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A New Type of Cupola

Elsewhere in this issue, a description is given by Mr. Doat, of the Conduites d'Eau Company of Liège, of a new type of cupola. In form it resembles a miniature blast furnace; there is external water cooling, a hot blast is provided, the tuyeres are water-cooled and gas is manufactured for use about the factory. As there is a zone of comparatively cool coke between the tuyere nozzle and the wall of the furnace, there is no attack upon the refractory. Slag control takes on a new and probably more difficult aspect. Thus the plant is capable of making both improved and worse irons than the conventional cupola. In the examples given by the Author, the one for heat-resisting irons is not strictly comparable as, in the second case cited, chromium has been added.

Both the plant and the process appear to be expensive, for incidentally the use of large quantities of ferro-silicon is not cheap, but against this there should be placed a fuel economy and the value of gas made available plus, of course, lowered refractory and maintenance costs. Like a blast furnace, the major advantages will only be forthcoming when the plant is worked continuously—a matter of some moment for the average foundry owner. Whilst the refractory costs should be materially less than with the conventional type of cupola, they may be offset by maintenance of the heat recuperators, as experience with other plants has shown these can be a headache. As the Author rightly points out, the personnel for the supervision will have to be of higher standing than is now usually the case. The plant seems to show great potentialities for the making of the new nodular cast irons, but this aspect is not referred to by the Author. Purity of the metal melted is associated with its high temperature. It is a matter for regret that the Author has not at this stage seen his way clear to give a cross-sectional drawing of the furnace, yet he has certainly disclosed sufficient to whet the appetites of the average foundrymen.

We congratulate Mr. Doat and his company upon the success that has crowned their pioneer efforts. It has been a big stride from the trickling of a little iron from a St. Etienne gas-producer to the orderly working of a modern melting plant. One of the major factors of this development has been to utilise metallurgically the inherent thermal potentialities of the cupola. We have always insisted that the heat generated in the hottest part of the cupola is sufficient to melt wrought iron, basing this upon the notion that if one could place a crucible full of that material in the melting zone of a conventional plant, it would easily liquefy. This new process has bridged the gap between this hot zone and the ladle. The cupola described by Renshaw showed the same basic notion, but the solution utilised a different, but essentially interesting technique. As a result of these new developments in melting practice, it is clear that there will be a real revival of interest in the subject. For instance, there seems to be an application in the provision of refined irons, for here is a case where continuous production is not a drawback. The acquisition of the "know-how" could not be cheap, but certainly a profound study of the subject is called for. For far too long, cupola practice was based on cheap and reliable pig-iron, coke, scrap and refractories. All these have now changed. The cupola has held the field for being the cheapest and most economical method of melting, but it is, as has been shown in recent times, capable of being modernised to advantage.

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Anti-corrosive Compositions

The first report of the Joint Technical Panel N/P2—"Paints for Underwater Service on Steel"—has been issued by the British Iron and Steel Research Association, 11, Park Lane, London, W.1. The panel, set up in 1946, includes representatives of the Admiralty Corrosion Committee, the Association of Ships' Compositions Manufacturers, the British Shipbuilding Research Association, and the Protective Coatings Subcommittee, the panel's parent body. The report gives the detailed results of tests made on 68 specially formulated anti-corrosive compositions. From considerations of performance and general applicability the most promising composition studied is one having a pigmentation of two parts of basic lead sulphate with one part each of aluminium powder, barytes and Burntisland red bound in a modified phenol-formaldehyde/stand oil/tung oil (ratio of oil, 1:1) medium. This composition has been selected for use in comparison with another containing the same pigmentation in the plain modified phenol-formaldehyde/stand oil medium in a new service test about to be conducted by the panel. Promising progress has been made towards the development of a method of preparing blank specimens for paint tests on which a reproducible amount of intact millscale is left at the time of painting. The preparation of specimens by simple exposure to the weather gives erratic results in this respect. The report includes a short statement of the various service tests on bottom compositions that have been executed to date.

British Association

The Birmingham meetings of the British Association have formed the basis of several broadcasts. On Tuesday, the eve of the opening, the B.B.C. Home Service presented "Mid-century Meeting of the British Association," a comprehensive review of modern science arranged by Mr. Robin Whitworth. Taking part were the Association's president, Sir Harold Hartley, and three past-presidents—Sir Henry Dale, Sir Richard Gregory, and Sir John Russell.

The opening on Wednesday was broadcast from Birmingham Town Hall, and listeners to the Home and Third programmes heard the president's address on "Man's Use of Energy."

Eminent men attending the meetings will be introduced in the Home Service by Mr. Arthur Haslett. It is hoped that comments from Prof. O. A. Saunders on gas turbines; Sir John Cockcroft on nuclear power; Prof. R. E. Peierls on atom machines; and Prof. A. Tufton on automatic control, will be included.

Bauxite Project in Jamaica

An advance of $2,500,000 and £1,500,000 to Jamaica Bauxite, Limited, is to be made by the Economic Co-operation Administration for the development of a new bauxite project in Jamaica. The money will be used for the construction of a plant having a production capacity of about 40,000 tons of alumina a year, the purchase and installation of plant and equipment, and the establishment of related mining and transport facilities. Repayment will be in aluminium to be added to the stockpile in the United States over a period of eight years.

Jamaica Bauxite, Limited, is a subsidiary of the Canadian firm of Aluminium, Limited. It has invested the equivalent of 3,400,000 Canadian dollars in acquiring freehold property in Jamaica, and in research and development of bauxite deposits.

Standard Locos Next Year

The first examples of British Railways' standard locomotives, designed for a wide range of use and enabling a greater number of older types to be replaced, will be introduced in 1951. Designs for standard all-steel carriages are well advanced and 12 types are to be built during 1951, including kitchen cars and passenger brake vans; these will incorporate a wide range of components which will be standard throughout the whole series.

So far, about 1,180 miles of track have been partially or completely renewed this year; about half the complete renewals have been with the new standard flat-bottom rails. By the end of the year it is anticipated that a further 690 miles of track will have been completely or partially renewed. By that time there will be approximately 1,570 miles of track on British Railways with the new flat-bottom rail. Relaying is being speeded up by the use of an increasing number of mechanical devices. In tunnels and other confined spaces particularly, mechanical track-laying units are now doing work which formerly had to be done by hand under great difficulties.

Lecture Course on Refractories

At the Northampton Polytechnic, St. John Street, London, E.C.1, commencing on October 3, there are to be given weekly lectures on "Refractories, their Manufacture, Properties and Uses" by L. R. Barrett. The Course extends to ten lectures and is organised primarily to provide a detailed and up-to-date survey of refractories and the refractories industry for technologists engaged in the metallurgical, fuels, carbonising, glass and chemical industries. It is, however, also suitable for students of metallurgy and of other related branches of applied chemistry, provided they possess the necessary fundamental knowledge of chemistry. In addition, this course will be of value to those preparing for the examinations of the Institution of Metallurgists and of the Institute of Fuel.

The fee for the Course is 30s. payable in advance on enrolment.

South Wales Institute of Engineers

The annual golf meeting of the Institute will be held on Saturday, September 16, when three challenge cups and other prizes will be competed for. All ties will be played off on the Radyn golf course. The main prizes are as follow:—(1) The Institute Challenge Cup; (2) the Barrington Hooper Challenge Cup, and (3) the Herbert Coope Challenge Cup. Only members of the Institute are eligible to enter for these trophies, but other prizes will be open to members of recognised golf clubs. Full particulars may be had from the Secretary, Park Place, Cardiff.

Owing to a labour dispute in the printing industry, it has been necessary to reduce the number of pages in this week's issue of the "Journal." The dispute affects all firms in the London area affiliated to the Master Printers' Federation.

The "Metallurgical Blast Cupola"*

By Robert Doat

BEFORE GETTING DOWN to the subject of this lecture the Author wishes to thank the Italian Metallurgical Association for its invitation to present this Paper. His thanks are also due to Mr. Olivo, the president of the Foundry Group. Mr. Olivo is himself a cupola specialist and one who places technique above everything else.

History of the Plant

The metallurgical blast cupola—it will be obvious why this name has been given—is in reality a slagging gas-producer. A gas-producer of this type which works with a blast heated to a high temperature was installed in 1925 at *La Societe des Houllières de Saint Etienne* by a French technician, Mr. Philipon. This plant worked from 1925 to 1935 and generated 200,000 cub. metres of gas per 24 hours, the gas being used for operating glass melting furnaces. This producer used a particularly high-ash fuel, the ash being ferruginous. It was noticed that liquid iron was leaving the bottom of the gas-producer together with the slag. It thus came about that someone added small steel scrap and cast iron was made as a by-product.

In 1935 the glass works, which utilised this gas, was transferred to the North of France and thus production was stopped. By progressive increases in the quantity of the metallic charges, the plant worked like a cupola, which produced cast iron as the main product, and gas as a by-product. Mr. Philipon showed a pilot plant of this type in a little foundry at Saint Etienne, and then a larger one was installed in a scrap dealers yard in the South of France.

