FOUNDRY TRADE JOURNAL

EST. 1902

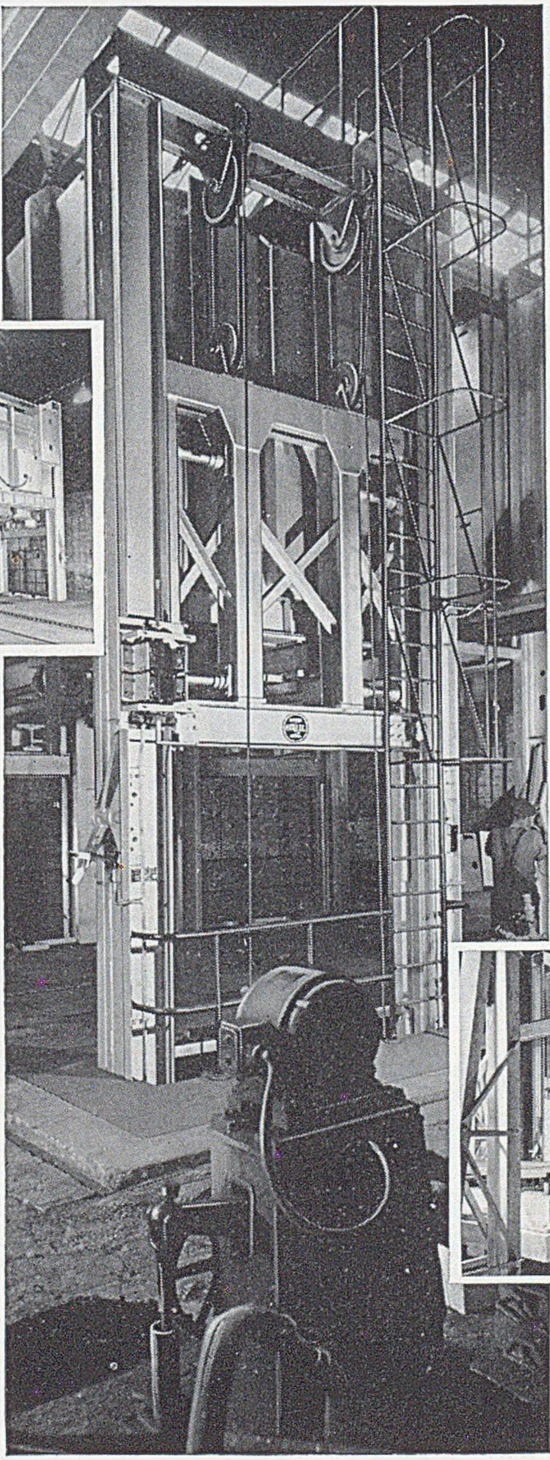
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

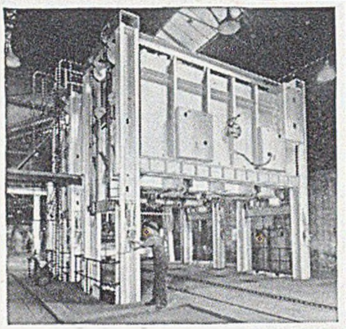
VOL. 94
No. 1904
Registered at the G.P.O. as a Newspaper

FEBRUARY 26, 1953
Offices: 49, Wellington Street, Strand, London, W.C.2

Single Copy, 9d. By Post 11d. Annual Subscription, Home 40/-, Abroad 45/- (Prepaid)

BIRLEC





gaseous blackheart malleable annealing

The Birlec gaseous process of annealing blackheart malleable castings brings, to this branch of the iron-foundry industry, the same advantages that characterise the operation of Birlec whiteheart annealing equipment.

Short (e.g. 48-hrs.) total annealing cycles.

Uniform, predetermined results giving specified mechanical properties.

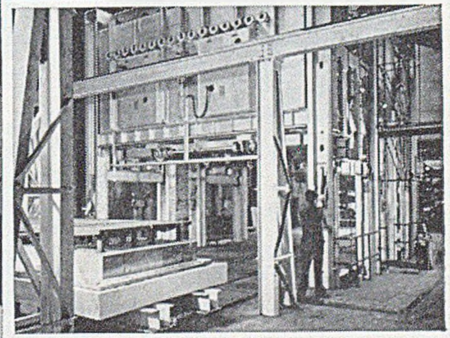
Low operating costs.

Large annealing outputs from small floor space used.

Clean, attractive working conditions.

Further details of Birlec elevator annealing furnaces for both blackheart and whiteheart (including details of comprehensive operating experience) will be readily given on application.

The installation illustrated consists of two elevator furnaces capable of annealing 50-75 tons per week. The annealing cycle consists of both high- and low-temperature operations; one furnace is used for temperatures up to 950°C, and the other up to 750°C. Bogie rails, enable the charges to be transferred from one furnace to the other.



Forty-four elevator furnaces have now been commissioned for annealing whiteheart malleable by the patented Birlec gaseous process.

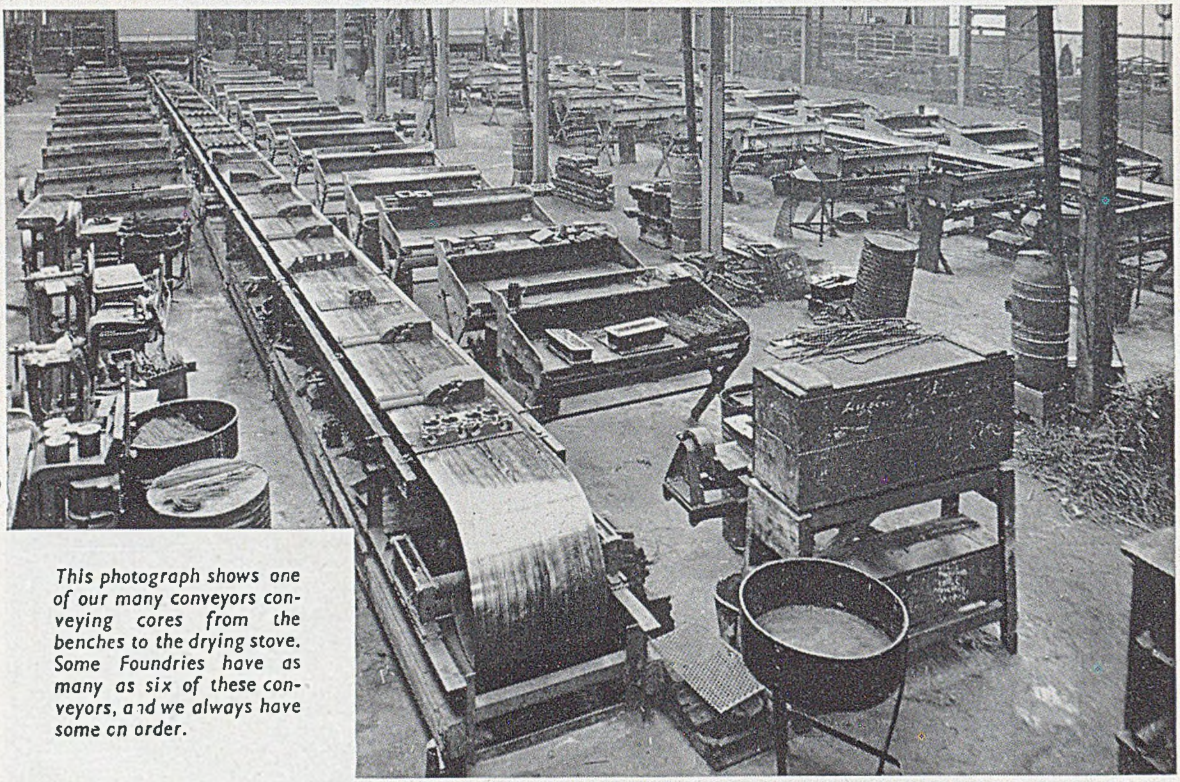
BIRLEC LIMITED

ERDINGTON · BIRMINGHAM · 24

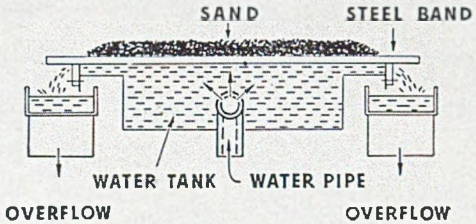
Sales and service offices in LONDON · SHEFFIELD · GLASGOW

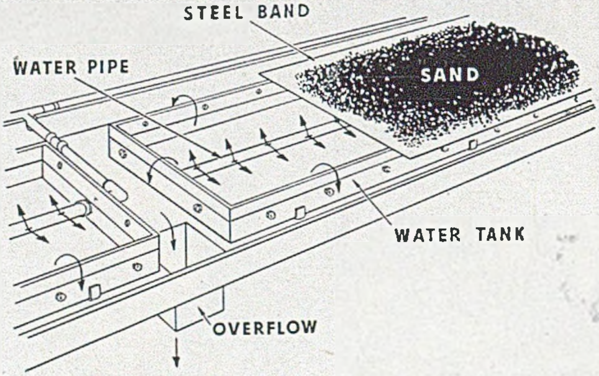
sm/b. 905. 53b

STEEL BAND CONVEYORS
serve the Foundry



This photograph shows one of our many conveyors conveying cores from the benches to the drying stove. Some Foundries have as many as six of these conveyors, and we always have some on order.





If you have difficulty with your warm sand adhering to patterns why not cool it on our patented water-cooled steel band conveyor as illustrated by diagrams above and on right.

