate must be raised to that extent within the next few years. Complete elimination of stillbirths and child deaths up to age fifteen would bring us within 6–7 per cent of the goal, but that is outside the bounds of possibility. The increase might be effected by less avoidance of marriage and by marriage at an earlier age, but if no such social changes as these occur, it can only come by increase in the average number of children per family.

The average citizen has little knowledge of a biological kind as to the best age for marriage and the most favourable spacing of children for the rearing of a healthy family, and even scientific men have to confess to a lamentable lack of concise information on these vital matters. It would be natural to expect, therefore, that any addition to such knowledge would be eagerly studied. Little comment has been made upon the facts revealed by the fertility report: such as the findings that 42 per cent of marital children

born in 1938 were first children, whereas only 19 per cent were born to mothers who had already had more than two, and that the risk of stillbirth was 30 per 1,000 for first-born and less than 20 for subsequent children to mothers less than twenty-five years old, whereas for first-born children it was 45 at ages 25-34 and 87 at 35 or over. Another important fact discoverable from the Registrar-General's 1938 report is that whereas the risk of maternal death when confinement occurs between the ages of 20 and 25 is only 1.5 per 1,000 maternities, it rises to 3 at ages 30-34, to 4 at 35-39 and to 6 at 40-44. The risk of a stillbirth increases from 28 per 1,000 births when the mother's age is 20-24 to 32, 39, 54 and 70 at succeeding age groups of five years. For young mothers under 20, both risks are slightly greater than at 20-24. Here is an important fact which should be stressed, namely, that the dangers to both mother and child are least when confinement occurs between the ages of twenty and twenty-five.

The Population Act statistics can tell us little about the survival of live-born children according to family size and maternal age, and we have little reliable data on this point since the census of 1911; but this gap has now been partly bridged by a study of the records of health visitors of the maternity and child welfare area of the Administrative County of Durham for the years 1930-37 by Mrs. C. M. Burns*.

This book needs careful study, for not all the conclusions, even when in the heavy type liberally used, can be accepted as proved by the data tabulated. From the point of view of survival up to five years, the report shows that first, second and third children are best born while the mother is between twenty and thirty-five, whereas fourth and fifth children have a better chance if born to mothers of 35-39 than if born to younger mothers; but the attempt which is made to prove that the latter finding is not the result of some form of social selection is not entirely convincing.

Nor can the evidence for the statement that "high death rates are more dependent on the size of family than on the housing conditions, as measured by rooms per person or rooms per family" be accepted as conclusive. First children of miners born to mothers aged 20-29 and housed at average densities of 1.1 and 1.8 persons per room respectively suffered losses before the fifth birthday of 147 and 143 in each 1,000 live or stillborn, whereas miners' sixth to ninth children born at any age of the mother and housed at average densities of 2.2 and more than 3 per room respectively suffered losses of 201 and 238 per 1,000. But no effect of overcrowding on health would be expected until the density exceeds about two persons per room, so the equality of the first two rates proves nothing; and the rising rates in the last two groups may as well have been due to overcrowding as to rapid breeding, these being so inseparably connected as to defy any statistician to disentangle them. It has long ago been demonstrated from the national statistics that mortality of children aged 1-5 years is more sensitive to environmental conditions than is infant mortality, and there can be little doubt that the presence of five other children in an overcrowded home is more likely to enhance the risks to a young child from most infective diseases than the presence of an equal number of adults.

* Infant and Maternal Mortality in relation to size of Family and Rapidity of Breeding: A Study in Human Responsibility. By C. M. Burns. (King's College, University of Durham: Department of Physiology, 1942.) 5s. post paid.

The evidence that longer spacing between births results *per se* in better survival seems to have been based mainly upon a comparison of 119 sixth children born to mothers aged 25-29, of whom 28 or 23.5 per cent failed to reach their fifth birthday, with 353 sixth children of mothers aged 30-34 whose non-survival rate was 17.6 per cent, and upon similar differences in survival of the five previous children. This is slender evidence on which to base a far-reaching conclusion. That rapid breeding and overcrowding are each deleterious to the survival of young children may be accepted from the evidence, but it remains unproved which of the two is the more important.

The method of basing 'death-rates' of children upon the original number of live and stillbirths of which they were the survivors may lead to strange fallacies, such as the conclusion that twin children who have survived the first year thereafter "display quite normal death-rates". The data show that 414 per 1,000 twins failed to survive a year compared with 112 per 1,000 single born, and that the 'rates' at 1-4 years were 27 and 31 respectively; but if based upon the numbers at risk to die, the true rates at 1-5 years were 46 and 35 per 1,000 respectively, which shows the conclusion to be fallacious.

A conclusion which must occasion surprise is that in small families of one, two or three children "the fall in infant death-rates during this century has been very slight". It is deduced from the 1911 fertility report, by what method is not stated, that infant mortality in 1905-10 in families with one child was then about 55 per 1,000. Actually for marriages of 2½ years average duration, 62 per 1,000 first children born alive were dead at the census, and since the average interval between marriage and the first child, when that child was born in the first five years, was 1.63 years in 1938 according to the recent official report, and is unlikely to have been less than 1.5 years in 1905-10, the original figure 62 seems a more probable estimate for mortality of first children within a year than 55. By applying the Durham infant mortality-rates for children of successive birth ranks to the distribution of 1938 births in England and Wales according to birth rank, it can be estimated that the rate for first-born children was then about 92 per cent of that for all children (53), which gives 49 as the 1938 rate among first-born. Although a fall from 62 to 49 can scarcely be described as "very slight", it is small compared with the 50 per cent drop in the total infant mortality-rate, and Mrs. Burns has at least succeeded in showing that a large part of the improvement in infant and child survival in Great Britain on which we are apt to pride ourselves must have been due to the reduction in average size of family.

Mrs. Burns has produced with great industry a work so challenging that it will be widely quoted, and for that reason it has been deemed important to put those who study and use it upon their guard against its faults. If it is unnecessarily gloomy we shall not quarrel with it on that account, for it contains much information which is unique and timely. The fertility position has got to be faced, and we cannot hope to apply the right remedies without a diagnosis of the causes. It is cheering to read in this report, based as it is upon conditions in a depressed area, that: "If marriages take place early enough it would be quite easy to produce a fairly large proportion of well-spaced families of four, five or even six children under the best 'biological' conditions".