Immediately after the war, all foundries met the following problem, that was the impossibility of producing owing to the shortage of pig-iron, caused by the blast furnaces preferring to make material for use by their steelworks.

The *Compagnie Générale des Conduites d'Eau*, having some knowledge of the Philipon plants, thought that if these—which when operated by non-foundry technicians gave "wild" irons—were susceptible to improvement and adaptation for a proper industrial foundry production—they would thus solve the problem of lack of pig-iron. This industrial production of foundry iron could be done by starting off with small steel scrap. The iron to be made was for making centrifugally-cast iron pipes utilising the de Lavaud process, but dispensing with any heat-treatment before use. After long months

* Translation of a Paper read before the Italian Metallurgical Association. The Author is on the staff of the *Compagnie Générale des Conduites d'Eau* of Liège.

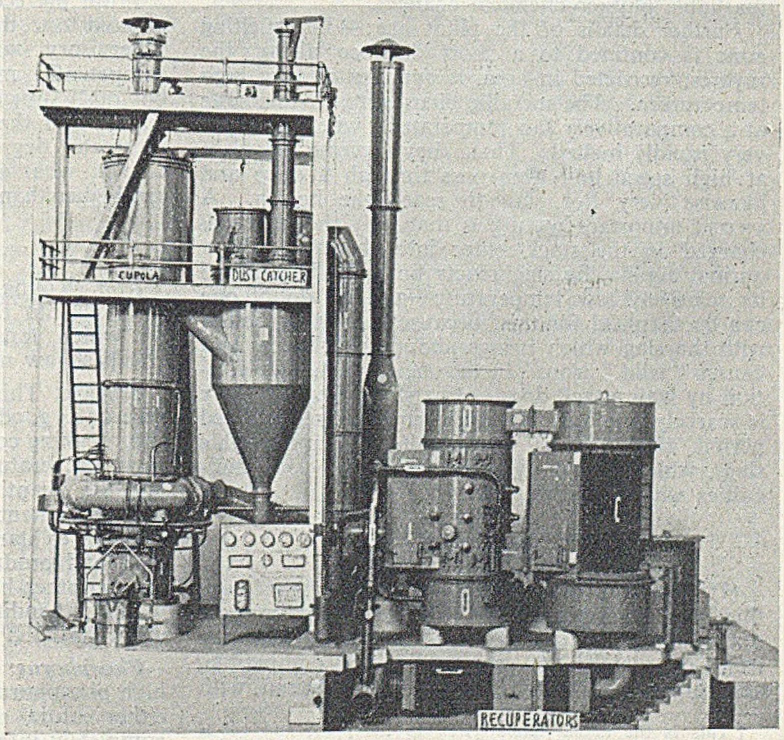


FIG. 1.—*Scale Model of the "Metallurgical Blast Cupola."*

The "Metallurgical Blast Cupola"

of adjustment and perfecting, the conduct of the plant installed at Liège—which has a five ton per hour capacity—became an industrial proposition. This will be gone into later. For more than a year, with a plant having a diameter of 850 mm. (34 in.) between the tuyeres, the production of iron has been of the order of 1,200 metric tons per month as an average. It is this installation which is to be described.

General Arrangement

From Fig. 1, which shows a model of the plant, the outstanding characteristics are revealed. The cupola is externally water cooled by surface coolers; the tuyeres are also water cooled. The throat is closed and about 35 per cent. of the gas is passed to the blast heaters, the remainder being used in and about the foundry for various purposes. The blast is heated during its passage through three nests of boiler tubes by the combustion of the stock gases. A dust catcher is placed between the cupola and the recuperator and holds back the larger impurities.

Details of the Plant

When the operation of the plant is properly understood, that is, its advantages as well as its drawbacks, it is no longer necessary to regard it as a melting apparatus, such as an ordinary cupola, either hot or cold blast, but as something quite new. That is why it has been given the new name of "metallurgical blast cupola."† It permits of the production of metals which have properties very different from those charged as they undergo remarkable physico-chemical changes.

Further details of the plant are:—The melting zone is confined to a short distance above the tuyeres; restricted in area, it operates at very high temperature. The metallic charges reach this zone at a comparatively low temperature, where they are very rapidly melted. Thus, they traverse this zone at high speed and then pass through a deep and likewise very hot slag to reach the hearth. A second important feature is that only the materials charged in the stack enter into the slag. In a normal cupola the slag reacts but little because of its relatively low temperature—and no doubt one can be thankful for this, because it is this reaction with the slag which brings about irregularities and causes "wild" iron. In this new plant, slag dilution by wall attack does not exist, as the refractory is scarcely touched. The high temperatures attained permit the creation of certain difficulty-fusible slags, which would cause bridging and other difficulties with the normal plant.

Advantages

(1) The features disclosed clearly show that with this plant it is possible to undertake metallurgical operations permitting one to obtain any particular iron of which the composition is compatible, according to the laws of chemical equilibrium, with the slag it passes through. Later, some practical examples will be given.

(2) There being a reducing atmosphere inside the furnace, there are no metallic losses. Careful analyses show that in the slag there is less iron and manganese than is brought in with the coke ash. The problem of the loss of silicon is a little more complicated and will be referred to later.

(3) The iron is produced at an exceedingly high temperature (beyond 1,500 deg. C.), at which it is easily possible to create, initially, and from a unique mix, a series of special irons well suited for inoculation carried out either at the spout or in some sort of mixer ladle.

(4) The following advantages relate to the economies of the process:—Poor-quality coke can be used—that is, high-ash or other types—and metallic oxides can also be charged.

(5) The monthly yield from the plant is very high, as no repairs are needed.

(6) Economy in both raw materials and labour for repair work is a not inconsiderable element.

Drawbacks

Just as there are advantages resulting from the fundamental characteristics of the plant, there are also inherent drawbacks. The reactions take place at such a high temperature, are infinitely more rapid, and consequently the plant is much more sensitive. The homogeneity of the raw materials charged is of enhanced importance, especially those of a non-metallic nature—*e.g.*, coke ash and limestone, the importance of which is usually neglected.

From the economic point of view, it should be pointed out that the plant requires a high-grade supervisory staff and not merely a man who can competently make up a top-hole. The plant is obviously much more expensive than an ordinary cupola and the installation of control instruments in greater degree than normal is an essential. Put simply, what are usually known as melting costs are higher than in an ordinary cupola.

Input and Output

Iron: Ruling out iron ore, which can only be charged into the cupola after special preparation on which tests are now being carried out, the cheapest raw material is small steel scrap.

Carbon: This can be charged as coke of any type or as good coke or with an addition of anthracite. Taking cognisance of the following factors:—blast temperature; quantity and quality of the fuel; and the quantity and composition of the slag, the carbon content can be controlled at will. It is possible to start-off with a charge of 100 per cent. steel and produce iron with 4 per cent of carbon. On the other hand, its also possible by altering the working conditions to produce low-carbon irons when initially charging high carbons.

Phosphorus: This can be introduced either as high phosphorus cast iron scrap or as phosphates—either natural or in the form of basic slag. It passes completely into the iron.

† This is the actual name given to the plant and not a translation.—EDITOR.

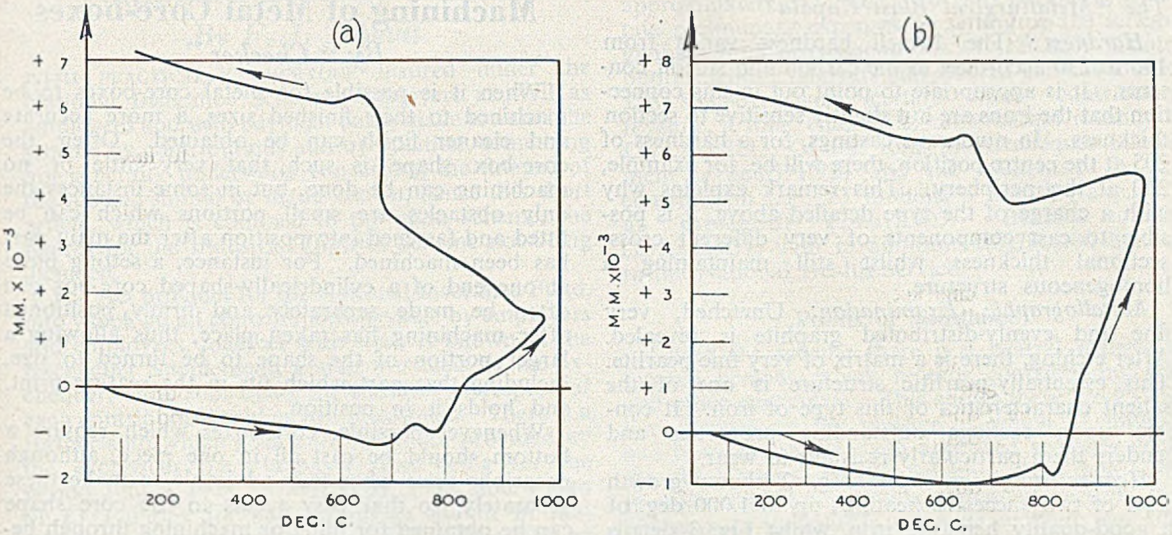


FIG. 2.—(*a*) *First Heating to* 1,000 *deg. C., Growth* 7×10^{-3}; (*b*) *Second Heating to* 1,000 *deg. C., Growth* 7.5×10^{-3}

Silicon: This is usually introduced as ferro-silicon. Sometimes, however, it is cheaper to add it as high-silicon iron scrap and to reduce the import of scrap steel.