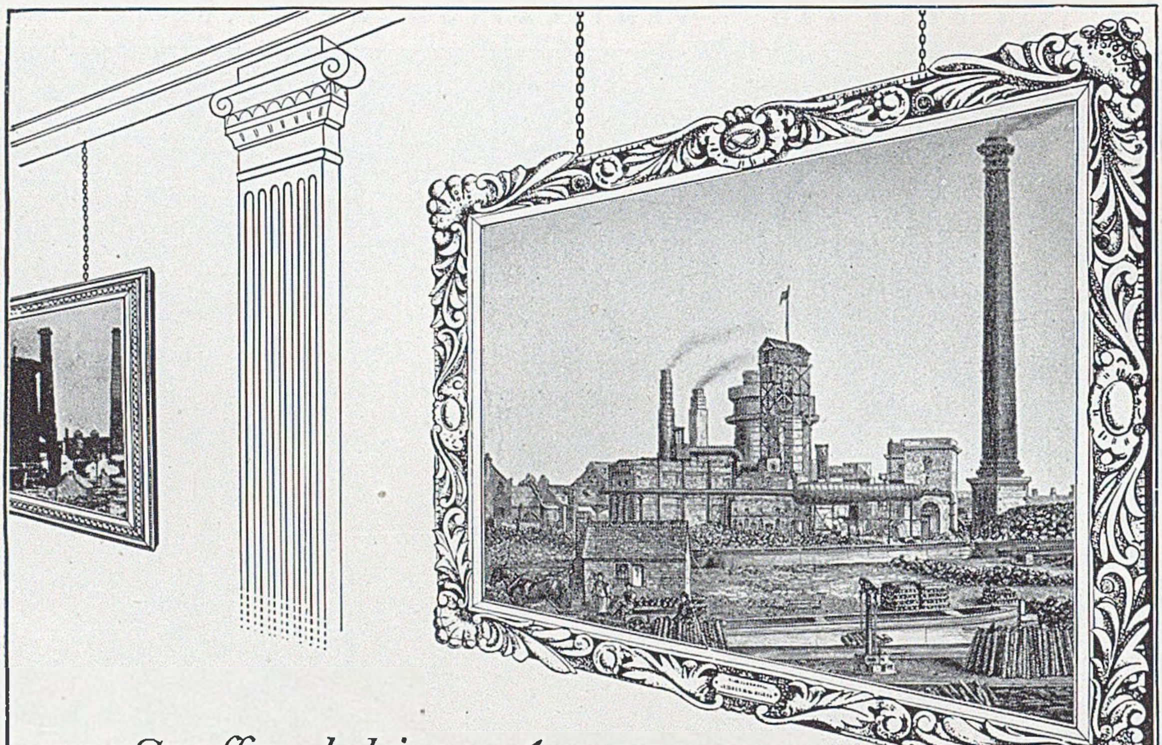
SSBC

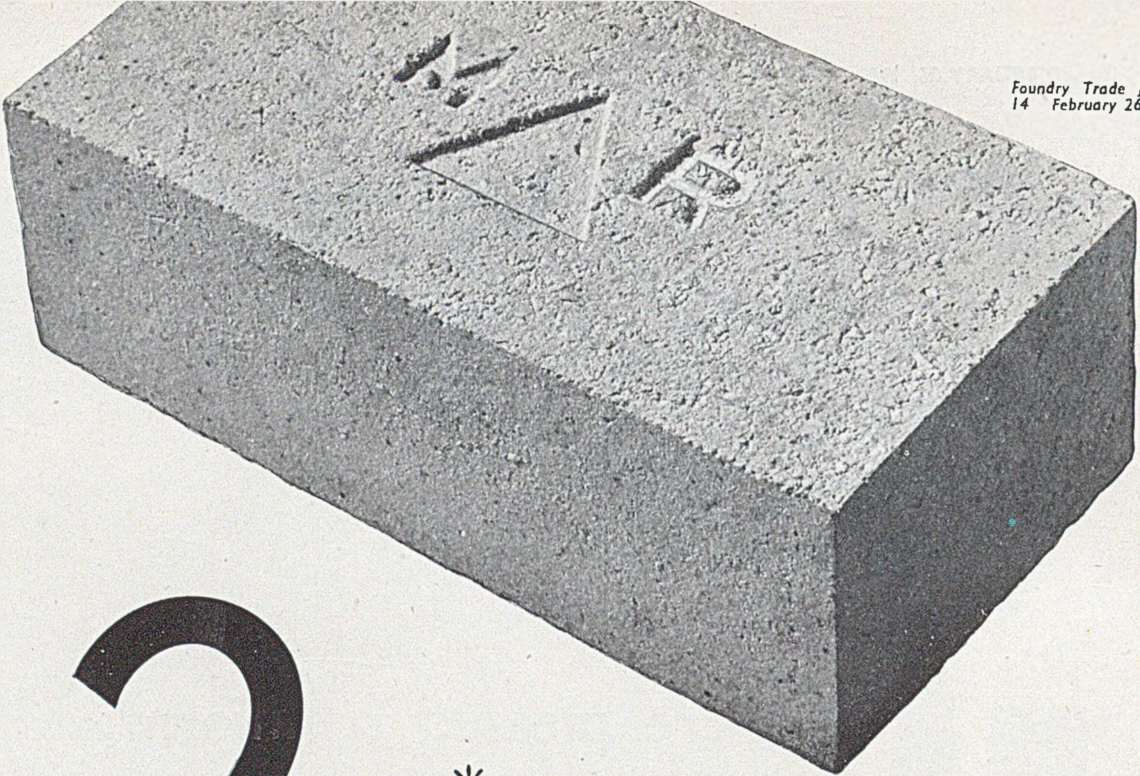
SANDVIK STEEL BAND CONVEYORS LTD

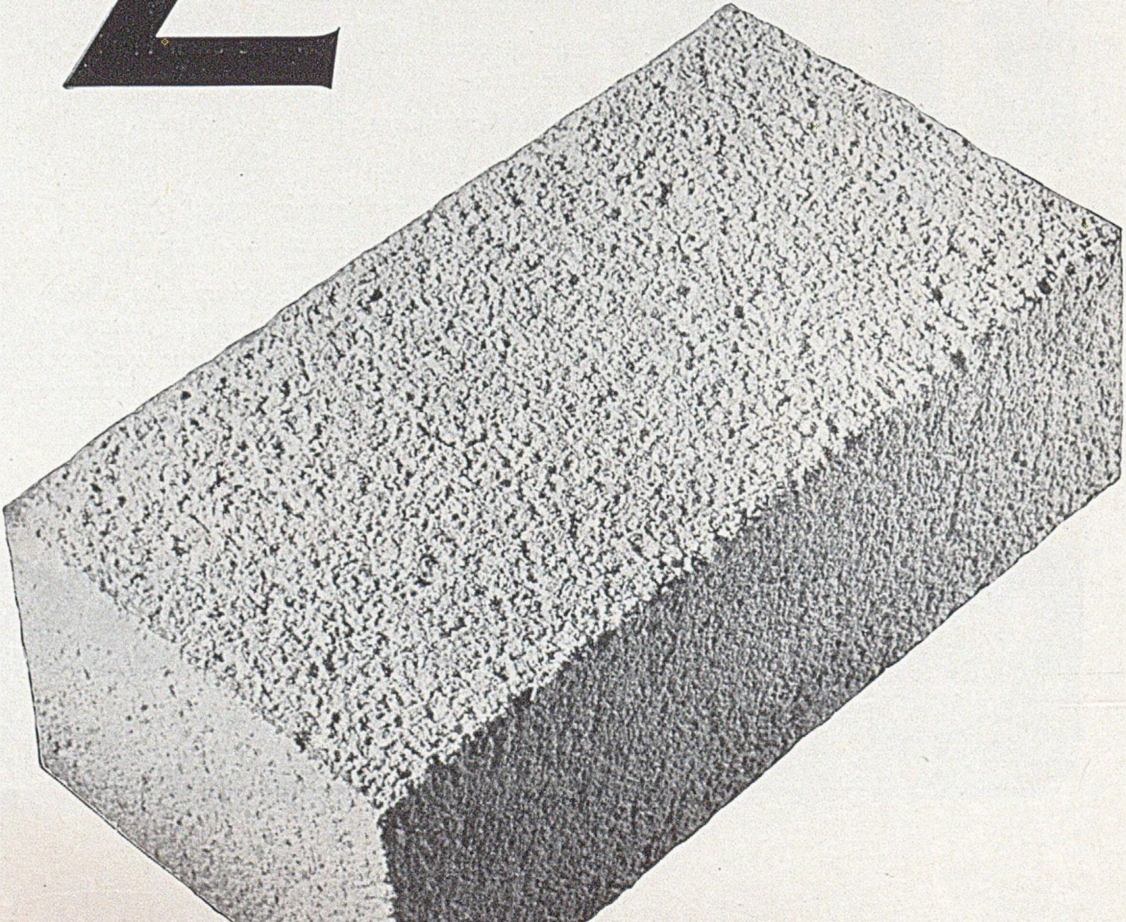
DAWLISH ROAD, SELLY OAK, BIRMINGHAM, 29

Telephone: SELly Oak 1113-4-5 Telegrams: Simplicity, Birmingham

2







Foundry Trade Journal
February 26, 1953 15

* THE MORGAN M.R.1

A brick that carries the ordinary high quality firebrick into entirely new fields of usefulness. It can be used, for example, at temperatures as high as 1600°C—far beyond the capacity of other refractories of similar alumina content: up to this temperature after-contraction is negligible. The strength and resistance to abrasion are unusually high. With these bricks, the conventional standard of comparison—alumina content—is no longer valid. They can be judged only on performance, and in performance they are comparable only with special purpose refractories having a very high alumina content indeed.

How is it done? The answer is in the way they are made: in the selection and purification of the clay; in the unusually hard burning and careful grading of the grog; above all in the very high temperature of the final firing. The manufacturing process is a continuous one—which in itself makes for uniformity—and it is carried out under rigorous quality control. All this costs money—but bricks of this type, although not previously manufactured in this country or in Europe, have been in use for some years in the U.S.A. where they have decisively proved their economy in terms of reduced furnace maintenance.

TYPICAL PROPERTIES OF M.R.1

Approximate Chemical Analysis			Physical Characteristics	
Silica	(SiO_2)	52-53%	Refractoriness ...	Cone 35 (1770°C)
Alumina	(Al_2O_3)	43-44%	Refractoriness under load (25 lb./sq.in.)	
Iron Oxide	(Fe_2O_3)	less than 1%	Commencement of subsidence	1600°C
Titanium Oxide	(TiO_2)	less than 1%	10% subsidence	1700°C
Magnesia	(MgO)	less than 2%	Bulk density ...	132-137 lb./cu.ft.
Lime	(CaO)	less than 2%	After-contraction (2 hrs. 1600°C) ..	less than 1.0%
Potash	(K_2O)	less than 2%	Thermal expansion ..	4.5×10^{-6} per °C.
Soda	(Na_2O)	less than 2%		

whole conception of furnace maintenance and efficiency

* THE MORGAN LOW STORAGE REFRACTORY M.I.28

—a brick that can double furnace output. It is a hot-face insulating refractory which can be used at furnace (or interface) temperatures up to 2800°F (1538°C).

At these temperatures it has a lower conductivity than any other type of refractory and therefore provides a greater reduction in the losses from the outside of the furnace. But that is less than half the story. The M.I.28 is only one-third the weight of an ordinary refractory and consequently would require only a third of the heat to raise it to the same average temperature. But, with the same furnace temperature, the average temperature of an M.I.28 is much lower (owing to its lower conductivity), and this still further reduces the amount of heat it takes up. With the same heat input, therefore, furnaces built from M.I.28 bricks heat up rapidly. On batch furnaces the bricks can double the furnace output—to say nothing of the saving in fuel.

There have been hot-face refractories before. What is new about the M.I.28, then? In theory nothing. . . . but in manufacture Morgans have put the whole of the theory into practice. The bricks are made on entirely new plant with scrupulous attention to detail and rigorous quality control from the purification of the clay to the final grinding to size. As in the case of the M.R.1., bricks of this quality have been available for some years in the U.S.A., and the improvements they can make in furnace efficiency have been firmly established.

TYPICAL PROPERTIES OF M.I.28

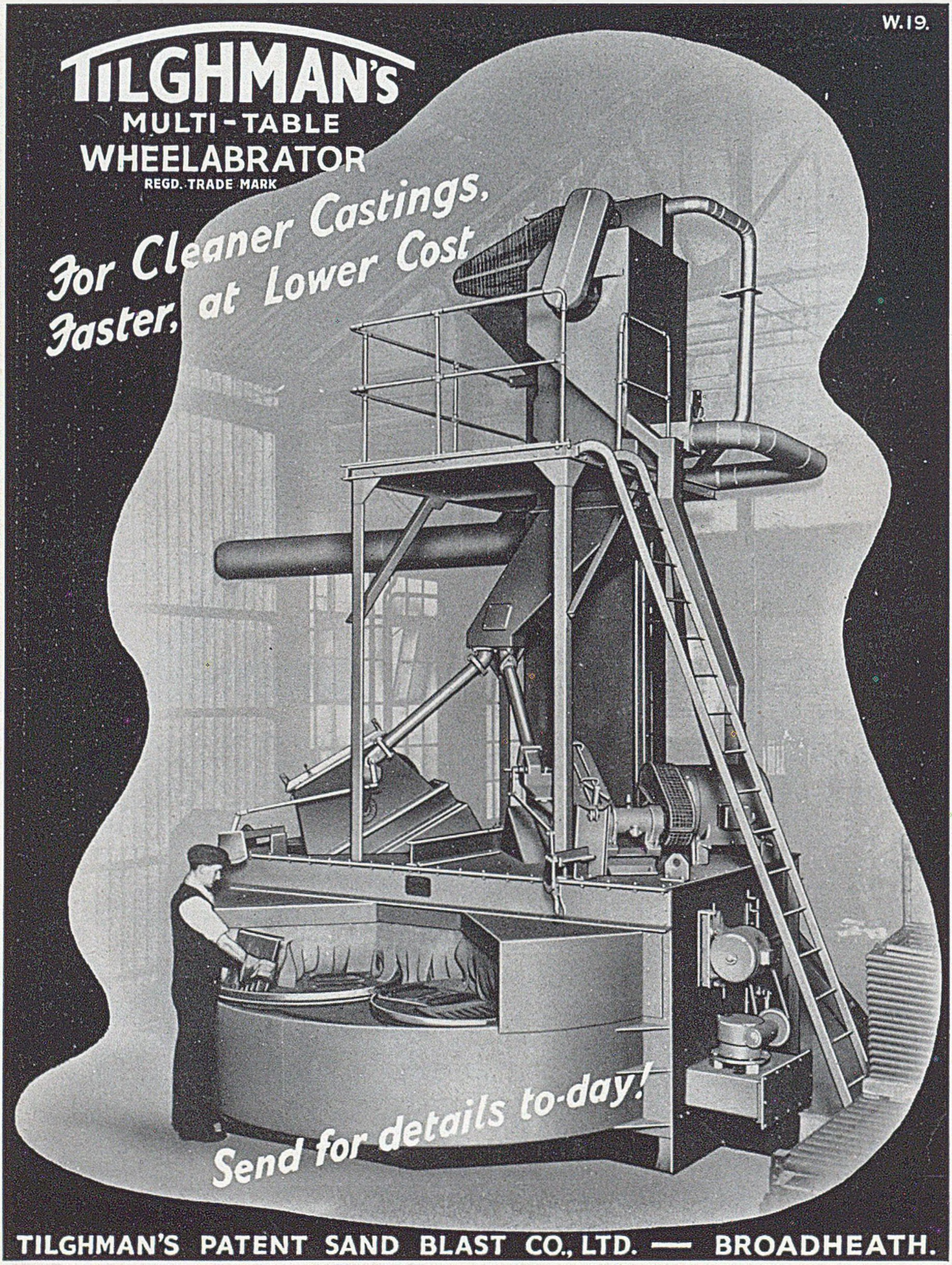
Maximum Service Temperature		1538°C (2800°F)
Thermal Conductivity:		
Mean Temperature	538°C (1000°F)	2.4 B.Th.U/hr.(sq.ft.)(in.)(°F)
	816°C (1500°F)	2.9 B.Th.U/hr.(sq.ft.)(in.)(°F)
Bulk Density		47.5 lb./cubic ft.
Refractoriness		1710°C (3110°F)
Modulus of Rupture		greater than 120 lb./sq.in.
Heat Capacity Factor		0.105

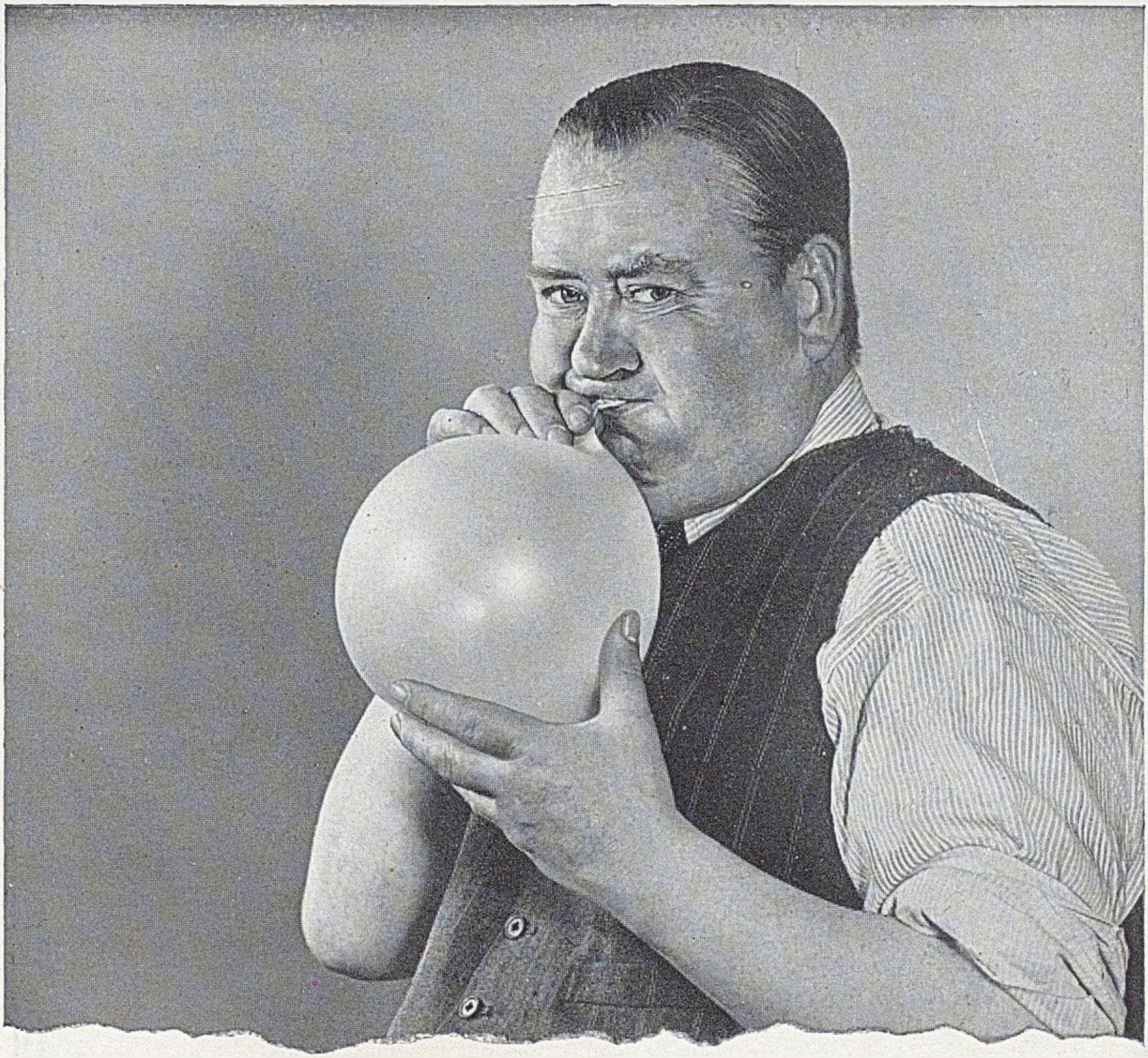
(the ratio of the heat stored in a M.I.28 furnace wall relative to that stored in a firebrick wall of the same area, and of a thickness giving similar hot and cold face temperatures)

MORGAN Refractories ARE WORTH FAR MORE THAN THEY COST

THE MORGAN CRUCIBLE COMPANY LTD.