Manganese: There is usually sufficient in the normal charge, but, if not, ferro-manganese is added.

Sulphur: Introduced from the fuel and the scrap charge, it can easily be removed by means of a suitable slag.

Gas: Using a charge of 170 Kilos (374 lb.) of coke per metric ton of ore, the production of gas is equal to 100 Kilos (220 lb.) of coke per ton.

Properties of the Iron Made

Having described the features of the metallurgical blast cupola and its outstanding differences from existing installations, attention is now turned to the irons made by the plant. It cannot be too strongly stressed that they are totally different from those made by the ordinary cupolas—be they hot or cold blast. The "life" of the iron is better for any given temperature or composition. Three examples are cited below of the irons made. They are by no means exhaustive.

Iron for Spun Pipes: In normal cupola practice it is impossible to add steel to the charge if the annealing of the pipes is to be eliminated. Moreover, it is difficult to use less than 60 per cent. of pig-iron The metallurgical blast cupola for the production of the same class of iron uses for the charge only steel and iron scrap.

High-strength Cast Iron: Such irons are usually made from charges of the following type:—

Coke, 15 to 17 per cent.
Limestone, 5 to 8 per cent.
Fe-Si (10 per cent.), 15 to 20 per cent.
Steel scrap, 80 to 85 per cent.

The chemical composition is of the following order:—C, 2.8 to 3.2; Si, 1.8 to 2.3; Mn, 0.5 to 0.8; S, 0.05 to 0.08; and P, 0.05 to 0.10 per cent.

Mechanical Properties: Shear strength 30 to 40 kilos.

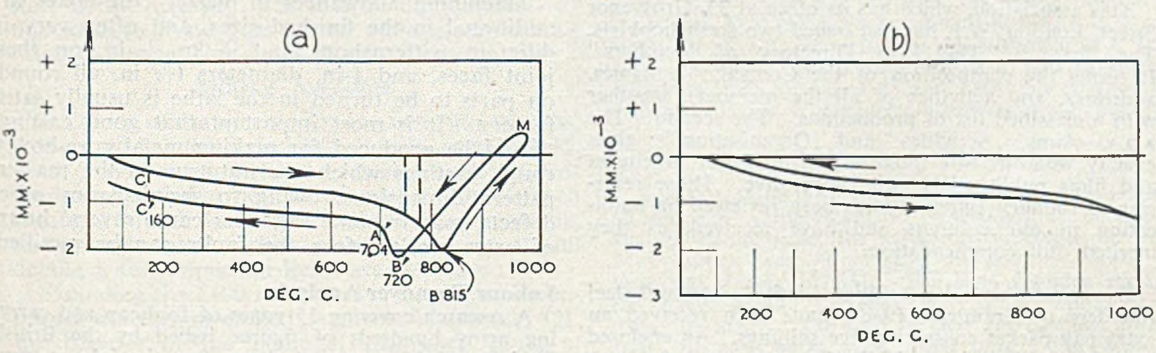


FIG. 3.—(*a*) *First Heating to* 1,000 *deg. C., Slight Contraction of* 0.5×10^{-3}; (*b*) *Second Heating to* 1,000 *deg. C., No Permanent Growth.*

The "Metallurgical Blast Cupola"

Hardness: The Brinell hardness varies from 190 to 250 according to the carbon and silicon contents. It is appropriate to point out in this connection that the irons are but slightly sensitive to section thickness. In numerous castings, for a hardness of 205 at the centre position, there will be, for example, 200 at the periphery. This remark explains why with a charge of the type detailed above, it is possible to cast components of very different cross-sectional thickness whilst still maintaining a homogeneous structure.

Metallographic Examination: Unetched, very fine and evenly-distributed graphite is revealed. After etching, there is a matrix of very fine pearlite. This essentially-pearlitic structure is one of the salient characteristics of this type of iron. It confers upon castings outstanding properties and renders them particularly resistant to wear.

Heat-resisting cast iron: Fig. 2 shows growth tests of two succesive heatings up to 1,000 deg. of a good-quality hematite iron, whilst Fig. 3 details the results from an iron made in the new cupola similarly treated. The special iron was made from 100 per cent. steel scrap and ferro-silicon, with 0.8 per cent. of chromium added in the ladle. This iron can be used satisfactorily at temperatures up to 800 deg. C.

Conclusion

What has been printed should help materially the understanding of the metallurgical blast cupola. By setting out a few results given by the products of the system, it is clearly shown that it functions quite differently from the traditional cupola, and that interesting potentialities are disclosed. It marks perhaps a turning point in the history of the iron foundry. Up to now, with certain exceptions, the ironfounder was a man who was pre-eminently specialised in the filling of moulds with a liquid metal which he had bought in the solid state and which he was content just to melt. The metallurgical blast cupola now allows the founder to "blend" his metal himself. It will be necessary for him to plumb the depths of metallurgical knowledge and thereby record one step further along the path of progress.

Aluminium Development Association

This association, which has its office at 33, Grosvenor Street, London, W.1, has just issued two fresh booklets. The first is "The A.D.A. Directory of Members." It prints the composition of the Council, the names, addresses, and activities of all the members, together with a classified list of productions. The second "The A.D.A.—Aims, Activities and Organisation" gives exactly what its title indicates. The list of brochures and films published is quite impressive. Those referring to foundry activities have been reviewed on publication in our columns and have received, as they merited, full commendation.

EMPLOYEES OF Lake & Elliot, Limited, iron and steel founders of Braintree, Essex, have each received an extra pay packet containing five shillings. An enclosed note from the directors of the firm expressed the hope that the money would be used to toast the health of the new princess.

Machining of Metal Core-boxes

By "Checker"

When it is possible for metal core-boxes to be machined to their finished sizes, a more accurate and cleaner finish can be obtained. Often, the core-box shape is such that very little or no machining can be done, but in some instances the only obstacles are small portions which can be fitted and fastened into position after the main part has been machined. For instance, a setting piece at one end of a cylindrically-shaped core-box can often be made separately and firmly positioned after machining has taken place, thus allowing a larger portion of the shape to be turned to size, including that part which fits in the seating print, and holds it in position.

Whenever possible, core-boxes which require a bottom should be cast all in one piece, although occasions arise when it is advisable to make these separately, so that easy access to the core shape can be obtained for filing or machining through before the bottom is fixed in position. When bottoms are made separately, they should always be dowelled through their base into the main body of the core-box. This gives extra support, overcomes any risk of movement between the core-box parts while being used in the core-shop and, in addition, assures that correct location can always be made if the core-box is at any time dismantled for alteration or repair.

Uniform Depth

It is always better to make metal core-boxes of a uniform depth from their joint face, or box top. This can be accomplished with some core-boxes, which vary considerably in size from one end to the other by incorporating in the master core-box either suitable ribs or legs, which are deep enough to allow the core-box to stand level. In many cases it will be only necessary for these extensions to be placed on one end. When the bottoms of metal core-boxes are made in this manner, any machining operations required can be more easily accomplished, as no packing will be required on the back face when setting up on machines, and, of course, in many cases core-boxes are much easier for the core-maker to use when they stand firm and level.

Machining allowances in master core-boxes are additional to the finished sizes, and often vary in different patternshops, but $\frac{1}{32}$ to $\frac{1}{16}$ in. on their joint faces, and $\frac{1}{8}$-in. diameters ($\frac{1}{16}$ in. all round) on parts to be turned in the lathe is usually satisfactory. It is most important that good castings should be produced for making metal core-boxes; rough castings which are not true to the master-pattern dimensions, owing to shrinkage or other defects, may in some instances cause several hours of extra work before the faults can be rectified.

Labour Turnover Analysis

A research covering 15 pages of foolscap and carrying many hundreds of figures issued by the British Institute of Management shows that the labour turnover rate decreases as the size of the establishment increases. Now, what are they going to do about it?

National Insurance Scheme

By F. J. Tebbutt

WITH PRACTICALLY EVERYONE insured under the National Insurance Scheme, employers as well as employees and with payment being made towards the scheme by contributions and by taxation, something not generally understood concerning the finance of the scheme should be made known, hence this short article, which is confined to the main scheme, the figures for the Industrial Injuries Scheme not being included.

The Act provides for the National Insurance Fund, into which go all contributions payable by employers and employees, together with what is known as the Exchequer Supplement, a sum provided by the exchequer, such sum being an addition in respect of each contribution paid as just mentioned. There is a further sum which goes into this fund, provided by the exchequer (*i.e.*, taxpayer) this being for the period July 5, 1948, to March 31, 1949, and a sum of £3 millions for each complete month in that period. For the next six years, £40 million will be provided for the first year, which sum will be increased each subsequent year by £4 millions, thus for the second year £44 millions, for the third £48 millions and so on. Out of this fund is paid all the benefits and certain other expenses, as for example, contributions to the National Health Service and administrative charges.

To show the make-up of the contribution, take that paid by adult men; the employee's share is 4s. 7d., the employer's share 3s. 10d., the exchequer's 2s. 1d., so that the total contribution revenue for each adult male employee is 10s. 6d. The shares for other classes of contributors are similarly divided, but of course are different, being according to the contribution rates of the different classes. It might be useful to note that the amount handed to the National Health Service is based on the contributions paid, a proportion of the full contribution applying, being 10d. for each adult man and 8d. for each woman.

There is also another fund called the National Insurance (Reserve) fund, which embraces the assets of the old Health Insurance, Unemployment Insurance, and Contributory Pensions Schemes. But £100 millions of those assets were carried to the National Insurance Fund as working capital at the start of the scheme. The interest on the assets of this Reserve Fund goes to the National Insurance Fund as above.

Official Accounts

Accounts of the scheme for the first nine months, that is covering the period July 5, 1948, to March 31, 1949, have recently been published; subsequent accounts will cover periods of twelve months, each ending at March 31. These accounts are interesting, and though space forbids publication here of full details, a few important items are as follow:—

Excluding the £100 millions working capital mentioned, the receipts exceed payments by £95,423, 851, the balance of the National Insurance Fund at March 31, 1949, plus the £100 millions thus being £195,423,851. The cost of administration was approximately £17,750,000 for this period, plus certain preliminary expenses on setting up the scheme, giving a total provisionally of £19,120,850. Contributions from employers and insured persons totalled £285,833,807, with certain other contribution revenue, a total entered as contribution revenue of £379,243,721. Of this total the Exchequer Supplement is £66,571,924 and the exchequer flat-rate contribution (*i.e.*, £3 millions a month (taxpayers) as explained) £26,612,903. Benefits totalled £257,222,057, with in addition £27,790,400 handed to the National Health Service.

Points of Substance

Under the scheme there is a central register of insured persons which records contributions paid and other particulars. This shows there are 25 million persons on the register of which 21 millions had been insured through approved societies under the old National Health Scheme. It is interesting to note that the accounts statement records that 221 persons voluntarily surrendered their pensions, total amount £7,532 14s. 4d., for varying periods as a contribution towards the national emergency.

The National Insurance (Reserve) fund, as explained earlier, was set up to receive the capital assets of the Health, Pensions, and Unemployment Schemes, transferred as at July 5, 1948. Before this date the investments held to cover the assets amounted to £897,895,957. But on transfer to the reserve fund these were revalued (as at July 5, 1948) at current prices, which gave £885,027,985. The balance of the reserve fund at March 31, 1949, was £786,234,934, this being the balance after taking into account the transfer of the £100 millions to the National Insurance Fund.

Steel Nationalisation

Nationalisation of the iron and steel industry is to become a reality if the Labour Party remains in power. In the party's policy statement, published last week under the title of "Labour and the New Society," it is made clear that the Socialists have every intention of putting into effect the legislation already passed to make iron and steel a public enterprise. Other industries which were earmarked for State intervention in the party's election manifesto are not mentioned in the latest statement.

Economic independence by 1952 is one of the party's aims. A world plan is proposed for mutual assistance to succeed Marshall aid when it ends in 1952. In broad terms the plan provides for the establishment of a technical service to take knowledge, skill, and experience wherever they are needed, and assist in solving the social and industrial problems of undeveloped countries.

Latest Foundry Statistics

The July Bulletin of the British and Steel Federation shows that employment in ironfoundries decreased slightly during June; the reduction, as compared with May figures, was 78, making the total 146,900. A year ago it was 147,061. The steel foundry showed the much greater decrease of 130, of whom there were 109 males. The melt of steel for castings during June averaged each week 8,600 tons. For May it was 8,500, and June, 1949, 7,900 tons.

Allied Apprentice School Opened

The lack of apprentices in the foundries has been a question which has long worried foundry managements in the Falkirk area, where the light iron castings industry has been centred for the past two centuries. Young lads were just not wanting to work in the foundries or learn the moulding trade, principally because parents had the idea that they were working under unattractive conditions. Great improvements, however, have been introduced by the founders, among whom are Allied Ironfounders Company, Limited, of Falkirk, with six out of their 22 member firms in the Falkirk area.

On August 16 they opened an apprentice training centre at their Castlelaurie works, Bankside, Falkirk. This is the first of its kind to be opened in the district and the first in the light-castings industry in Scotland. The aim of this centre is to give moulding apprentices a thorough training in in their craft and to attract boys to the trade by providing for them the best possible conditions of work and a chance to make the most of their abilities. The boys who have enrolled in the course will complete their apprenticeship in Allied Ironfounders' six foundries.

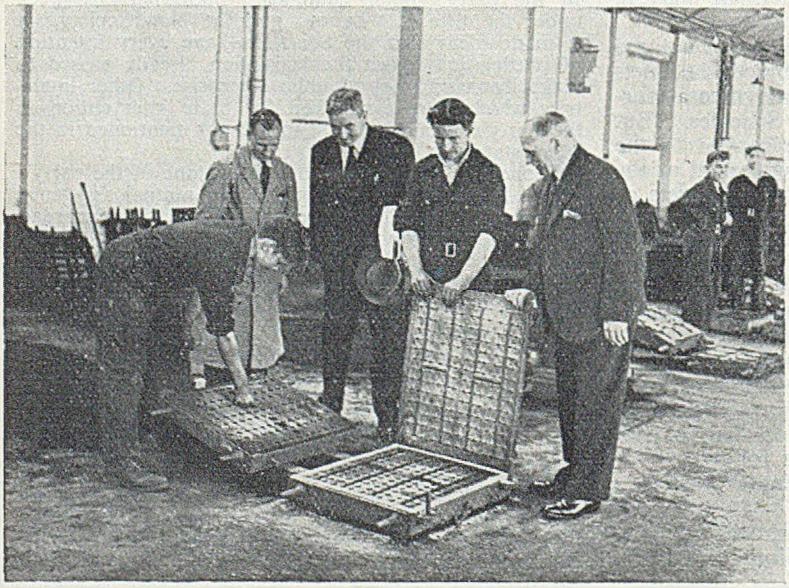
The centre at Castlelaurie covers 6,000 sq. ft. and is clean, airy, well lighted and heated and suitably adapted for the purpose. The scheme was originally arranged to accommodate 10 apprentices but the response has been so good that numbers have been increased to twelve, and there is a waiting list for another class to be started next January. The boys wear overalls provided by the firm and at the end of the day after a visit to the showers leave clean and well dressed.

Instruction is of course mainly of actual moulding-floor practice, but lectures are given by members of the Allied staff in various technical subjects, first aid, organisation of the industry and other subjects. Films and film strips on moulding practice and other subjects are shown once weekly. Two classes of boys are catered for, those who wish to pass as quickly as possible to mass-production work such as plate moulding (one-year course), and those who wish to have a thorough all-round training in all branches of the craft (two years). At the conclusion of the five years apprenticeship, each boy is given a certificate with details of his experiences.

One advantage of this type of training is that it forms an introductory system and the boy fresh from school is not flung at once into the strange and possibly rather rough conditions of the average moulding shop.

The centre was formally inaugurated by Provost Andrew Wallace of Falkirk. He expressed his pleasure in the project and particularly at the way it was being developed by Allied Ironfounders. His previous conception of the training of the moulders had not envisaged a scheme like this, which he said, was ideal for training young people and he congratulated the Allied concern on their foresight. To the apprentices present at the ceremony he emphasised the importance of attending evening class seriously. Among those present were Mr. George McLaren, O.B.E., convener of the County of Stirlingshire (himself a trained and practical moulder); Mr. Wm. Ure, divisional organiser of the Amalgamated Union of Foundry Workers; Miss Brand, H.M. Inspector of Factories; F. F. McFadzean, secretary of the National Light Castings Federation. Among the directors of Allied Ironfounders were Mr. W. H. Smith, deputy managing director of the group, and Mr. R. L. Hunter, director and general manager, M. Cockburn & Company, Limited, one of the Allied foundries.

The apprentices are trained by Mr. John Conry who is a skilled moulder and who takes a great interest in the training of the youths. Mr. N. Erskine, manager of the Castlelaurie works, in a supervisory capacity, contributed much to the success of the scheme.



Boys at Work in the Falkirk Apprentice Foundry School. Mr. R. L. Hunter, Managing Director, Gowanbank Foundry of M. Cockburn & Company, Limited, is in the centre of the photograph. On the right is Provost Wallace, and on the left (with overcoat) is Mr. J. Conry, instructor.