Battersea Church Road, London, S.W.11. Tel: Battersea 8822

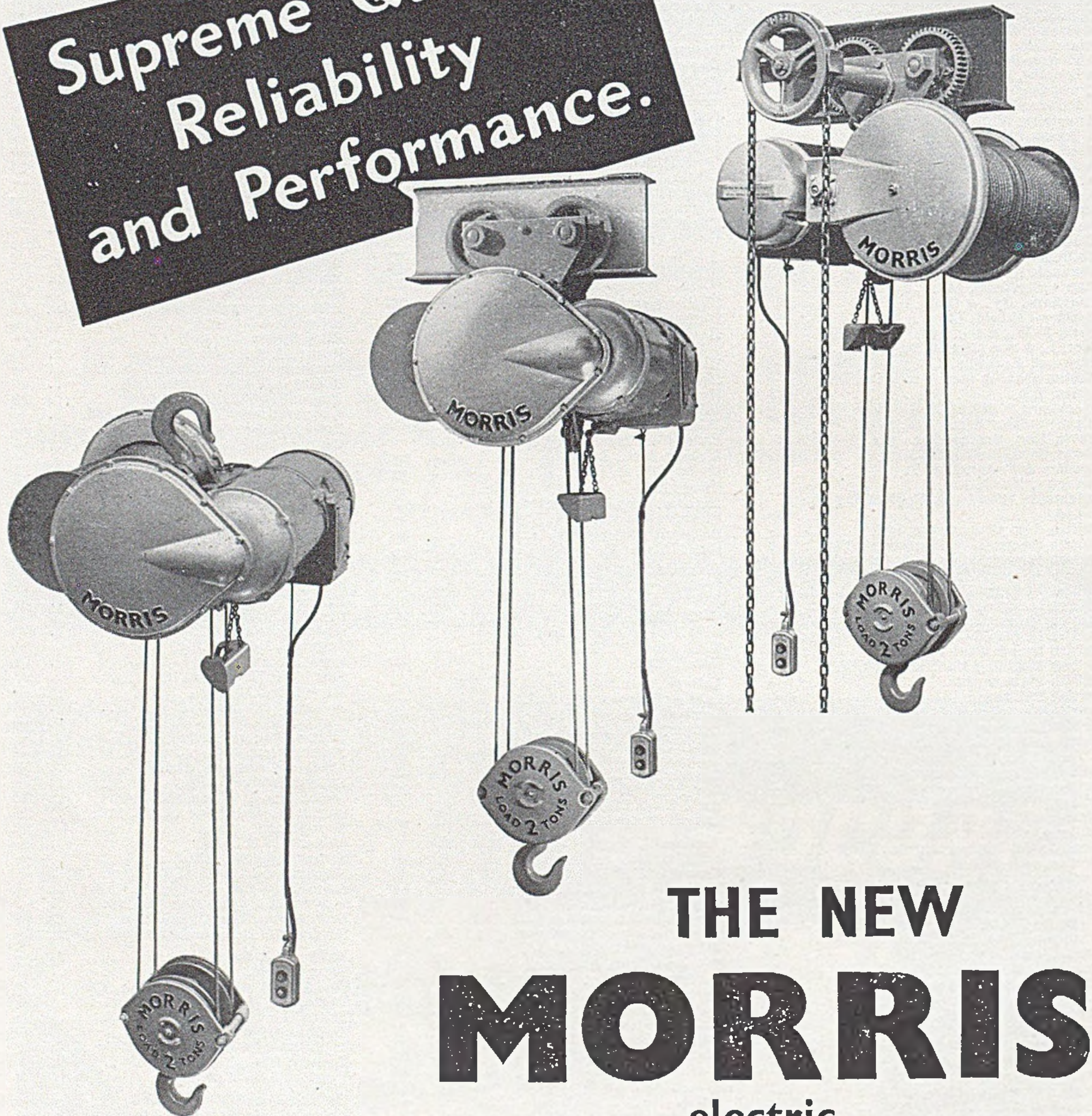

W.19.
TILGHMAN'S
MULTI-TABLE
WHEELABRATOR
REGD. TRADE MARK
For Cleaner Castings,
Faster, at Lower Cost
Send for details to-day!
TILGHMAN'S PATENT SAND BLAST CO., LTD. — BROADHEATH.



INDEX TO ADVERTISERS

PAGE NOS.

Supreme Quality, Reliability and Performance.



THE NEW MORRIS electric HOIST-BLOCK

Delivery from stock in most sizes—write for folder F.163 to Dept. 46C

HERBERT MORRIS LTD LOUGHBOROUGH ENGLAND

FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

The FOUNDRY TRADE JOURNAL is the Official Organ of the following :—

INSTITUTE OF BRITISH FOUNDRYMEN

PRESIDENT : **Dr. C. J. Dadswell,** English Steel Corporation, Limited, Sheffield.

Secretary : **T. Makemson, M.B.E.,** Saint John Street Chambers, Deansgate, Manchester, 3. 'Phone and 'Grams : Blackfriars 6178.

BRANCHES

Birmingham, Coventry and West Midlands : E. R. Dunning, 55, Shakespeare Drive, Shirley, Warwickshire. *Bristol and West of England :* G. W. Brown, 51, Westbury Road, Bristol. *E. Midlands:* S. A. Horton, 163, Morley Road, Chaddesdon, Derby. *Lancs :* F. W. Nield, Henry Wallwork & Co., Ltd., Red Bank, Manchester. *Lincs:* T. H. North, 46, Mildmay Street, Lincoln. *London:* W. G. Mochrie, Tyseley Metal Works, Limited, Balfour House, Finsbury Pavement, London, E.C.2. *Newcastle-upon-Tyne :* F. Robinson, Sir W. G. Armstrong, Whitworth & Co. (Ironfounders), Ltd., Close Works, Gateshead. *Scottish :* J. Bell, 60, St. Enoch Square, Glasgow. *Sheffield :* J. H. Pearce, 31, Causeway Head Road, Dore, Sheffield. *Tees-side:* F. Shepherd, Head, Wrightson & Co., Ltd., Teesdale Iron Works, Thornaby-on-Tees. *Wales and Monmouth :* A. S. Wall, 14, Palace Avenue, Llandaff, Cardiff. *West Riding of Yorkshire :* H. W. Griffiths, 46, Peckover Drive, Thornbury, Bradford. *South Africa :* Secretaries, S.E.I.F.S.A., Barclays Bank Buildings, Cr. Commissioner and Harrison Street, Johannesburg.

SECTIONS

Burnley : H. Buckley, 33, Newcastle Street, Burnley. *Cape Town :* S. Wade, P.O. Box 46, Salt River. *East Anglia :* L. W. Sanders, Lake and Elliot, Limited, Braintree, Essex. *Falkirk :* A. Bulloch, Jones & Campbell, Limited, Torwood Foundry, Larbert, Stirlingshire. *Scottish-North Eastern :* R. Leeks, Alexander Shanks & Son, Limited, Arbroath. *Slough :* P. Hoesli, Light Production Co., Ltd., Slough, Bucks. *West Wales :* (new secretary shortly to be appointed). *Southampton :* Dr. O. P. Einerl, F.I.M., John I. Thornycroft & Co., Ltd., Woolston, Southampton.

BRITISH STEEL FOUNDERS' ASSOCIATION

Chairman : **T. H. Summerson,** Summerson's Foundries Limited Albert Hill Foundry, Darlington, Co. Durham. *Secretary :* **Robert Barber, A.C.I.S.,** Broomgrove Lodge, 13, Broomgrove Road, Sheffield, 10. 'Phone and 'Grams : Sheffield 63046.

RESEARCH AND DEVELOPMENT DIVISION

Chairman: **F. N. Lloyd,** F. H. Lloyd & Co., Ltd. *Director:* **J. F. B. Jackson, B.Sc., A.R.I.C., F.I.M.** *Secretary :* **Robert Barber, A.C.I.S.,** Broomgrove Lodge, 13, Broomgrove Road, Sheffield, 10. 'Phone and 'Grams : Sheffield 63046.

ASSOCIATION OF BRONZE AND BRASS FOUNDERS

President: **W. R. Marsland,** Newman, Hender & Company, Limited, Woodchester, Glos. *Secretaries :* **Heathcote & Coleman,** 25, Bennetts Hill, Birmingham, 2. 'Phone : Midland 2901. 'Grams : "Clarify," Birmingham.

LIGHT METAL FOUNDERS' ASSOCIATION

Chairman : **A. H. Sturdee, M.B.E., Wh.Ex., M.I.Mech.E,** *Secretary :* **Eric L. Heathcote,** 25, Bennetts Hill, Birmingham, 2. 'Phone : Midland 2901/4. 'Grams : "Clarify," Birmingham.

FOUNDRY TRADES' EQUIPMENT AND SUPPLIES ASSOCIATION

President : **Frank Webster,** August's Limited, Exmoor Street, Halifax. *Secretaries :* **Peat, Marwick, Mitchell & Company,** 94/98, Petty France, London, S.W.1. 'Phone : Abbey 7515. 'Grams : "Crusades, Sowest," London.

INSTITUTE OF VITREOUS ENAMELLERS

President : **Dr. Harold Hartley, C.B.E., D.Sc., Hon. M.I.Gas E.,** Radiation Limited, 7, Stratford Place, London, W.1. *Chairman:* **S. Hallsworth,** Prince Enamel and Metal Works Limited, Marsh Side, Workington, Cumberland. *Secretaries:* **John Gardom & Company,** Ripley, Derbyshire. 'Phone : Ripley 136.

COUNCIL OF IRONFOUNDRY ASSOCIATIONS

Chairman : **N. P. Newman,** Newman, Hender and Company, Limited, Woodchester, near Gloucester. *Director :* **K. Marshall.** *Secretary:* **J. W. Butler,** Crusader House, 14, Pall Mall, London, S.W.1 Phone : Whitehall 7941.

Participating Associations : British Cast Iron Research Association (affiliated) ; Institute of British Foundrymen (affiliated) ; and the following :—

Automobile Ironfounders' Association.—Secretaries : Heathcote and Coleman, 25, Bennetts Hill, Birmingham, 2. 'Phone: Midland 2901; 'Grams : "Clarify," Birmingham.

British Ironfounders' Association and British Bath Manufacturers' Association.—Director and Secretary : J. Galbraith Sneddon, C.A., 145, St. Vincent Street, Glasgow, C.2. 'Phone : Central 2891 ; 'Grams : "Groundwork," Glasgow.

British Grit Association.—Secretary: J. Campbell MacGregor, 10, Bank Street, Airdrie, Lanarkshire.

British Malleable Tube Fittings Association.—Secretary: F. B. Ridgwell, 196, Shaftesbury Avenue, London, W.C.2. 'Phone: Temple Bar 6052-3; 'Grams : "Brimatufia," London.

Cast Iron Chair Association.—Secretaries : Peat, Marwick, Mitchell & Co., The Cast Iron Chair Association, Queen's Square, Middlesbrough, Yorkshire.

Cast Iron Axlebox Association and National Ingot Mould Association.—Secretaries: Peat, Marwick, Mitchell & Company, 301, Glossop Road, Sheffield. 'Phone and 'Grams : Broomhill 63031.

Cast Iron, Heating, Boiler and Radiator Manufacturers' Association.—Secretary : Stanley Henderson, 69, Cannon Street, London, E.C.4. 'Phone : City 4444.

Cast Iron Pipe Association.—Secretary : T. Clark, Crusader House, 14, Pall Mall, London, S.W.1. 'Phone : Whitehall 7941.

Cast Iron Segment Association.—Secretary: H. A. D. Acland, 5, Victoria Street, London, S.W.1. 'Phone : Abbey 1394.

Greensand Pipe Founders' Association.—Secretaries: McClure Naismith Brodie & Company, 77, St. Vincent Street, Glasgow, C.2. 'Phone: Glasgow 9476 ; 'Grams : "Lycidas," Glasgow.

National Association of Malleable Ironfounders.—Secretary : Miss L. Verity, Chamber of Commerce Offices, Tudor House, Bridge Street. Walsall. 'Phone : Walsall 5671.

IRONFOUNDERS' NATIONAL CONFEDERATION

Chairman: **D. Graham Bisset,** Enfield Foundry Co., Ltd., Waltham Cross. *Director :* **R. Forbes Baird,** 117, Church Lane, Handsworth Wood, Birmingham, 20. 'Phone : Northern 0343 & 0037 ; 'Grams : "Irocast," Birmingham.