Steel Consumption Analysis

Distribution Figures of Various Industries

THE MECHANICAL ENGINEERING, building, and motor-car industries are together responsible for nearly half of finished steel deliveries in Britain. This is brought out in an analysis of estimated steel consumption industry by industry published by the British Iron and Steel Federation in its monthly statistical bulletin.

Another illuminating point brought out in the federation's analysis is that *per capita* consumption of steel in Britain is nearly double that for 1924.

For the purpose of forward planning, some idea of the distribution of steel by consuming industry is indispensable. Without at least a rough idea of the relative importance of two industries as steel consumers it is of little use to know that the one is expected to expand and the other to contract. But once the industrial distribution of steel is known, it is possible, for example, to say that a cut of 10 per cent. in building and construction would reduce total home requirements of steel by 1 to 1½ per cent.; or that a 20 per cent. reduction in shipbuilding and marine engineering could be more than offset by a 10 per cent. increase in mechanical engineering.

TABLE I.—*Estimated Finished Steel Deliveries by Industry*, 1949.

Industry.	Thous. tons.	Per cent.
Shipbuilding and marine engineering ..	925	9.0
Building and constructional engineering..	1,350	13.1
Mechanical engineering	2,340	22.8
Electrical engineering	565	5.5
Motors, cycles, aircraft	1,045	10.2
Railways and rolling stock	850	8.3
Collieries	555	5.4
Hardware, hollow-ware, etc.	980	9.5
Rivets, bolts, nuts, springs, etc.	500	4.9
Wire and wire manufactures	685	6.7
Other..	475	4.6
TOTAL	10,270	100.0

Table I, giving estimates of deliveries to broad industrial groups in 1949, brings out the paramount importance of the mechanical-engineering industry as a steel consumer and shows that this industry, the building group and the motor group were together responsible for almost half of last year's finished steel deliveries. It also suggests that the various industries differ considerably in their steel requirements per unit of output or per worker employed.

To quote an extreme example, the traditional small house, which absorbs less than half a ton of steel, requires about 2,600 man-hours for its construction, whereas a small car, which may absorb two to three times as much steel, requires a total of perhaps 600 man-hours. A Government attempt to maintain employment by a housebuilding programme would thus have little effect on the demand for steel. On the other hand, an increase in exports of vehicles would have considerable repercussions on the steel industry. For example, a steamship of 10,500 tons dw. requires 3,000 tons of steel, a main-line locomotive 75 tons, a railway carriage 20 tons, a railway wagon 7 tons, a double-decker bus 6½ tons, an aeroplane 4 tons, and a 10-h.p. motor-car 1 ton.

British usage of steel per head of the population is nearly twice the Western European average, but it is still only half the U.S. figure. The American motor industry accounted for about one-quarter of total U.S. steel consumption last year, as compared with about one-tenth in this country. The oil and natural gas industries also figure as important users in the U.S.A., but have hitherto been of small importance here. On the other hand, mechanical engineering is relatively much more important in Britain, while shipbuilding and marine engineering account for 9 per cent. of the total here, as against only 2 per cent. in the U.S.A. Building and constructional engineering take a similar share in both countries.

A rough idea of the relative importance of the principal American consuming industries as compared with their British counterparts may be gleaned from the following percentage figures:—

	USA	UK
Motors, cycles, and aircraft	27	10
Mechanical and electrical engineering	17	27
Oil and gas	11	3
Building and constructional engineering ..	13	12
Railways and rolling stock	9	8
Shipbuilding and marine engineering	2	9
Other industries	21	31
TOTAL	100	100

Looking at the figures in Table II, it is apparent that the past quarter of a century has witnessed a striking advance in steel consumption in this country. A small part of the increase is, of course, attributable to the growth of the population, but in the main the figures reflect the steadily increasing dependence of the national economy upon the products of the steel-using industries. Apparent consumption per head of the population rose from about 326 lb. (ingot equivalent) in 1924 to 353 lb. in 1930 and to 309 lb. in 1935. Last year's figure—642 lb. per head—is almost double that for 1924.

TABLE II.—*Estimated Distribution of Finished Steel by Industry.* (*Thousand tons*)

	1924.	1930.	1935.	1937.	1949.	Per cent. increase 1949 on 1935.
Shipbuilding and marine engineering ..	925	880	540	840	925	71
Building and constructional engineering..	670	920	1,375	1,725	1,350	—
Mechanical engineering	780	820	880	1,180	2,340	166
Electrical engineering	100	120	180	235	565	214
Motors, cycles, aircraft	187	275	450	575	1,045	132
Railways and rolling stock	600	565	610	760	850	39
Collieries	200	250	330	360	555	68
Hardware, hollow-ware, etc.	350	500	685	790	980	43
Rivets, bolts, nuts, springs, etc. ..	400	450	510	630	500	—
Wire and wire manufactures	300	300	400	500	685	71
Other	363	395	540	685	475	—
TOTAL	4,875	5,475	6,500	8,280	10,270	58

News in Brief

AGA HEAT, LIMITED, propose extending their foundry premises at Mafeking Road, Smethwick.

THE PRICE of tungsten ore now ranges from 175s. to 185s. nominal, per unit, c.i.f., against 170s. to 180s. previously.

THE LARGEST VESSEL ever to be built at the Neptune yard, Walker-on-Tyne, of Swan, Hunter & Wigham Richardson, Limited, has been launched. She is the 16,000-ton French liner Provence.

CELEBATING ITS CENTENARY this year is the Cradley Heath (Staffs) firm of David Willetts, Limited, chain, rivet, nut, anchor manufacturers, etc. The firm was formed into a limited company in 1902.

FIRE BROKE OUT last week in the pattern store at Dougal's Foundry, Bathgate, in the early hours of the morning. Local firemen were quickly on the scene and prevented the flames from spreading. Damage is estimated at £1,000. The outbreak is thought to have been caused by a spark from a converter stack.

AT THE S.B.A.C. flying display and exhibition at Farnborough, September 5 to 10, the stand of Renfrew Foundries, Limited, will feature sand and die castings for aero engines and airframes in "Alminal" aluminium alloys. Information regarding the application of aluminium-alloy castings will also be displayed.

BRITISH OILFIELD EQUIPMENT, COMPANY, LIMITED, of London and Leeds (known as B.O.F.E.C.) recently disclosed that they have been granted by Cameron Ironworks Inc., of Houston, Texas, a sole licence to produce in England a range of their world-famous Cameron products for marketing in the sterling areas, and that contracts worth £1 million per year are involved in the agreement. B.O.F.E.C. have a number of associates, including J. & H. McLaren, Limited, Diesel-engine manufacturers, of Hunslet, Leeds, which will participate in this latest drive for additional world trade and increased dollar earnings for this country.

INTERNATIONAL BUSINESS MACHINES WORLD CORPORATION, the biggest organisation of their kind in the world, have decided to acquire a factory in the Kip Valley, near Greenock, to employ ultimately 3,000 people. Mr. James G. Johnston, vice-president of the firm, completed negotiations last week with Greenock Corporation, Renfrew County Council, and Ardgowan Estates, Limited, who are owners of the land. The firm have acquired 110 acres, but only 30 acres are required for industrial development. The remainder will provide recreational facilities for employees, including a golf course. The factory will employ mainly male workers who will be recruited locally. This firm supplied all the mechanical equipment for the conference room and offices during the meetings of U.N.O.—electric typewriters, accountancy machines, portable radio sets, and recording and broadcasting apparatus.

LEYLAND MOTORS LIMITED of Leyland, Lancs, have just carried through a reorganisation in the administration to relieve Mr. H. Spurrier of some of the responsibilities attendant on his dual capacity of managing director and general manager, it has been decided that he should relinquish the position of general manager; the responsibility of this position will jointly be undertaken by two directors, Mr. W. West and Mr. S. Markland. Mr. West has taken charge of sales, service, overseas organisations, foundries and laboratories; Mr. Markland controls production, including works engineering, buying and inspection. Engineering and design are now under the control of Mr. Norman Tattersall, formerly chief designer, who has been appointed acting chief engineer. Policy for design and development is in the hands of a design committee, whose permanent members are Mr. Spurrier and the joint general managers.

A.D.A. Educational Service

For several years the Aluminium Development Association has been laying the foundation of a comprehensive educational service for technical colleges, secondary schools and industrial training establishments. In addition, facilities have been provided to assist the educational work of professional societies.

The rapid development of the aluminium industry has outpaced the supply of educational material, and it was to meet this deficiency that a special department of the Association was established. To cope with the growing demands on the services provided, the Association is now further expanding the scope of its educational activities. As an example, the services supplied during 1949 included many lectures by members of the Association's staff, film shows to more than 15,000 students, and the supply of technical literature and specimens for the use of teachers in hundreds of schools. In numerous instances direct help was given to teachers and instructors up and down the country. This has enabled visual and other teaching aids to be devised in the light of direct experience of the needs of teachers at the present time.

The recent publication of the first of a series of wall charts, together with teachers' notes, marks the beginning of this new phase of activity. The chart and notes are supplied with a box of specimens, which includes raw materials and samples of aluminium alloys as supplied to industry. It is left with the teacher to make use of the complete teaching unit in the manner best suited to his students. Future development of the scheme involves the publication of special educational publications, further wall charts, film strips, and the expansion of the film lending library now firmly established. Special exhibits are available on temporary loan to technical colleges and, where required, arrangements can be made for a discussion on the problems of giving instruction in aluminium technology.

At present, educational aids on this scale can only be made direct to schools and colleges on the application of principals or heads of departments. They are supplied free of cost or other obligation by the Aluminium Development Association from 33, Grosvenor Street, London, W.1.

Obituary

MR. W. J. TRAVIS, chairman of the Baker Blower Engineering Company, Limited, Stanley Street, Sheffield, 3, died on August 15 at the age of 83.

MR. THOMAS BELCHER, representative for the Union Steel & Manufacturing Company, Limited, Wolverhampton, died on August 17 at the age of 60.

SIR ARTHUR YOUNG, Bt., M.P. for the Scotstoun Division of Glasgow, whose death was reported last week, was a director of the Glasgow Royal Technical College.

MR. ALFRED EWING, managing director of Sanderson Bros. & Newboulds, Limited, tool manufacturers, etc., of Newhall Road, Sheffield, since 1933, died on August 18 after an operation at the age of 68. He was also chairman and managing director of the Climax Rock Drill & Engineering Works, Limited, Broad Street, London, E.C.1; chairman of John Kenyon & Company (Sheffield 1930), Limited, saw and edge-tool manufacturers; and proprietor of Alfred Ewing & Company, mining machinery engineers, of Broad Street, London.

Mr. Ewing also served on the board of several other companies, including Robey & Company, Limited, engineers and boilermakers, of Lincoln, and Sandycroft, Limited, mining machinery manufacturers, of Broad Street, London.

Personal

MR. H. L. RICHARDSON is now secretary to the Climax Molybdenum Company of Europe, Limited. He succeeds MR. G. F. ANDERSON, who, owing to increased activities in other directions, has resigned.

SIR HENRY LEWIS GUY, F.R.S., has decided, because of ill health, to relinquish his appointment as secretary of the Institution of Mechanical Engineers at the end of this year. Sir Henry, who is 63, was appointed secretary in 1942.

MR. JOSEPH GRIFFIN WALKER is resigning as a director of Walker Bros., Limited, constructional engineers, etc., of Walsall, after 64 years' service on the board. Mr. Walker, who is 80, is a past-president of the Birmingham Mechanical Engineering Association.

MR. PERCY JACKSON, manager of the research and development department of William Doxford & Sons, Limited, shipbuilders, of Sunderland, has been re-elected chairman of the research commitee of the British Internal Combustion Engine Research Association.

MR. A. MACLENNAN, late works chemist of Jas. Dougall & Sons, Limited, manufacturers of refractories, of Bonnybridge (Stirlingshire), has taken up an appointment as manager and technical chemist with A. L. Curtis & Company, manufacturers of refractory material, etc., of Chatteris (Cambs).

MR. F. FARENDEN (Eyre Smelting Company, Limited), DR. E. SCHEUER (International Alloys, Limited), and MR. R. JONES (High Duty Alloys, Limited) are the United Kingdom representatives on the O.E.E.C. mission of experts which, as reported in our last issue, has gone to the United States to study the recovery and use of secondary aluminium.

The late Dr. Herman Shaw's successor as Director of the Science Museum is to be DR. F. SHERWOOD TAYLOR, whose appointment—the recommendation of the Civil Service Commission—is announced by Mr. George Tomlinson, Minister of Education. Dr. Taylor, who is 52, is Curator of the Museum of the History of Science at Oxford. He was Assistant Lecturer in Organic Chemistry at Queen Mary College, London, from 1933 to 1938. He is to take up his new appointment on October 1.

Recent Shipbuilding Orders

Among recent shipbuilding orders received are the following:—

JOHN READHEAD & SONS, LIMITED, South Shields—After having suffered empty yards since last May the firm has recently acquired orders for five cargo ships estimated to be worth over £2,000,000. Two of the vessels will each be of 10,450 dw., and are for the Harrison Line (T. & J. Harrison, managers). The other ships, one of which has been ordered by the Stag Line, Limited (Joseph Robinson & Sons), will each be of 8,000 tons dw. Two of the smaller vessels will be engined by the North Eastern Marine Engineering Company (1938), Limited, and the remainder will be fitted with engines by the builders.

WILLIAM GRAY & COMPANY, LIMITED, West Hartlepool—Constants (South Wales), Limited, Cardiff, has ordered two single-deck colliers, each of 4,500 tons dw. The Central Marine Engine Works will supply the propelling machinery. Uruguayan owners have ordered a 8,900-ton cargo vessel.

TURBO-ALTERNATORS worth £1,000,000 are to be supplied to Canada by C. A. Parsons & Company, Limited, Newcastle-upon-Tyne.

House Organs

F.B.I. Review, No. 4, July, 1950. Issued by the Federation of British Industries, 21, Tothill Street, London, S.W.1.

This magazine, apart from being nicely "groomed," contains a wealth of really interesting articles. Mr. John H. Lord, a director of the Dunlop Rubber Company, shows how the present fiscal policy is leading the country to disaster. The author rightly states that three of the main essentials for industrial progress, hard work, thrift and enterprise are now being penalised rather than stimulated under the existing burden of taxation. Each of these is examined in some detail and the existing financial policy of the Government is shown to lack proper vision. "Research and Its Application" is an article based on a F.B.I. Report and could usefully be an addendum to Mr. Lord's as much the same conclusions are reached:—The present high cost of development is because of the ridiculous level of taxation impeding progress. There are a number of other high-grade articles including the reports of a number of productivity teams.

Carron Cupola, Vol. 1, No. 3, July. Issued by the Carron Company, Falkirk.

The Editor has given, in as much non-technical language as he could find, a description of Mungal foundry, with its mechanised moulding plant. He, like most laymen, gets a little muddled between "mould" and "casting." Yet it is factual that he has made a good job of his difficult task. It is interesting to note that a second mechanised plant is to be installed immediately. The article on a South African plant for making *inter alia* bath tubs, is particularly interesting. The teething troubles encountered are honestly dealt with and the reorganisation plans disclosed. The reviewer looks forward with interest to further articles on the development of this interesting plant. Moulding machines, not Sandslingers, have been tried out. The "Carron Cupola" can be placed amongst the most interesting of foundry magazines reaching us.

"600," Vol. 24, No. 111. Published by George Cohen, Sons & Company, Limited, Cunard Works, Chase Road, London, N.W.10.

One of the drawbacks of present-day conditions is the high cost of French wines, and reading Mr. F. W. Rowe's article on claret left the reviewer with memories of those halcyon days when a vin ordinaire cost little more than a bottle of Bass. A daily consumption of the cheap "wet" Bordeaux wines is not a bad apprenticeship for a fuller appreciation of the vintage wines. A very sweet, yet excellent wine from Chile is now available at a post-war reasonable price and it has both Mr. Rowe's and the reviewer's approbation. However, this not a place for a dissertation on an interesting topic, but it is sufficient to affirm that this issue of "600" is a vintage one with "fruity" as the most suitable adjective.

Tandem News, July. Issued by the Eyre Smelting Company, Limited, Merton Abbey, London, S.W.19.

The reviewer learnt from this issue that the company operates a factory in India and has done so for the last twenty years. It is located at 5, Hide Road, Kidderpore, Calcutta. An interesting authenticated article shows how by the fitting of an automatic lubricator to an overhead crane a worthwhile saving in oil consumption was realised. This was of the order of 9½ gallons weekly, or 86.5 per cent.

There is an announcement that the ingots which the firm markets are to be made in new shape and of a lower weight—16 instead of 24 lb.

Imports and Exports of Iron and Steel

Board of Trade Returns for July

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in July. Figures for the same month in 1949 are given for purposes of comparison; respective totals for the first seven months of this year and of 1949 are also included.

Total Exports of Iron and Steel.