LOCAL BRANCH ASSOCIATIONS

East and West Ridings.—Secretary: O. Gibson, Oliver Gibson & Sons, Ltd., Leeds. 'Phone : Leeds 21226. *London, Home and Eastern Counties.*—Secretary : A. L. Nadin, Cooper Roller Bearing Co., Ltd. King's Lynn, Norfolk. 'Phone: King's Lynn 2500. *Midlands.*—Secretary: R. Forbes Baird, 117, Church Lane, Birmingham, 20. 'Phone : Northern 0037 & 0343. *North Midland.*—Secretary : E. A. Phillips, Harper, Phillips & Co., Ltd., Albion Foundry, Eastgate, Grimsby. 'Phone: Grimsby 2541. *North Western.*—Secretary: H. Gott, North Foundries, Ltd., Lansdowne Road, Monton, Eccles. 'Phone : Eccles 3545. *Scottish.*—Secretary : Allan F. Ure, Allan Ure, Ltd., Keppochhill, Glasgow. 'Phone : Glasgow, Douglas 2641.

NATIONAL IRONFOUNDING EMPLOYERS' FEDERATION

President : **T. Lee,** Henry Hollindrake & Son, Limited, Princes Street, Stockport. *Secretaries :* **Mann, Judd & Co.,** 8, Fredericks Place, Old Jewry, London, E.C.2. 'Phone : Metropolitan 8613 ; 'Grams : "Manjudca Phone," London.

LOCAL ASSOCIATIONS

Cardiff and District Founders' Association.—Secretary : G. Morris, 12, West Bute Street, Docks, Cardiff. 'Phone : Cardiff 32701.

Leeds and District Ironfounders' Association.—Secretary : F. Bowling, John Bowling & Co., Ltd., Cyclops Foundry, Kirksall Road, Leeds, 3. 'Phone : Leeds 25183.

Leicester and District Ironfounders' Employers' Association.—Secretary: C. S. Bishop, 8, New Street, Leicester. 'Phone : Granby 511.

Liverpool and District Ironfounders' Association.—Secretary: J. S. Hassal, 16/18, Hackins Hey, Liverpool, 2. 'Phone : Central 0114.

Manchester and District Ironfounders' Employers' Association.—Secretaries : Webb, Hanson, Bullivant & Co., 90, Deansgate, Manchester. 'Phone : Blackfriars 8367 ; 'Grams : "Sound," Manchester.

Midland Ironfounders' Association.—Secretary : R. Forbes Baird, 117, Church Lane, Handsworth Wood, Birmingham, 20. 'Phone : Northern 0343. 'Grams : "Jacelace," Birmingham.

Monmouthshire Founders' Association.—Secretary : I. J. Smith, Goulds Foundries, Limited, Newport, Mon. 'Phone: Newport 4275; 'Grams: "Rogerwinch," Newport.

North of England Ironfounders' Association.—Secretaries : Mann, Judd Gordon & Co., 61, Westgate Road, Newcastle-upon-Tyne. 'Phone : Newcastle 20836 ; 'Grams : "Mannca," Newcastle.

North Staffordshire Ironfounders' Association.—Secretary : Bourner, Bullock & Co., Federation House, Station Road, Stoke-on-Trent. 'Phone : Stoke-on-Trent 44245.

Scottish Ironfounders' Association.—Secretaries : Mann, Judd, Gordon & Co., 142, St. Vincent Street, Glasgow, C.1. 'Phone: Central 2857; 'Grams : "Mannca," Glasgow.

Sheffield and District Ironfounders' Association.—Secretary: T. Goddard, Mander, 59, Clarkhouse Road, Sheffield, 10. 'Phone: Sheffield 60047; 'Grams : "Emplofedra," Sheffield.

South of England Ironfounders' Association.—Secretaries : Mann, Judd & Co., 8, Fredericks Place, Old Jewry, London, E.C.2. 'Phone: Metropolitan 8613. 'Grams : "Manjudca Phone," London.

Welsh Engineers' and Founders' Association.—Secretary : W. D. M. Davis, 1, St. James Gardens, Swansea. 'Phone : Swansea 59166 ; 'Grams : "Iron," Swansea.

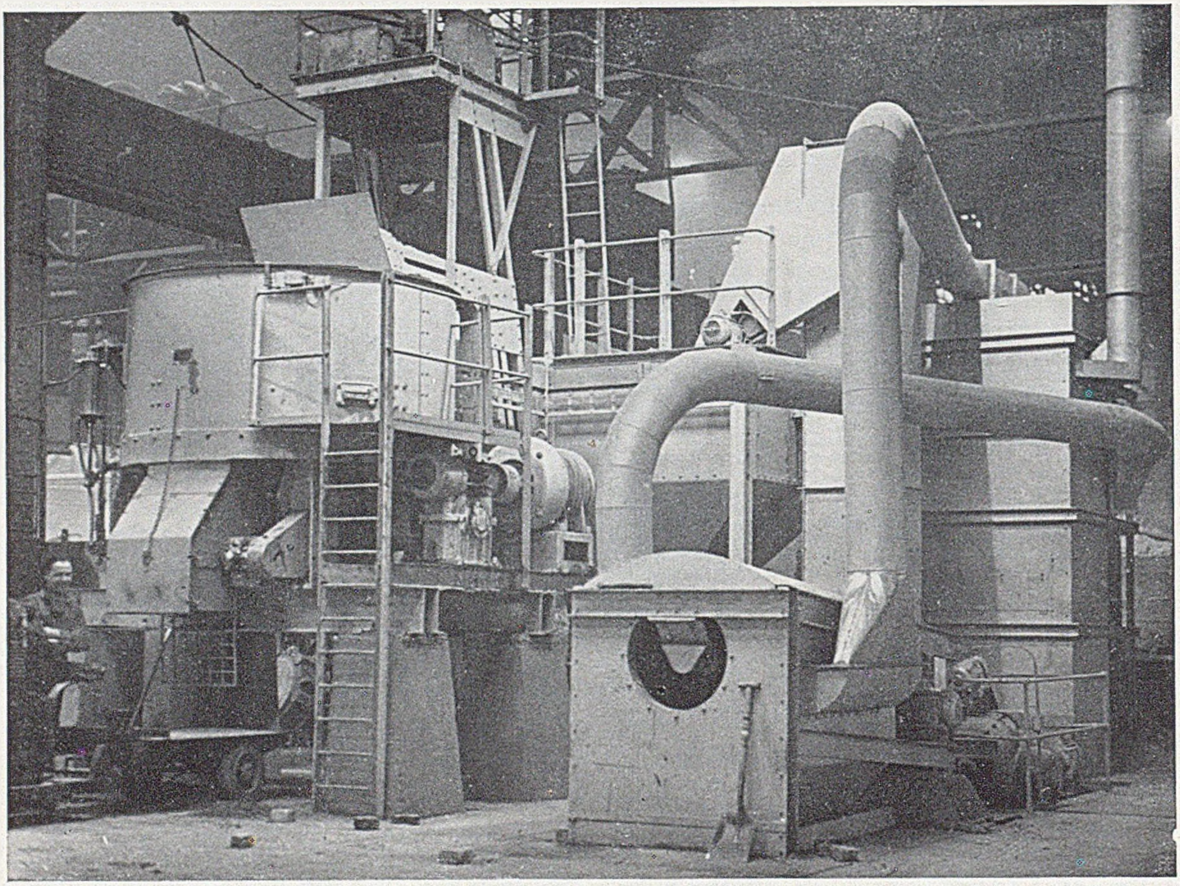
West of England Ironfounders' Association.—Secretary : R. Forbes Baird, 117, Church Lane, Handsworth Wood, Birmingham, 20. 'Phone: Northern 0343. 'Grams : "Jacelace," Birmingham.

West Riding Ironfounders' Association.—Secretary : C. D. Buckle, 13, Cheapside, Bradford. 'Phone : Bradford 25346.

BRITISH CAST IRON RESEARCH ASSOCIATION

Alvechurch, Birmingham 'Phone and 'Grams : Redditch 716.

Scottish Laboratories.—Blantyre Industrial Estate, Blantyre, Lanarkshire. 'Phone 486.



Reproduced by courtesy of the Davy & United Roll Foundry Limited, Billingham, Co. Durham

FOUNDRY TRADE JOURNAL

Established 1902

Vol. 94 Thursday, February 26, 1953 No. 1904

PRINCIPAL CONTENTS

PUBLISHED WEEKLY: Single Copy, 9d. By Post 11d. Annual Subscription, Home 40s., Abroad 45s. (Prepaid).

49 Wellington Street, London, W.C.2. 'Phone : Temple Bar 3951 (Private Branch Exchange) Grams : "Zacatecas, Rand, London"

The Proceedings

The 45th volume of Proceedings of the Institute of British Foundrymen, which has just arrived from the printers, initially covers the story of the Buxton and Sheffield Conference held last June. Maybe because of the location of the conference, the pattern of the make-up of the volume has changed somewhat. The result is that, probably for the first time, there is a preponderance of papers dealing with steelfounding. In the past, ironfounding has invariably led the field. It is worth noting that in the last two volumes, there is not a single paper devoted to malleable ironfounding. In the last few years, many more papers have been given covering all phases of non-ferrous foundry practice. In connection with the latter, it is high time that the Institute, being well established as a recognized medium for the presentation of papers appertaining to foundry practice, should be chosen for the first publication of original research work and not a vehicle for rehashes or surveys, as is occasionally the case.

We note with pleasure that among members there are now fewer complaints of the papers being insufficiently practical. In fact, allowing for the increased dissemination of technical knowledge, they are less academic than those presented at the first conference held at Manchester. An interesting development in the field of practice has been the use of photography. In earlier days, resort was made to line drawings and snaps taken with a cheap camera. Methods of production have been much clarified by recent papers, and the benefits derived by members are in consequence infinitely greater. There have been at least a dozen of this type of paper within the last two issues of the Proceedings. The steelfounding papers, especially those from Belgium (Mr. J. J. Dewez) and America (Mr. G. A. Lillieqvist) were of wide interest as is shown by the extensive discussion they provoked. The French exchange paper on Sand-cast Beryllium Bronze by Mr. L. Grand was also of a high order and copies of it are still being sought by overseas organizations. Of home-produced papers, we liked best that of Dr. Angus. Whilst there have been many contributions covering alloyed cast iron, this one dealt with the plain material and showed up its great potentialities. It filled a real need, by clarifying a subject often obscured by "additions."

The Proceedings have been excellently edited by Mr. G. Lambert and we would commend readers to the very comprehensive index. This is most valuable, as speakers very often introduce subjects in no way germane to the paper under discussion, but nevertheless make interesting contributions to the general reservoir of knowledge of foundry practice. We regard these annual publications as something more than a record of recent developments in the art and science of casting metals. Rather, they reflect a clearer vision, now everywhere apparent, of future trends of the industry. If some bewilderment be prevalent, the discussions reveal an intelligent interest in the relative importance and scope of modern innovations.

H.D.A. Instal Giant Press

A giant steel forging press weighing more than 800 tons, the largest of its kind in Europe, was inaugurated at Redditch, near Birmingham, last Tuesday by Sir Frank Spriggs, chairman of High Duty Alloys, Limited, and managing director of its parent company, the Hawker Siddeley Group, Limited. The press, which cost more than £500,000 and took ten months to construct, is 42 ft. 9 in. high and a further 13 ft. 7 in. is encased in concrete below ground. Its adjustment is such as to enable engineers to work to a fraction of an inch and its maximum pressure of 12,000 tons is four times as much as its nearest rival. The new press means a saving in time, money and raw materials and its use will mean greater strength for aircraft parts because they will be pressed out in one piece instead of being riveted together. For example, this press will produce at one time the forging required for the largest jet engines.

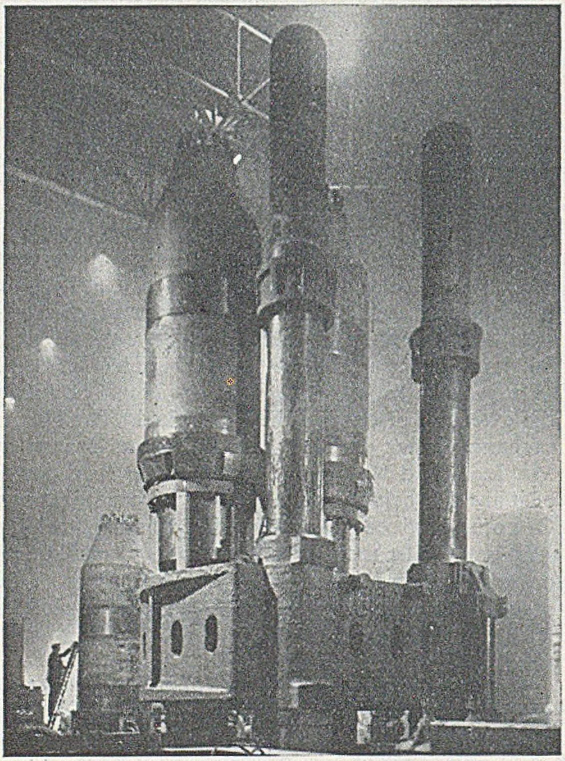


FIG. 1.—*New Forging Press weighing over 800 tons for Aluminium Aircraft Parts installed at High Duty Alloys, Limited. An Idea of its Size may be gained by comparison with the Man shown in the left-hand corner.*

Tuesday's ceremony was preceded by the reading of a technical paper by Mr. H. G. Herrington, managing director of H.D.A., who said "this press is a result of three or four years' controversy throughout the industry, both here and America, upon the merits of very large forging presses of 50,000 to 75,000 tons capacity and the advantages of using large forgings in air-frame construction. To accommodate it, it has been necessary to reconstruct an entire bay of the forging division of High Duty Alloys, Limited, without interfering with the schedule production."

An Assembly of Castings

Adjacent to the press bay is located a new electrical sub-station and other ancillary equipment consisting of the accumulator unit. This has four treble-ram pumps, each driven through a reduction-gear unit by 550-h.p. motors—a 6,500-gall. water storage tank, two water vessels and twelve air vessels. Interconnected to the accumulator system are two large pre-filling tanks. To serve the press with pre-heated billets, there are three 30-ft. gas-fired furnaces, each having a capacity of 10 tons.

The press itself shown under construction in Fig. 1 has two bedplates each weighing 14 tons. On these bedplates are located four adjustable plates recessed to contain and position the ends of the four supporting columns, each of which is 31 in. dia., 4 ft. 9 in. long and weighs 53 tons. These four columns serve a dual purpose; they pass right through the lower platen, thereby acting as ties to the whole press, and they provide the means of carrying and guiding the crosshead. The lower platen is made up of three castings, the centre section (weighing 64 tons) and two side sections (42 tons each) being dowelled, dovetailed and bolted together to form one piece.

On the lower face of the moving crosshead (weighing with its bushes 108 tons) are the necessary spigot recesses and tee slots for locating and fixing the top bolster and forging or press dies. The motive power is provided to the crosshead by three hydraulic rams, each of which is 4 ft. 3 in. dia., 15 ft. long and weighs $28\frac{1}{2}$ tons. These operate in separate cylinders weighing 36 tons each and are fixed in the upper platen, which weighs 94 tons.

Work-study Course in Bristol

The Engineering and Allied Employers' West of England Association are engaging upon educational activities. Last Friday at Brunel House, St. George's Road, Bristol, there was an opening ceremony for the inauguration of a Department of Work Study. Here in residence there are to be ten picked students, sent by the local works to be trained in the latest techniques of motion-study; time-study; job evaluation; incentives; and the like. The course, which extends over eight weeks and costs ninety guineas, is taken up with four weeks in the Department, two weeks in the student's own factory where he works in collaboration with the teaching staff, and a final two weeks at Brunel House. It is a unique enterprise deserving of success.

London Branch Stag Party.—The annual men-only dinner of the London branch of the Institute of British Foundrymen will again be held at the Horse Shoe Hotel, Tottenham Court Road; the date is Friday, March 20, and the time 7 for 7.30 p.m. The function is to be informal and there will be light entertainment. A limit on the numbers that can be accommodated at the Horse Shoe makes it necessary to confine the allocation of tickets before March 7 to members. After this date, tickets will be issued to both members and male guests in date order according to application. The price is 21s. per head, and members who wish to attend are urged to make immediate application for tickets to Mr. A. R. Parkes, assistant hon. secretary, c/o FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

Progress of Spheroidal-graphite Iron*

By W. W. Braidwood

The first description of a process for controlled production of spheroidal graphite in as-cast iron was given in the paper by Morrogh and Williams,[1] published in March, 1948, which dealt with the treatment of iron by introduction of cerium. The first announcements of the magnesium process followed in May of the same year[2 3] and since that time there has developed a volume of investigation and exploration greater than anything previously known in the field of ironfoundry metallurgy. Commercial production of the new iron really began, however, in 1949, in America initially, and subsequently in Europe. During the last three years progress has been considerable, despite various retarding factors.

Early Difficulties and Progress

The incomplete response to magnesium treatment of irons contaminated with small proportions of incidental elements of subversive type was one difficulty attending the early introduction of spheroidal-graphite irons into commercial practice. This limitation made it necessary to ensure, from the outset, that only relatively pure base irons were employed, and this proved to be a problem in several areas. Additionally, although the interest of the foundryman and metallurgist in this new material developed virtually overnight, the outlook of the engineering user was considerably more cautious and conservative. His duty is to test the new iron thoroughly, not only in the laboratory, but also in service. For that reason in the case of any material there may be considerable lag between satisfactory initial production and wide application in industry.

However, as always with a major invention of great practical significance, the advent of the new idea has focused the attention of a great number of interested individuals, firms and organizations, whose investigations and experiences have rapidly and greatly expanded the effort devoted to improvements in technique. It is not surprising, therefore, that these early difficulties and natural handicaps have been and are being overcome, and that the development is swiftly increasing in both mass and impetus.

The rapidity of development may well be measured by the fact that although a previous paper by the present Author, presented in February, 1952,[4] described the position as it existed at the end of 1951, a further paper is already justified.

Neutralization of Subversive Elements

For example, the statement was made that " . . . methods of perfecting the response of non-ideal irons are being developed with success." At that time a completely satisfactory method of overcoming the effects of subversive elements had already been developed, and an application for a supplementary patent had been made by the Author's firm, to cover such improvements. The British Cast Iron Research Association had also done much pioneering work on the subject, and their results were subsequently reported at the International Foundry Congress, in May, 1952, in a paper entitled "The Influence of Some Residual Elements and their Neutralization in Magnesium-treated Nodular Cast Iron" by Morrogh.[5] The practical outcome of this development is that perfect response to magnesium treatment, of virtually every commercial iron, can be ensured by addition, to the magnesium-treated iron, of only 0.01 per cent. of mischmetall. An addition of this order costs only about 8s. per ton of metal treated, and in most countries this outlay is more than recouped by the saving in base-iron cost, and by widening the range of irons suitable for treatment by the magnesium process. Moreover, the current considerable expansion in production of mischmetall and other rare-earth compounds ensures that supplies will be ample even for treatment of the

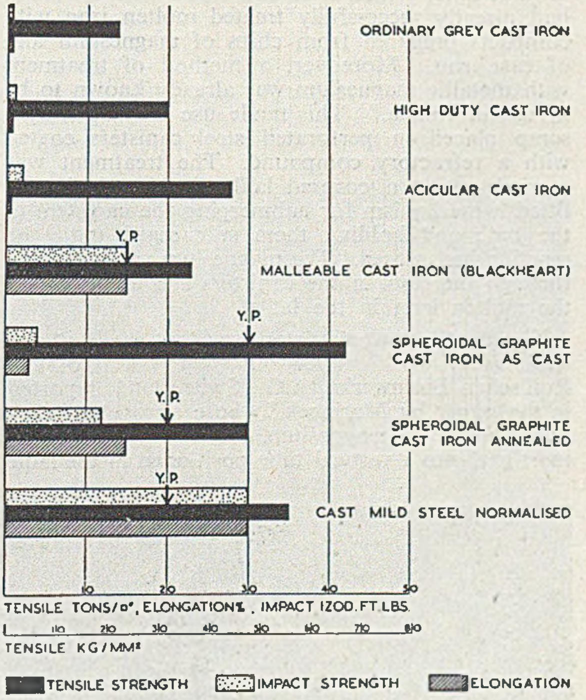


FIG. 1.—*Diagram comparing the main Mechanical Properties of S.-g. Iron with those of other Cast Irons and Cast Steel.*
[Kg. per sq. mm. × 0.635 = tons per sq. in.]

* Paper presented on October 6, 1952, to the Sixth Conference of the *Centro Fonderia* of Italy, at Rapallo. The Author is attached to the Mond Nickel Company, Limited.

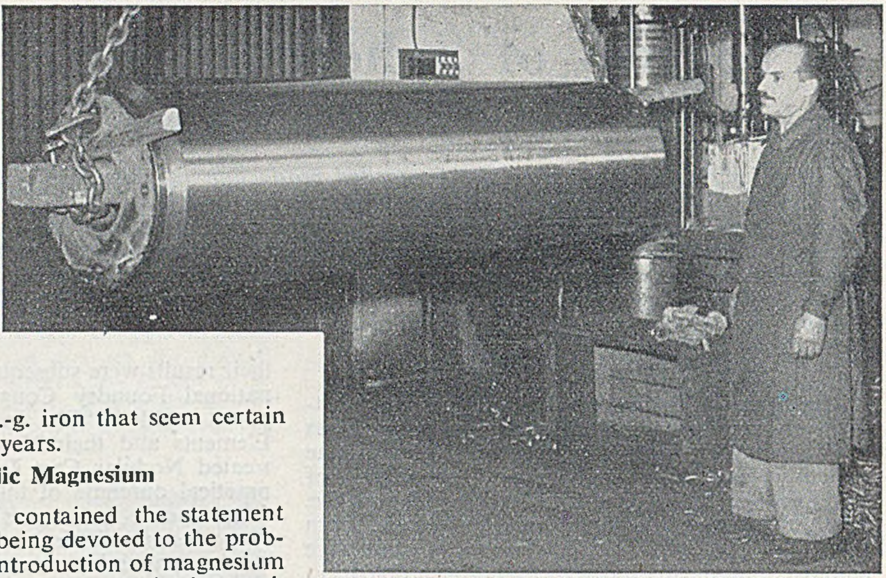


FIG. 2.—*Ram weighing $2\frac{1}{2}$ tons in Pearlitic S.-g. Iron, for use in an Extrusion Press of 600 tons capacity; made by Fonderie Petri, Italy. This Particular Example well illustrates the High Degree of Mirror Finish, which can be obtained on Spheroidal-graphite Iron Parts by Normal Machining Methods.*

enormous quantities of S.-g. iron that seem certain to be produced in future years.

Use of Metallic Magnesium

The earlier paper also contained the statement that much ingenuity was being devoted to the problem of effecting efficient introduction of magnesium by other methods, some of them completely novel, including the use of alternative materials, not necessarily alloys of magnesium with other metals. Methods involving generation of magnesium vapour within the bath of molten metal, or externally, were given as possibilities. Improved methods for the introduction of magnesium were also forecast, and it was stated as possible that safe and efficient procedures might be evolved using metallic magnesium. At that time, White, Rice and Elsea[6] in the U.S.A., had already successfully treated molten iron with compacts prepared from chips of magnesium and of cast iron. Moreover, a method of treatment with metallic magnesium was already known to be in use in Russia.[7] This made use of "Elektron" scrap placed in perforated steel canisters coated with a refractory compound. The treatment was carried out in a covered ladle, inside which was fitted a mechanism for submerging the canisters in the bath and holding them submerged until the reaction had ceased. The magnesium vapour issued through the slots in the canisters and reacted with the molten iron in the ladle.

The next noteworthy step was that made in the exploratory work carried out by the firm of von Roll'schen Eisenwerke, A.G., Switzerland, reported in the paper by Marincek,[8] whose apparatus introduces powdered magnesium, carried in a stream of inert gas, into a vertical tube positioned in the ladle of metal. In this instance also the sensible heat of the ladle contents causes the magnesium to volatilize, and magnesium vapour bubbles through the bath. This procedure is known to be effective, reliable, and safe in use. Simultaneously, exploratory work with the same object was being carried out in other parts of the world, and the successful culmination of the research by the *Instituto Finsider* has been reported in the Italian Exchange Paper to the International Foundry Congress of 1952, by Longaretti and Noris.[9] Their preliminary work on bonded briquettes of magnesium chips and inert material, preferably graphite, led to the successful and safe use of porous compacts consisting only of chips of magnesium or of "Elektron" scrap. These compacts are prepared by ramming the chips into the perforated head of a plunger, which is eventually immersed in the ladle of molten iron. The magnesium vapour so generated issues from the perforations, and bubbles through the molten iron, so treating it satisfactorily and without explosive effects.

These two main advances, namely, neutralization of the effects of subversive incidental elements, and treatment with metallic magnesium, are of considerable practical significance, because of their beneficial influence on the quality of the product, the widening of the range of suitable base irons, and the cost of treatment. Improvements of these types, coupled with others such as greater use of the basic cupola for ready and economical provision of iron of ideal composition, all allied to the increasing experience of the producing

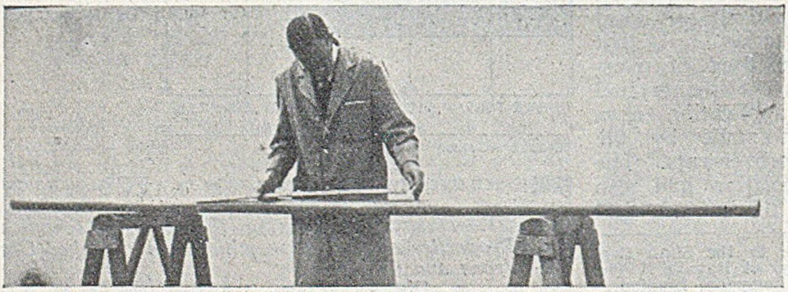


FIG. 3.—*Tube, 2 in. bore, $\frac{3}{16}$ in. thick and 14 ft. long, extruded from a Billet $7\frac{1}{2}$ in. o.d. and 8 in. long.*

[Courtesy Henry Wiggin & Company Limited foundries and the users, will further increase the tempo of production.

Mechanical Properties

The properties of S.-g. iron are best considered together with those of other materials already in widespread use, and the comparison is most clearly shown in graphical form. For this purpose the diagram which forms Fig. 1 is very useful. This is taken from the paper by A. B. Everest.[10]

It will be seen that, of the materials studied, as-cast (pearlitic) S.-g. iron exhibits the highest ultimate tensile strength; also that ferritic S.-g. iron exhibits notably higher yield strength than conventional blackheart malleable cast iron. This is something not universally appreciated, and some of the illustrations widely used in literature on the subject, such as twisted bars, may have given the impression that S.-g. iron is readily deformed. This is not the case; plastic deformation is resisted up to high stress values, before deformation takes place. Kraft and Flinn[11] have compared the properties of S.-g. irons and steels of similar matrix structures. They report that, in the irons, strength is decreased by only about 20 per cent. When compared with flake-graphite irons having similar matrices, the S.-g. irons were two to three times stronger, and their elongations were five to twenty times greater.