Destination.	Month ended July 31.		Seven months ended July 31.	
	1949.	1950.	1949.	1950.
	Tons.	Tons.	Tons.	Tons.
Channel Islands ..	917	762	6,920	4,828
Gibraltar	134	116	1,143	958
Malta and Gozo ..	429	154	2,837	2,801
Cyprus	559	1,028	2,642	5,452
British West Africa ..	7,628	6,069	49,833	54,753
Union of South Africa	16,020	14,042	97,369	100,793
Northern Rhodesia ..	2,826	2,603	11,197	17,893
Southern Rhodesia ..	8,210	8,268	30,749	46,636
British East Africa ..	9,142	7,361	48,209	58,166
Mauritius	485	631	3,784	5,463
Bahrein, Koweit, Qatar and Trucial Oman..	1,493	828	14,872	4,603
India	10,511	15,422	51,452	60,822
Pakistan	5,782	10,970	23,670	60,185
Malaya	4,281	4,621	33,048	47,559
Ceylon	3,441	3,518	12,953	22,586
North Borneo ..	436	326	7,932	3,971
Sarawak	9	60	975	723
Hongkong	1,647	3,522	21,418	28,885
Australia	17,264	42,617	83,951	205,532
New Zealand	9,355	12,834	61,524	103,556
Canada	7,700	24,482	44,193	101,307
British West Indies ..	3,670	4,411	37,173	37,761
British Guiana ..	420	485	2,332	4,637
Anglo-Egyptian Sudan	1,382	935	8,026	10,620
Other Commonwealth countries	572	1,252	6,710	7,109
Irish Republic ..	4,898	7,377	39,076	54,113
Russia	41	29	8,624	513
Finland	7,689	7,240	42,574	38,871
Sweden	6,148	4,813	34,830	51,964
Norway	5,025	6,875	42,124	52,234
Iceland	865	621	4,894	2,994
Denmark	8,004	8,039	55,598	78,597
Poland	182	70	766	1,092
Germany	11	261	422	462
Netherlands	10,167	5,277	69,981	46,666
Belgium	921	929	7,117	7,860
Luxemburg	769	—	3,626	372
France..	2,263	2,115	18,730	14,870
Switzerland	699	721	8,156	7,029
Portugal	1,552	1,451	11,279	12,208
Spain	480	739	6,616	5,127
Italy	298	1,083	1,825	6,089
Hungary	254	65	701	321
Greece	416	451	3,504	3,547
Turkey	3,763	553	10,682	5,789
Indonesia*	2,407	471	17,184	8,588
Netherlands Antilles..	744	413	4,556	5,217
Belgian Congo ..	258	62	1,023	929
Angola	1,094	176	5,338	1,629
Portuguese East Africa	326	251	2,660	2,963
Canary Islands ..	145	222	2,105	1,233
Syria	78	26	881	593
Lebanon	1,637	693	21,433	6,668
Israel	1,718	3,005	10,743	12,968
Egypt	7,289	2,979	36,427	37,741
Morocco	9	7	593	1,579
Saudi Arabia	80	32	2,546	1,764
Iraq	5,099	2,098	35,281	23,208
Iran	14,499	10,347	83,444	68,695
Burma..	706	1,297	6,166	6,920
Thailand	430	633	2,469	3,770
China	120	23	2,445	1,961
Philippine Islands ..	52	810	2,254	6,888
USA	174	2,460	2,196	12,942
Cuba	85	324	295	1,134
Colombia	572	632	3,452	4,009
Venezuela	3,209	4,226	36,889	23,096
Ecuador	220	205	2,293	2,229
Peru	645	1,648	3,765	7,644
Chile	513	1,063	3,868	11,167
Brazil	1,477	4,401	10,496	19,676
Uruguay	625	732	5,607	5,467
Argentina	4,511	6,383	27,033	40,094
Other foreign countries	863	7,315	6,950	20,012
TOTAL	219,273	268,966	1,376,489	1,729,101

* Includes Netherlands New Guinea in 1949.

Total Imports of Iron and Steel.

From	Month ended July 31.		Seven months ended July 31.	
	1949.	1950.	1949.	1950.
	Tons.	Tons.	Tons.	Tons.
Australia	63	13	8,059	33
Canada	4,957	1,992	38,530	24,023
Other Commonwealth countries and Irish Republic	3,788	58	11,314	23,813
Sweden	973	885	10,667	7,041
Norway	2,070	5,169	19,859	29,781
Germany	3,949	7,748	8,702	54,949
Netherlands	8,113	2,361	61,875	35,413
Belgium	31,967	17,395	261,527	68,226
Luxemburg	18,464	5,953	124,304	30,347
France	20,729	29,295	125,815	169,271
Austria	4,576	198	30,315	2,485
USA	42,578	6,145	142,582	41,932
Other foreign countries	154	949	2,047	5,028
TOTAL	142,381	78,161	845,596	492,342
Iron ore and concentrates—				
Manganiferous ..	—	—	6,976	10,876
Other sorts ..	861,793	873,309	4,868,325	5,119,301
Iron and steel scrap and waste, fit only for the recovery of metal	428,167	227,266	1,226,701	1,442,072

Exports of Iron and Steel by Products.

Product.	Month ended July 31.		Seven months ended July 31.	
	1949.	1950.	1949.	1950.
	Tons.	Tons.	Tons.	Tons.
Pig-iron	842	2,280	2,873	15,331
Ferro-alloys, etc.—				
Ferro-tungsten ..	44	92	496	688
Spiegeleisen, ferro-manganese ..	938	145	4,420	1,241
All other descriptions	176	167	713	951
Ingots, blooms, billets and slabs	132	825	1,448	4,217
Iron bars and rods ..	459	154	3,756	2,641
Sheet and tinplate bars, wire rods ..	203	3,901	2,264	5,761
Bright steel bars ..	1,103	4,305	11,487	24,743
Other steel bars and rods	17,240	20,290	98,310	138,547
Special steel	1,270	1,019	8,320	8,526
Angles, shapes, and sections	11,217	13,101	69,322	85,508
Castings and forgings	910	515	4,867	4,894
Girders, beams, joists, and pillars	2,305	5,730	16,159	38,359
Hoop and strip ..	4,858	9,987	29,346	63,019
Iron plate	412	239	2,228	1,495
Tinplates	19,934	19,636	115,886	143,151
Tinned sheets ..	233	228	2,357	1,856
Terneplates, decor. tinplates	6	234	194	511
Other steel plate (min. $\frac{1}{8}$ in. thick) ..	21,511	33,112	130,040	188,828
Galvanised sheets ..	8,009	10,712	51,789	68,121
Black sheets	12,766	12,975	83,276	82,071
Other coated plates ..	846	999	4,427	6,976
Cast-iron pipes, up to 6-in. dia.	5,913	5,319	46,626	45,250
Do., over 6-in. dia. ..	6,926	6,317	46,857	48,906
Wrought-iron tubes ..	27,412	31,328	197,432	209,515
Railway material ..	23,658	31,619	118,942	180,401
Wire	5,375	6,932	29,974	42,871
Cable and rope ..	2,930	3,285	17,379	19,983
Netting, fencing, and mesh	1,779	1,123	12,679	9,902
Other wire manufactures	1,084	3,474	7,298	15,224
Nails, tacks, etc. ..	723	735	4,607	3,355
Rivets and washers ..	752	529	5,769	4,638
Wood screws	313	359	1,992	2,206
Bolts, nuts and metal screws	2,338	2,558	15,271	18,206
Stoves, grates, etc. (excl. gas)	822	1,084	5,727	6,452
Do., gas	259	202	1,497	1,523
Baths	748	1,388	5,575	8,446
Anchors, etc. ..	814	963	5,501	5,371
Chains, etc.	826	808	6,049	6,150
Springs	906	551	5,135	5,459
Hollow-ware	6,517	7,024	45,618	51,025
All other manufactures	23,758	22,772	152,583	156,583
TOTAL	219,273	268,966	1,376,489	1,729,101

Raw Material Markets

Iron and Steel

Production of pig-iron is rising, but has not yet reached the level of current requirements. Provision of ample supplies of basic iron for the melting shops is the first consideration, and this is the primary purpose of the big new blast furnaces now in course of construction. But the call for the usual range of foundry grades of pig-iron is also expanding and cannot at present be wholly satisfied. This deficiency is particularly noticeable in the case of low- and medium-phosphorus grades, and users are compelled at times to use hematite or refined iron as substitutes.

Makers of bar iron are fairly regularly employed, but forward commitments are not heavy and their ability to offer fairly early delivery is attractive to buyers, who foresee longer waiting periods for steel bars, etc.

The market for re-rolled products has undergone a complete transformation during the past few weeks. Continental makers have suddenly abandoned cut-throat prices; in fact, Belgian quotations for merchant bars are now on a par with British, and our own manufacturers are able to offer more favourable delivery dates. Hence a more active market for blooms, billets, and slabs has developed, and sheetmakers are taking up the full production of both prime sheet bars and defectives.

Non-ferrous Metals

The advance of £16 to £202 in the price of copper last week was short-lived, for only two days after the announcement the quotation was brought back to £186 once again. In the United States there was a partial move up to 24½ cents—the big producers remained at 22½ cents—and the Ministry of Supply, which apparently misjudged the situation, took alarm too soon. The Ministry may have feared a scramble for supplies here in face of the indication from New York that the producers' resistance to a rise had come to an end. To that extent the Ministry could hardly be blamed for what proved to be undue haste. In any case, it was not unreasonable to suppose that the big producers would fall into line speedily, for there has been an upward thrust in copper prices for a long time past. On the commodity market in New York, for example, 24.75 cents was asked at the end of last week for September copper.

Lead was raised by £8 to £112 early last week and may go higher yet before a halt is called to this revised trend in values. Zinc remained at 15 cents in the U.S. as to the producers' price, but 20 cents nominal was quoted on the futures markets. In the U.K. the quotation was unchanged at £127 10s. Scrap prices moved up sharply when the change in copper was announced, but consumers had not accustomed themselves to the revised levels for secondary copper and brass when the price of electro dropped back to £186. The situation is now confused and uncertain, being made worse by the fact that the duty on imported copper into the States has not been lifted. But little business in semis is believed to have passed during the two days that copper stood at £202.