Response to Heat-treatment

Moreover, like steels, S.-g. iron responds fully to conventional heat-treatment, and its properties can therefore be so modified, to give vast improvements and most desirable combinations, to suit specific purposes. By different heat-treatments, ranging from full annealing to oil-quenching and tempering, the properties can be varied from 28 tons per sq. in. (44 kg. per sq. mm.) ultimate tensile strength, associated with hardness of 170 Brinell, to as much as 90 tons per sq. in. (142 kg. per sq. mm.) at 450 Brinell. It is, therefore, quite practicable to produce a range of products of markedly different properties from a single as-cast material, simply by variation in the heat-treatment applied. Addition-

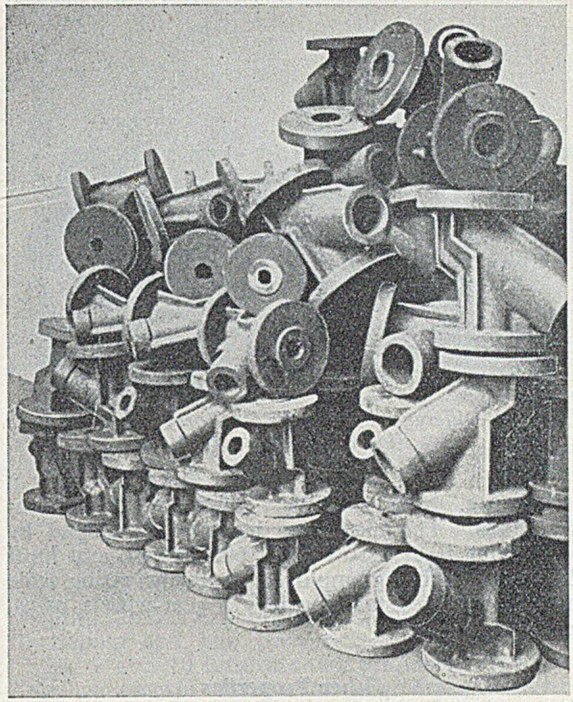


FIG. 5.—*Screw valves in annealed S.-g. Iron for handling Natural Gas at high pressure; made by Fonderia Caster, Italy.*

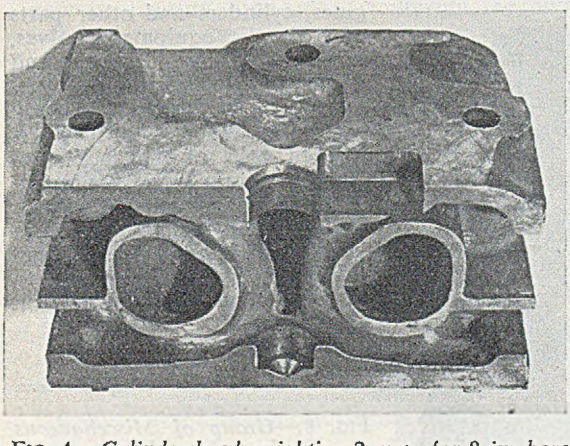


FIG. 4.—*Cylinder-head weighting 2 cwt., for 8 in. bore, high-speed Diesel Engine, sectioned to show Soundness; made by Fiat Grandi Motori, Italy.*

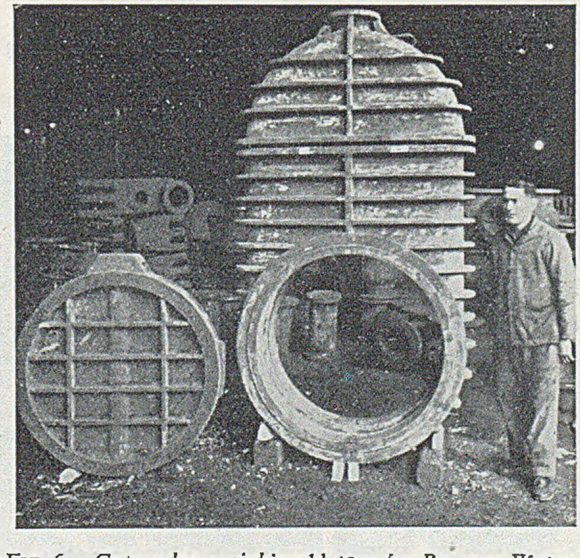


FIG. 6.—*Gate valve, weighing 1½ tons for Pressure Water System; made by Fonderia Mario Pensotti, Italy.*

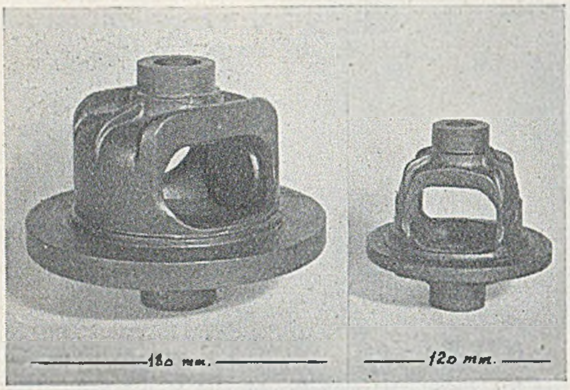


FIG. 7.—*Differential Housings for Lorry and Car; made by Fiat Grandi Motori, Italy.*

ally, S.-g. irons can be flame- and induction-hardened. The maximum hardness developed by quenching is of the order of 600 Brinell, and local hardening is being employed on an increasing scale for the wear-resistant surfaces of gear-wheels, cams, etc.

Other Properties

Other excellent properties of less obvious type are also featured in this development. For example, the ease of machining at high levels of strength and hardness is of great practical importance, as is the high degree of finish of the machined surface of S.-g. iron, illustrated in Fig. 2. The replacement of interconnecting flakes of graphite, which provide ready access for oxidizing and corrosive gases, by separately-disposed spheroids, greatly enhances the resistance of cast iron to scaling and growth under high-temperature conditions, and many applications in this field have proved successful.

The new iron is particularly suitable for coating with tin and zinc. It is therefore being used on a considerable scale for such items as bearing shells. Galvanizing also gives rise to no difficulty, as was reported by Montgomery.[12] In conditions in which ordinary grey iron proved unsatisfactory, S.-g. iron castings coated perfectly, and a contributor to the discussion said that, as the use of S.-g. iron expanded, the problems facing galvanizers of cast iron would be reduced. The hot-working of S.-g. iron is also proving to be practicable, and interesting possibilities are opening up along this line. Fig. 3 is a photograph of a tube, 2-in. bore, $\frac{3}{16}$-in. wall thickness, and 14 ft. long, extruded from a billet $7\frac{1}{2}$-in. o.d. and 8 in. long.

Special S.-g. Irons

Magnesium treatment can be applied to all types of iron, and the matrix structures can be pearlitic, ferritic, acicular, martensitic or austenitic. S.-g. irons of the austenitic type offer very great possibilities. Already, "NOduMAG," the spheroidal-graphite variant of the first austenitic (nickel-manganese) iron, "Nomag," is in production by Ferranti, Limited, Hollinwood. Additionally, S.-g. Ni-Resist is in use, on a production basis, for many special castings, particularly items of aircraft jet engines. This grade of iron gives, in the as-cast condition, the following properties:—Ultimate tensile strength, 25 to 28 tons per sq. in. (39 to 44 kg. per sq. mm.); yield point, 13 to 17 tons per sq. in. (20 to 27 kg. per sq. mm.); elongation, 10 to 20 per cent., and hardness, 120-170 Brinell, all allied with the excellent resistance to corrosion already associated with Ni-Resist, and with enhanced resistance to high-temperature conditions.

Applications

The tendency of S.-g. irons to yield cast sections free from dispersed porosity, coupled with excellent mechanical properties, is opening up a vast field of application for pressure-resistant items, for example, cylinder-heads for compressors and high-efficiency Diesel engines, cylinders and other parts of hydraulic equipment, valves, pipes and fittings. Figs 4, 5 and 6 show typical examples. Another major field, already becoming well established, is that of rolls of the indefinite-chill and grain types, for metal-working and for other processes. To date, rolls up to 20 tons in weight have been poured, and results in service are proving to be extremely good. S.-g. iron

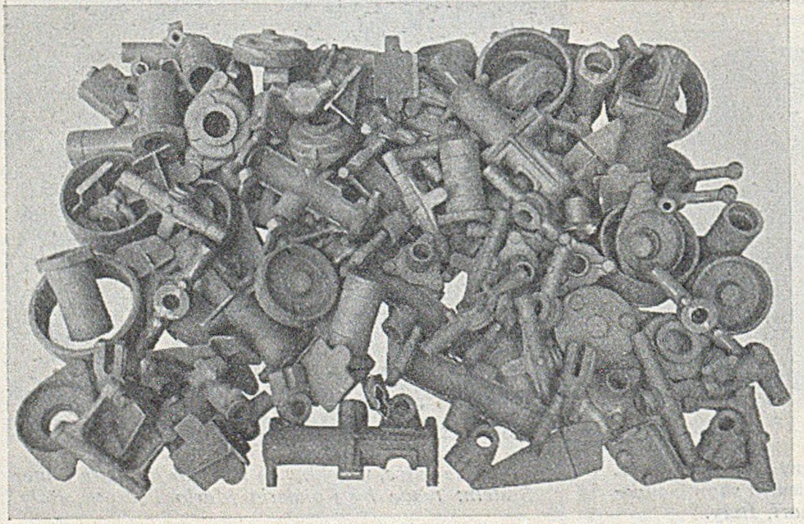


FIG. 8.—*Group of Miscellaneous Castings for Motor-scooters: made by Fonderia Glisenti, Italy.*

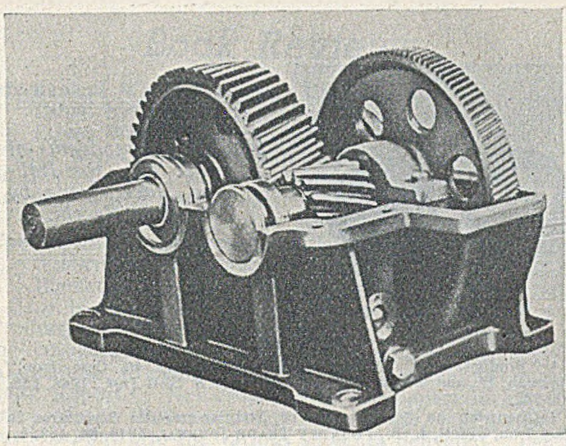


FIG. 9.—*Speed Reducer with Main Gears in Heat-treated S.-g. Iron (replacing Steel); made by Fonderie Petri, for S.p.A. de Bartolomeis, Italy.*

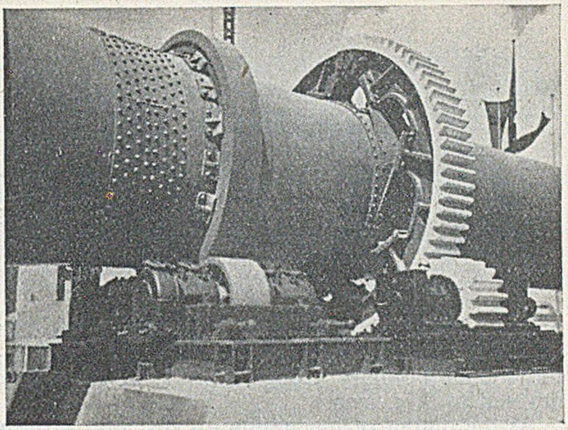


FIG. 10.—*Girth Gear and Pinion in S.-g. Iron, shown assembled as the Drive for a Rotary Cement Mill; made by Fonderia Tagliabue, Italy.*

combines the mechanical properties of a steel with the corrosion-resistance of cast iron. Moreover, its ductility overcomes the objection of ship designers to the use of cast iron for engine parts and ship fittings which might, in the event of war, be exposed to the shock of underwater or near-miss explosions. Accordingly, many applications are developing in marine engineering, and it may be recorded that the U.S. Navy has now issued a specification covering the use of ferritic S.-g. iron for shipboard applications.

Crankshafts for petrol-, gas- and oil-engines, and for compressors, etc., are an obvious application of constantly increasing interest. Applications in the automobile field are expanding. Fig. 7 shows differential housings for lorry and car respectively, and Fig. 8, a group of castings used in motor-scooters. Good results are reported in Germany from piston rings used in high-speed petrol engines and, in Britain, pistons, each weighing 2 tons as-cast, are now in quantity production, following the highly satisfactory performance of their prototype during the first year of service. Gear wheels of many types and for a variety of purposes are proving their worth. Italian experience in this field has been outstanding, and has been described by Galletto[13]. Figs. 9 and 10 illustrate two examples. Individual applications in the general engineering industries are too numerous to detail, and Figs. 11 to 15, taken from Italian sources, serve to illustrate only a few of the many successful uses.

Present Position and Outlook

The magnesium process for the production of S.-g. iron is the subject of patents and patent applications by the International Nickel Company. Licences to manufacture have been and are being granted in many countries. The lively interest in this subject being shown by the founding and metallurgical industries is well attested by the great number of relevant papers and articles which have

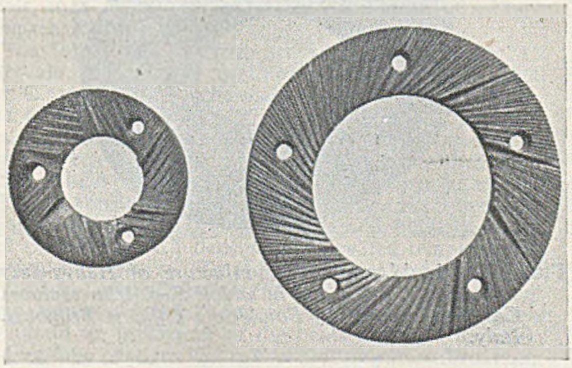


FIG. 11.—*Discs in Hardened S.-g. Iron for grinding of Coffee Beans; made by Fonderia Valdevit, Italy.*

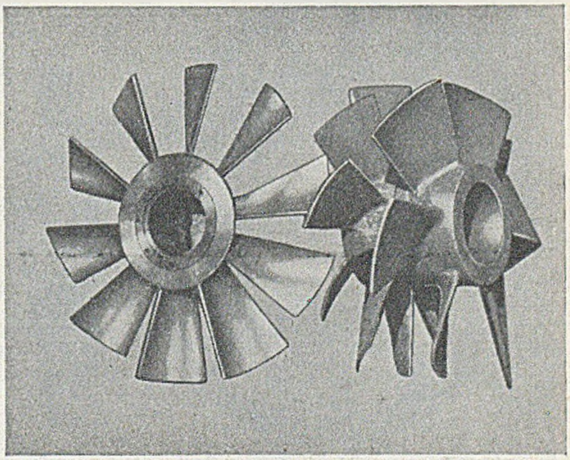


FIG. 12.—*Bladed Head for a Methane Burner; made by Fonderie Saronno, Italy.*

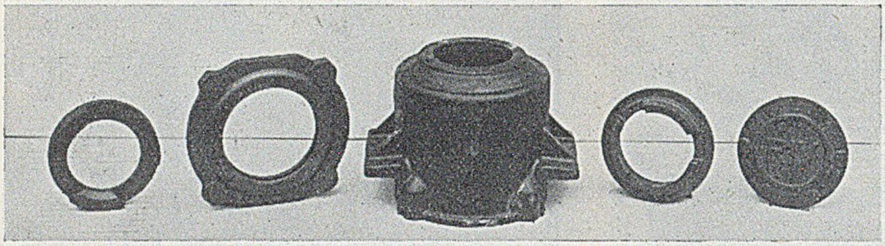


FIG. 13.—*Components of Axle Box for Rolling Stock; made by Fonderia Necchi.*

already been published, and it is noteworthy that of the 22 papers on cast irons presented at the International Foundry Congress in 1952, nine were devoted to S.-g. iron.

As the output of magnesium-treated iron steadily increases it will become more and more the product of specially-designed foundries and sections thereof. Already several licensees, in Europe, in Africa and in America have equipped separate bays solely for production of S.-g. iron, and Goheen[14] has recently described the current construction by the American Brake Shoe Company, of a complete new foundry intended solely for production of castings in this iron. Enough evidence is surely now available to convince even the most sceptical that S.-g. iron is not merely a matter of laboratory interest, nor a seven-days' wonder, but a new material, already in production on a substantial and expanding scale, produced by methods which are constantly being improved. A new iron, moreover, which is being taken very seriously indeed by responsible authorities and engineering designers throughout the world, and which is clearly destined to play a rôle of ever-increasing importance in industry and commerce.

The Author is indebted to the Mond Nickel Company Limited, for permission to publish this paper, and acknowledges much assistance given by his colleagues and associates in many countries.

REFERENCES

1 "Production of Nodular-graphite Structures in Cast Iron," Morrogh, H., and Williams, W. J. *Jnl. Iron & Steel Inst.*, 1948, **158**, 306-322.

2 Discussion on "Production of Nodular-graphite Structures in Cast Iron," Pfeil, L. B., FOUNDRY TRADE JOURNAL 1948, **84**, 463.

3 Discussion on "Production of Nodular-graphite Structures in Grey Cast Irons," by Morrogh, H., Wickenden, T. H., Trans. Amer. Foundrymen's Soc., 1948, **56**, 88.

4 "Spheroidal-graphite Iron Up-to-date," Braidwood, W. W., FOUNDRY TRADE JOURNAL, 1952, **92**, 325-329; 361-366; and disc., 393-394.

5 "Influence of Some Residual Elements and their Neutralization in Magnesium-treated Nodular Cast Iron," Morrogh, H., A.F.S. Preprint No. 52-79, 1952, 13 pp.

6 "Influence of Silicon Content on Mechanical and High-temperature Properties of Nodular Cast Iron," White, W. H., Rice, L. P. and Elsea, A.R., A.F.S. Preprint 51-5, 1951, 9 pp.

7 "An Experiment in the Production of Cast Iron with Nodular-graphite at the Red Star Foundry," Berdyanskaya, M. G., Tsymbal A. G., and Adamski, V. A. *Sel'khozma hina*, 1951, No. 5, pp. 23-27.

8 "Beitrag zur Herstellung von Gusseisen mit Kugelgraphit" Marincek, B., Von Roll Mitteilungen, 1951, **10**, 14-44.

9 "New Process for the Industrial Production of Nodular Cast Iron with Low Treatment Cost," Longaretti, C.,and Noris, M., *Fonderia Italiana*, 1952, I, No. 1, 3-9.

10 "Engineering Properties and Applications of Spheroidal-graphite Cast Iron," Everest, A. B., *Engineer*, 1952, **193**, 794-795, and 838-840.

11 "Interrelation of Mechanical Properties, Casting Size and Microstructure of Ductile Cast Iron," Kraft, R. W., and Flinn, R. A., Amer. Soc. Metals, Preprint No. 33, 1951, 25 pp.

12 "Galvanizing of Iron Castings." Montgomery, W., Presented at Second International Conference on Hot-Dip Galvanizing, Dusseldorf, 1952, FOUNDRY TRADE JOURNAL, **93**, 107-108.

13 "Production of Heavy Gear Wheels in Spheroidal-graphite Cast Iron," Galletto, C., Paper to International Foundry Congress, Atlantic City, May, 1952.

14 "Designing with Ductile Iron," Goheen, J. L., *Machine Design*, 1952, **24**, 161-166.

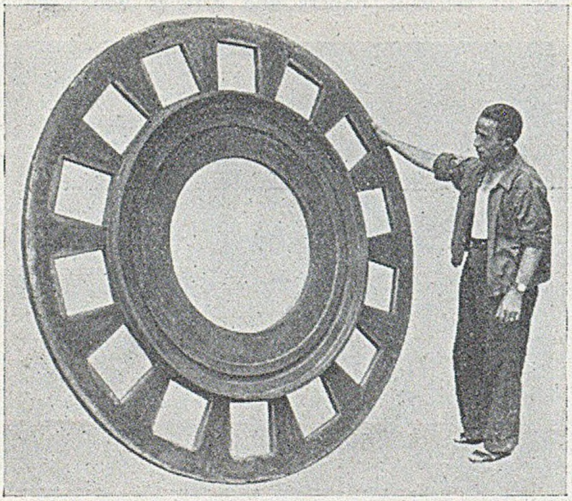


FIG. 14.—*Turntable of Tile Press, about 7 ft. dia.; made by Fonderia Galileo, Italy.*

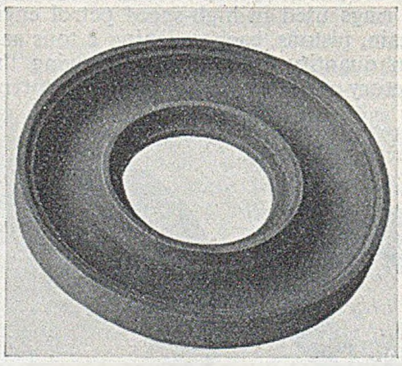


FIG. 15.—*Mould used in manufacture of Heavy-duty Tyres for Lorries and in which S.-g. Iron replaces Cast Steel; made by Fonderie e Officine Bragonzi, Italy.*

THE NATIONAL COMMITTEE of the Amalgamated Engineering Union will hold its annual meeting in the Town Hall, Eastbourne, from May 4 to May 15.

Book Reviews

Mechanical World Electrical Year Book, 1953. Published by Emmott & Company, Limited, 31, King Street West, Manchester, 3. Price 3s. net.

This well-known handbook contains a new section on lifts—a subject which makes a wide appeal. All the normal features are included.

Conference Proceedings, Harrogate.—Published by the Association of Bronze and Brassfounders, 25, Bennetts Hill, Birmingham, 2. Price 7s. 6d.

This is a complete account of the proceedings of a Productivity Conference organized by the Association in co-operation with the National Brassfoundry Association, to deliberate on the Brassfoundry Productivity Report.* Not only are all the papers included and profusely illustrated, together with the resulting discussions, but also the various speeches delivered. The bulk of the matter has appeared in the columns of this JOURNAL, the main additional features being papers on "brassfoundry" practice—that is, the manufacture of non-ferrous components, such as gas-taps and the like, by means other than that of casting. To have all these papers in the form of 100-page brochure has made available to the industry a most valuable text-book. The only fault the reviewer can find is the absence of the address of the Associations and he advises the inclusion of a loose sheet of paper remedying this omission. Readers, be they interested in ferrous or non-ferrous, are recommended to buy copies for personal study and for distribution to their staff.

V.C.F.

Physical Constants of Some Commercial Steels at Elevated Temperatures. Edited by the British Iron and Steel Research Association, Metallurgy (General) Division, Thermal Treatment Sub-committee, and published by Butterworths Scientific Publications, Limited, Bell Yard, Temple Bar, London, W.C.2, in conjunction with B.I.S.R.A. Price 21s.

Although heat-treatment and forging problems are now approached with an unprecedented degree of scientific precision, and although the employment of steels at high temperature has become increasingly common and increasingly arduous during the last half-century, no comprehensive set of tables of physical constants of steels at high temperatures has hitherto been published. This book fills the gap in respect of 22 steels, including a wide range of carbon steels, low-alloy constructional steel, and some special high-alloy steels, such as an austenitic stainless steel, and a high-tungsten tool steel.

The following properties are tabulated at 50 deg. C. intervals: specific and total heats, between 50 and 1,200 deg. C.; coefficients of thermal expansion (between 0 deg. and t deg. C.), up to 1,100 deg. C.; electrical resistivities, between 0 and 1,300 deg. C.; thermal conductivities, between 0 and 350 deg. C. In addition to these constants, which were obtained by direct measurement, the following constants have been derived by calculation: the mean coefficients of thermal expansion between t deg. and $(t+50)$ deg. C.; densities at elevated temperatures; thermal diffusivities. Total heat-temperature graphs and expansion-temperature graphs are given for ranges of temperature covering the transformations. It is possible to obtain an indication of the heats of transformation, and volume changes which occur during transformation, from these curves.

* Copies of the original Report (7s. 6d.) are also available from the secretaries of the Association at the address quoted.

The book is likely to be valuable to engineers and metallurgists concerned with design problems or steel behaviour at high temperatures, and to physicists concerned more generally with the properties of metals.

Atomic Theory for Students of Metallurgy (2nd edition), by W. Hume-Rothery. Published by the Institute of Metals, 4, Grosvenor Gardens, London, S.W.1. Price one guinea.

This book was first published in 1946 and was revised and reprinted in 1947 and in 1948. The new edition retains the framework of the first, but two of the chapters have been re-written. It was intended primarily for honours students in metallurgy who are often unable to understand the papers or text-books written by mathematical physicists. It is a self-contained monograph prepared by the author at the request of the publication committee of the Institute of Metals.

The book is divided into six parts, viz.:—I, the general background; II, the structure of the free atom; III, assemblies of atoms; IV, the free-electron theory of metals; V, the Brillouin-zone theory of metals, and VI, electrons, atoms, metals, and alloys. Although the author writes concisely and lucidly, few present-day metallurgical students will be able to follow many of the chapters, and a practical metallurgist is unlikely to find anything which will assist him in his work. Notwithstanding the wide field covered, nowhere is there any indication of a possible application of any of the theories or facts which are so lucidly described.

J. F. K.

Dynasty of Ironfounders.—The Darbys and Coalbrookdale, by Arthur Raistrick. Published by Longmans Green and Company, Limited, 6 and 7, Clifford Street, London, W.1, and elsewhere. Price 30s. net.

This beautifully presented book is an extremely well documented historical account of the conduct of one of the oldest and best-known iron foundries in the country. The author has been fortunate in having had placed at his disposal by the present proprietors, Allied Ironfounders, Limited, the records of the Coalbrookdale Company since its acquisition by the first Abraham Darby. The author has had the dual task of telling his readers the history of a great but individually short-lived family and the history of the various departments of the works. *Force majeure*, he has dealt much more extensively with the latter, utilizing numerous sketches which well command the interest of the engineering historian. Footnote material is essential on such a work as this, but it would be so much better if the reference could be included in the text—as in many cases it could. This would obviate looking at the footnote and then searching for the place where one left off reading. The coloured illustrations used are of an extremely high order. The main interest of the book is, however, the development of the foundry craft from the very inception of the industrial revolution as oriented by beneficent Quaker principles, which did not exclude the provision of gargantuan lashings of beer. One would have thought that all sentiment would finish with the acquisition of the concern by the great Allied Ironfounders group, yet we learn that the 250-years-old association of Coalbrookdale and the Darby's has been resuscitated by the presentation of a token holding in the company to Mr. Basil Darby, the well-known pig-iron merchant, who is tenth in the line of

Book Reviews

succession from the original Abraham. For those engaged in our industry, the acquisition of this modestly-priced book is very desirable as a knowledge of the developments of the past is helpful in assessing future progress. Moreover, it does instil in those genuinely interested in their profession a real sense of pride of craftsmanship and a warning to scout ephemeral quasi-artistic fashions.

V.C.F.

Atmospheric Pollution: Its Origins and Prevention. By A. R. Meetham. Published by the Pergamon Press, Limited, 2, 3 and 5, Studio Place, Kinnerton Street, London, S.W.1, price £1 15s. 0d.

In the great industrial areas and cities, the average citizen frequently inveighs against the evils of the smoky atmosphere. Indeed during the present winter he has had good cause to become irate that progress towards the reduction of atmospheric pollution should be to all outward appearances so slow. As an actual fact, however, a good deal of effective work directed towards the abatement of atmospheric pollution has been going on for several decades. Many classes of individuals have been interested and actively engaged in the fight against the attendant evil. They include scientists, engineers, architects, builders, public health officers, smoke and sanitary inspectors, meteorologists, city councillors, and legislators, and even ordinary citizens who by their written and spoken words have made their contribution. This new book by Dr. A. R. Meetham makes a timely appearance to tell the interesting story of this work. Though ostensibly written for those professionally interested in atmospheric pollution, it should make known to a wider circle of ordinary citizens the character of the struggles that are being made in this important work.

In a most engaging manner that must appeal to the layman this very interesting book takes the reader through the whole story. The first hundred pages are devoted to a description of the properties and uses of the fuels that give rise to the deleterious poisons to be controlled. This picture is confined to essentials, is simply put, and is yet informative in a constructive sense. Then comes the story of the domestic fire, from which quite incidentally practical hints for the user become abundantly apparent, so well versed is the author in his subject. To the man in the street, the most impressive sections of the book may well be the account not only of the tests that are made extensively to measure atmospheric pollution, but the story of the distribution of the pollution. When he learns of the extensive work that has been carried out by the pertinent authorities, he may well be persuaded to cease his grumbling and consider as a citizen what contribution he can make towards the solution of the problem. He may well be alarmed at the distressing effects that can take place at the time of an "inversion," when the air is warmer above than near the ground. Thus in December, 1930, in the Meuse Valley, near Liège, Belgium, occupied by a variety of works, engaged in the manufacture of iron and steel, zinc, glass, pottery, lime, power and chemicals, a fog persisted for five days and sixty-three people died as the result of atmospheric pollution. Other almost equally serious cases have happened elsewhere, and the recent incidents affecting the cattle at the Smithfield Market in London must be fresh in the minds of everyone.

As to what can be done about the matter, there are the main objectives of the prevention of smoke, the more difficult abatement of the effects of sulphur dioxide and the reduction of the dust arising from causes other than the combustion of fuel, perhaps an even greater task. After reading this book there will be left in the mind of the reader the conviction that in these matters lies a problem that cannot be lightly brushed aside with the remark, "We cannot afford to do anything about it at present."