To crown the events of an exciting week in non-ferrous metals, the Ministry announced last Saturday drastic increases in the premiums charged for forward purchases. The official statement said that, with ample stocks of copper, lead, and zinc available, it was essential that excessive forward purchases should be discouraged. The increases for all forward positions in copper and zinc are £12 per ton and in lead £6. This means that for delivery two and three months after the month of purchase copper will carry a premium of £13 10s., and zinc of £13. For the next three months copper will be surcharged by £15 and zinc by £14. In lead the corresponding figures will be £7 and £8 per ton. What effect this will have on trading in non-ferrous semis it is as yet too early to say, but obviously forward buying is discouraged to the point of extinction.

Metal Exchange official tin quotations were as follow:

Cash—Thursday, £800 to £802; Friday, £809 to £811; Monday, £795 to £805; Tuesday, £805 to £810.

Three Months—Thursday, £800 to £802; Friday, £809 to £811: Monday, £790 to £792; Tuesday, £795 to £800.

Book Reviews

The Extraction of Non-ferrous Metals. By E. R. Roberts, D.I.C., PH.D. Published by Temple Press, Limited, Bowling Green Lane, London, E.C.1. Price 16s. net.

The Author quite correctly asserts that "the chemistry underlying the extraction of metals from their ores has long been scantily treated in curricula designed for Intermediate and Higher School Certificate candidates, while in few institutions is an adequate knowledge of this chemistry not assumed in teaching post-Intermediate students." Only too frequently the metallurgist, because of his training, is highly specialised in but one branch of the science and lamentably ignorant of the balance. The reviewer was once consulted as to the possibility of reducing pyrolusite using charcoal and oil. Printed information was then difficult to locate, but had this book been available it would have been possible to deduce—though not too easily—that the basic equation is $MnO_2 + 2C = Mn + 2CO$ and gas reactions do not enter into the question. Though the real object of the Author has been to provide a textbook for metallurgical students, yet it is of distinct use when searching for information beyond one's normal activities. The Author has made a sort of double approach to his subject. He first gives the theoretical concepts of metal production from ores, following up this by general practical considerations. The second approach is to deal individually with each metal via their groupings. This system has undoubtedly made for much economy in space and has much to commend it. The coverage is very satisfactory and approaches completeness, and the indexing has been very thorough. At to-day's levels, the cost of the book is very reasonable; it will be appreciated both by the student and the consulting metallurgist.

V. C. F.

Engineering Structures. A collection of Papers presented at a symposium organised by the Colston Research Society and the University of Bristol. Published by Butterworths Scientific Publications, Limited, Bell Yard, Temple Bar, London, W.C.2. Price 26s. post free or 21s. to research subscribers.

This book contains fifteen Papers by eminent engineers covering recent research on engineering structures. None is related to cast products, but structures built up from wrought metals have been the subject of the most careful research. Additionally, aluminium rivets and concrete came within the purview of the symposium. The book will have considerable interest for designers, civil engineers, and architects, but it is somewhat too remote from foundry practice to warrant its inclusion in libraries devoted to the technology of cast metals.

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered, unless otherwise stated)

August 29, 1950

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2:—Middlesbrough, £10 10s. 3d.; Birmingham, £10 5s. 6d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent P, £12 1s. 6d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si)—North Zone, £12 10s.; South Zone, £12 12s. 6d.

Scotch Iron.—No. 3 foundry, £12 0s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £13 2s. 6d.; South Zone, £13 5s.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £13 12s. 6d.; South Zone, £13 15s.

Cold Blast.—South Staffs, £16 3s. 3d.

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. Coast and N.-W. Coast of England, £12 0s. 6d.; Scotland, £12 7s.; Sheffield, £12 15s. 6d.; Birmingham, £13 2s.; Wales (Welsh iron), £12 0s. 6d.

Spiegeleisen.—20 per cent. Mn, £17 16s.

Basic Pig-iron.—£10 11s. 6d., all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, basis 2-ton lots, d/d Sheffield works.)

Ferro-silicon (6-ton lots).—45 per cent., £33 15s.; 75 per cent., £49.

Ferro-vanadium.—35/60 per cent., 15s. per lb. of V.

Ferro-molybdenum.—70/75 per cent., carbon-free, 8s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £100 per ton.

Ferro-tungsten.—80/85 per cent., 12s. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 6d. per lb. of W.

Ferro-chrome.—4/8 per cent. C, £60; max. 2 per cent. C, 1s. 5½d. lb.; max. 1 per cent. C, 1s. 6d. lb.; max. 0.15 per cent. C, 1s. 6¾d. lb.; max. 0.10 per cent. C, 1s. 7d. lb.

Cobalt.—98/99 per cent., 15s. 6d. per lb.

Metallic Chromium.—98/99 per cent., 5s. 3d. per lb.

Ferro-manganese (blast-furnace). — 78 per cent. £28 3s. 3d.

Metallic Manganese.—96/98 per cent., carbon-free, 1s. 7d. to 1s. 8d. per lb.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft, u.t., £16 16s. 6d.; tested, up to 0.25 per cent. C (100-ton lots), £17 1s. 6d.; hard (0.42 to 0.60 per cent. C), £18 16s. 6d.; silico-manganese, £23 19s.; free-cutting, £20 1s. 6d. Siemens Martin Acid: Up to 0.25 per cent. C, £22 4s.; case-hardening, £23 1s. 6d.; silico-manganese, £26 6s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £19 16s. 6d.; basic, hard, over 0.41 up to 0.60 per cent. C, £21 1s. 6d.; acid, up to 0.25 per cent. C, £23 1s. 6d.

Sheet and Tinplate Bars.—£16 16s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £20 14s. 6d.; boiler plates (N.-E. Coast), £22 2s.; chequer plates (N.-E. Coast), £22 19s. 6d.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £19 13s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £22 6s.; flats, 5 in. wide and under, £22 6s.; rails, heavy, f.o.t., £19 2s. 6d.; hoop and strip, £23 1s.; black sheets, 17/20 g., £28 16s.

Alloy Steel Bars.—1-in. dia. and up: Nickel, £37 7s. 3d.; nickel-chrome, £55; nickel-chrome-molybdenum, £61 13s.

Tinplates.—I.C. cokes, 20 × 14, per box, 41s. 9d., f.o.t. makers' works.

NON-FERROUS METALS

Copper.—Electrolytic, £186; high-grade fire-refined, £185 10s.; fire-refined of not less than 99.7 per cent., £185; ditto, 99.2 per cent., £184 10s.; black hot-rolled wire rods, £195 12s. 6d.

Tin.—Cash, £805 to £810; three months, £795 to £800: settlement, £810.

Zinc.—G.O.B. (foreign) (duty paid), £127 10s.; ditto (domestic), £127 10s.; "Prime Western," £127 10s.; electrolytic, £132; not less than 99.99 per cent., £138.

Lead.—Good soft pig-lead (foreign) (duty paid), £112: ditto (Empire and domestic), £112; "English," £113 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, all English destinations, £146 5s.; rolled zinc (boiler plates), all English destinations, £144 5s.; zinc oxide (Red Seal), d/d buyers' premises, £119.

Other Metals.—Aluminium, ingots, £112; antimony, English, 99 per cent., £160; quicksilver, ex warehouse, £20 10s. to £21; nickel, £386.

Brass.—Solid-drawn tubes, 19¾d. per lb.; rods, drawn, 25⅝d.; sheets to 10 w.g., 24⅛d.; wire, 24⅜d.; rolled metal, 22⅞d.

Copper Tubes, etc.—Solid-drawn tubes, 21½d. per lb. wire, 209s. per cwt. basis; 20 s.w.g., 217s. 9d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £135 to £153; BS. 1400—LG3—1 (86/7/5/2), £143 to £160; BS. 1400—G1—1 (88/10/2), £195 to £260; Admiralty GM (88/10/2), virgin quality, £200 to £256, per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £214-£260; L.P.Bl, £148-£173 per ton.

Phosphor Bronze.—Strip, 32½d. per lb.; sheets to 10 w.g., 34¼d.; wire, 34d½.; rods, 32d.; tubes, 37¼d.; chill cast bars: solids, 33d., cored, 34d. (C. Clifford & Son, Limited.)

Nickel Silver, etc.—Ingots for raising, 2s. 2d. per lb. (7%) to 3s. 1¼d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 2s. 8d. (7%) to 3s. 7¼d. (30%); to 12 in. wide × .056, 2s. 8¼d. to 3s. 7½d.; to 25 in. wide × .056, 2s. 10¼d. to 3s. 9¼d. Spoon and fork metal, unsheared, 2s. 5d. to 3s. 4¼d. Wire, 10g., in coils, 3s. 1½d. (10%) to 4s. 0¾d.; (30%). Special quality turning rod, 10%, 3s. 0½d. 15%, 3s. 5¼d.; 18%, 3s. 9¾d.