The author, who has been intimately connected for many years with the active pursuit of research into atmospheric pollution, must be congratulated on having put his years of experience and effort to such good purpose in preparing the groundwork for this book. The publishers have produced a well-printed and well-illustrated volume. This critique certainly carries a strong recommendation to all interested in the subject that this book should be found a prominent place in their library shelves.

R. J. S.

Intercrystalline Corrosion

In a Paper entitled "Intercrystalline Corrosion in Cast Zinc/Aluminium Alloys," presented by C. W. Roberts,* B.Sc., A.I.M., to the Institute of Metals, a record is made of experiments to determine the susceptibility of zinc/aluminium alloys to intercrystalline corrosion in air/water-vapour atmosphere at 95 deg. C., and to examine the effect of the presence of other elements on the incidence of this form of corrosion. Alloys of various compositions within the range aluminium 0 to 22 per cent., copper 0 to 1.5 per cent., magnesium 0 to 0.09 per cent., lead, tin and cadmium 0 to 0.030 per cent., bismuth 0 to 0.016 per cent., and manganese 0 to 0.050 per cent. were prepared and tested in the as-cast condition. The main conclusions drawn from the work are that: (1) intercrystalline corrosion is confined to the α (zinc-rich) phase, although attack is more severe when the β (aluminium-rich) phase is also present, as a result of the larger surface area of the α grains in the two-phase alloys; (2) the severity of attack is greatly increased by the presence of small percentages of lead, tin, cadmium, and bismuth; (3) the addition of a small amount of magnesium greatly reduces the severity of the corrosion, whether impurities are present or not, provided conditions are such that intermetallic compounds of magnesium with the impurity elements are not formed; and (4) the presence of copper increases the resistance of two-phase alloys to intercrystalline attack. The results of the investigation and those published by other investigators are discussed, and tentative theories are put forward to explain certain aspects of the phenomenon.

* The Author is attached to the research department, Imperial Smelting Corporation, Limited, Avonmouth.

According to a report from Paris, negotiations for the formation of a Franco-American venture to prospect and possibly exploit the manganese occurrences near Franceville (Gabon) have led to the signing of a temporary agreement which requires, however, approval by the French Government. The agreement envisages the formation of a research company with an initial capital of 5,000,000 fcs. (£5,000), of which 65 per cent. will be taken by United States Steel, 15 per cent. by the French Government's Bureau Minière de la France d'Outre-mer, and 10 per cent. each by the Cie. Minière de l'Oubangui Oriental and the Mokta-el-Hadid.

"An Enlightened Industry"

Extracts from Mr. E. Hunter's Presidential Address

At the beginning of this session, Mr. E. Hunter was formally inducted as president of the Birmingham branch of the Institute of British Foundrymen and what follows is taken from his inaugural address:—

Forty-eight years ago, a group of foundrymen, about seven in number, gathered together to form an association in which foundrymen could get together to discuss mutual problems, to exchange ideas and generally raise the standard of education within the industry. This movement, which was the beginning of the Institute of British Foundrymen, was started at a time when craft prejudice was strong and methods of manufacture were treated as trade secrets. These were the barriers to progress which this body of men were determined to break down. Their wisdom began a new era, an era of enlightenment and progress which has transformed the foundry industry.

At the turn of the present century, the methods employed in the foundry were little better than those used in the eighteenth century. The manufacture of a casting was very much a craft, indeed it was looked upon by many as a craft not calling for a great deal of intelligence. In some of the early papers given to the Institute, one reads of the anxiety amongst members being caused by the fact that it was only the low-grade boy who was attracted to the industry. The concern was such that, in 1911 a resolution was passed "that the Council should form a sub-committee to deal with the matter and report to the Council as to the best means to be adopted to promote better education of young foundrymen." So the battle against ignorance began. The early idealists were quickly joined by others, until to-day the Institute stands 5,000 strong—but the battle for better education still goes on.

Increase in Complexity

To-day the educational problem is more complex because the pattern of the industry is changing. It is an industry—so rich in tradition—which is steadily moving from one in which creative art took so great a part, to one in which ultimately the laws of science will govern and the technicians take over completely from the craftsmen. There are many who would throw doubt on such a possibility, but, to these, one would point out that the forces of necessity are strong and relentless, and we find ourselves being ruthlessly propelled along the road called progress. As the milestones go by, so foundrymen find themselves being more and more involved in the technical developments of the age. As each new development occurs, so the demands made upon the industry become greater and more exacting.

The foundry industry is proud of the fact that it has always been able to respond to the demands made upon it; as casting problems increased, so the industry evolved means of overcoming them. When the call for greater mechanical strength was made, the industry was ready and produced irons with improved properties. When the need was for greater output, the industry increased its mechanical aids and produced the output required. Such progress must and does increase the complexity of industrial life, the call for manual skill diminishes and the call for technical knowledge and supervision increases. Therefore, as progress is made along the path of technical advancement, so the strain on supervision inevitably grows. Much of this strain must fall upon shop supervisors, or, as we know them, the foundry foremen, and, as time moves on, so their job will become more technical. The old conception of what made a good foreman will surely disappear, and in his place will come the highly-trained technical supervisor, who, in the larger foundries, will, in all probability, be a specialist in one particular branch of the industry.

In the past, craftsmanship and ingenuity have sufficed to keep the industry in the fore, but, living as we do in a time of breath-taking development, these assets, valuable as they are, will not be enough to keep the foundry industry in pace with the rest of the industrial world. To be ready for this, more attention must be given to the delegation of responsibility in the foundry; to the recruitment of people suitable for training into production supervisors, and to the training of such people. I think it was Mr. John Gardom (past-president of the Institute) who once said that "Good supervisors like good castings are made, but inherent properties in each case are an advantage." Reliance must not be placed upon the possibility of a good man developing among existing foundry personnel, but pains must be taken to find these people at an early age and develop them.

Emphasis on Student Technicians

It is possible that the technical requirements of supervision may eventually call for people of higher education, probably those having a university training. This is perhaps thinking a long way ahead, but I see no reason why we should not see more secondary-school boys entering the foundry industry now. By all the laws of reason, such boys should provide a much greater percentage of people suitable for the responsibilities of supervision and, by virtue of their advanced education, might be counted on to respond more readily to technical training. It may be argued that the need is for more operators but, whilst the need for more operators may be great at the moment, the real shortage in the future will most certainly be in supervision. This can be substantiated by the fact that in 1951 only 736 boys took the City and Guilds examination in patternmaking and in foundry practice. Of these, 256 passed in patternmaking and 177 in foundry practice. Assuming that this is a yardstick of the number of suitable candidates coming along for foundry supervisory jobs, then it would appear that unless some drive is made in recruitment, the number of candidates available is going to be a small per cent. of the number which will be required. Fortunately, the number of students enrolling at technical colleges for foundry courses is increasing each year, and more colleges, and even some public schools are installing small experimental foundries.

The student sections of the Birmingham branch are extending each year and are bringing forward young men who may well be the future leaders of the industry. Foundrymen must, however, employ more of these people and, to encourage them, in the idea that the foundry is not an attractive place in which to work must be "debunked." The foundry can and must be made attractive. We must make known to our youth the thrills of achievement and the adventures into the fields of development which await within our industry. Time is no longer on the founders' side. In an age which has given birth to faster-than-sound aircraft and atomic power, only the courageous can succeed, for there is little space for the timid. Let us then have no more talk about the foundry being the "Cinderella" of industry, but resolve to face up to our shortcomings, master them, and so keep the foundry industry in the forefront of industrial life.

In response to a proposition by Mr. H. Hall, seconded by Mr. R. Shotton, at the conclusion of Mr. Hunter's address, members applauded warmly their appreciation of the opinions expressed by the new president.

Midlands Employment

Unemployment in the Midlands has doubled in the past year, from 12,998 in January, 1952, to 25,701 in January this year, the Midland Regional Board for Industry was told at its meeting in Birmingham on February 17. In spite of these figures Major C. R. Dibben, chairman, stated that the Board remained "moderately optimistic with regard to the future." He pointed out that some firms which were on the downward grade had now experienced a reversal and there was reasonable hope in the region that an upward trend will come at the end of April or in May. The news from Australia was a heartening feature, Major Dibben said, although the Midlands would not feel the benefit of it for a month of two. It was, however, an indication that markets would reopen to Britain when the economic position of the importing countries justified the change.

A COMPOSITE DISPLAY of products supplied by 32 firms is being arranged by the Federation of British Hand Tool Manufacturers and the National Federation of Engineers' Tool Manufacturers for the International Trade Fair to be held in Toronto in June. The exhibit will be manned by experts from the Federations, assisted by salesmen and representatives of their Canadian agents.

I.E.E. Honorary Member

The council of the Institution of Electrical Engineers has elected Sir Harry Railing to honorary membership for his services to the electrical engineering profession and to the science, and for his services to the Institution. Born in 1878 and educated at Munich University, Sir Harry received his early training and practical experience on the Continent and in the United States. He joined the Witton engineering works of the General Electric Company, Limited, in 1905 to take charge of the test department and laboratories. Two years later he went to London as chief technical adviser to the head of the company. In 1911, he was made a director and placed in charge of the engineering works at Witton, where he remained for 20 years. In 1933 he left Witton for London, although he continued to control the works' organization, and in 1941 he was appointed joint general manager of the company, becoming successively vice-chairman and chairman and joint managing director. He received the honour of knighthood in the New Year Honours List of 1944.

A member of the Institution since 1912, he was elected a member of council in 1926, being elected a vice-president in 1928. He served again on the council from 1942 until he was elected president in 1944. He also served as chairman of the council of the British Electrical and Allied Manufacturers' Association in 1944-1945, and president of this association in 1952; vice-president and member of the management board of the Engineering and Allied Employers' National Federation since 1944; a member of the Department of Overseas Trade advisory council, of the heavy electrical plant committee of the Ministry of Supply since 1944, and of the engineering advisory council to the Ministry of Supply since 1947. In 1951 he was appointed a member of the Iron and Steel Consumers' Council. He is a past master of the Worshipful Company of Patternmakers.

Dinner

FOUNDRY COKE MERCHANTS' ASSOCIATION

Many prominent founders were among the 150 members and guests at the annual dinner of the Foundry Coke Merchants' Association which took place last Thursday at the May Fair Hotel, London. In the chair was Mr. Arnold Carr and supporting him at the high table were Mr. J. Y. Feggetter, Mr. Tom Brown, Dr. Cyril Dadswell, M.I.MECH.E., Mr. R. H. Thornley, Mr. R. J. Macdonald, Mr. F. W. Rowe, B.SC., Mr. G. H. Bedford, Mr. H. B. Darby, Mr. F. Houghton, Mr. Wilson Wiley, M.A., Mr. J. Y. Stannier, Mr. Barrington Hooper, C.B.E., Mr. W. H. Sharp, Mr. A. Bradbury, Mr. A. G. Drake and Mr. A. E. Bond. After the loyal toast, that of "our guests" was proposed from the Chair and replied to by Mr. J. Y. Feggetter, divisional marketing officer (carbonization and briquettes) of the National Coal Board. Among other points, Mr. Feggetter mentioned that last year's output of iron castings was likely to be a record—3,850,000 tons was the latest estimated figure. The foundry coke merchants, too, had had a good year. Mr. F. W. Rowe, managing director, K. & L. Steelfounders and Engineers, Limited, on behalf of the foundrymen present, also voiced the thanks for the guests. The toast of the Association, again, was proposed by a foundryman—Mr. Tom Brown, managing director of the Sheepbridge Group; in this case the reply was by Mr. H. Basil Darby. Entertainment was provided by the Foxhill Singers. The arrangements for the dinner were handled by Mr. F. Arnold Wilson.

Research for the Foundry Industry*

Cast Iron: by H. Morrogh
Steel: by F. N. Lloyd
Non-ferrous: by W. A. Baker

(*Continued from page* 221)

NON-FERROUS RESEARCH AND DEVELOPMENT

Before the first world war the non-ferrous founding industry was mainly concerned with the casting of brass, including high-tensile brass, and of bronzes and gunmetals. To-day, the light (aluminium and magnesium) metal founding industry is of the same magnitude as the heavy non-ferrous metals founding industry and, unlike the heavier metals which are mainly cast in sand moulds, a large proportion of the light metals is cast in metal moulds by the gravity- and pressure-die-casting methods. To complete the picture, one must bear in mind also the large volume of zinc-base and other low-melting-point metals cast to-day by the pressure-die-casting process. The present volume of copper-base die-castings production, although by no means negligible, is very small in comparison with light metal or zinc-alloy production by this method.

These few words about the make-up of the industry bring out two respects in which it differs quite significantly from its ferrous counterparts, namely, in the wide variety of metals and alloys cast and in the fact that a large proportion of the castings is made by die-casting processes. These differences have an important bearing on the industry's needs for research and development. Because of the variety of alloys cast, the non-ferrous founding industry has many problems of a metallurgical character and of these not a few are common to the wrought non-ferrous metals industry. Not so long ago, some of these problems could be tackled usefully with fairly simple equipment, but with the continual advance of knowledge it becomes increasingly necessary to employ the most modern and searching techniques. It follows that any organization attempting to deal with these problems must be equipped with every available facility even though some of the less common but relatively expensive equipment may be called on relatively infrequently. For example, into this category comes equipment for spectrographic, X-ray and electron-diffraction examination, for creep and fatigue testing, for the estimation of gas contents by vacuum extraction, for studies of corrosion behaviour, etc. Of course, the possession of the equipment is not in itself very helpful, for with it must be provided specialist staff experienced in the application of these techniques, and consequently the industry's needs for work on its basic metallurgical problems can only be met by the facilities of a large research laboratory. It will be agreed that no single non-ferrous founder could afford to maintain such facilities and the logical alternative is to provide them by co-operative action. Even so, it is doubtful whether the non-ferrous founding industry could sustain such facilities alone. For this reason, and because many of its metallurgical problems are common to the wrought non-ferrous industry, both sides of the industry seek solutions to their metallurgical problems through a common organization—the British Non-Ferrous Metals Research Association.

Problems Tackled

The B.N.F. (to use a common abbreviation) has tackled some of these problems and in the past 10 or 15 years has gone a long way towards providing founders of both the heavy and light non-ferrous metals with a better understanding of the manner in which various types of alloy solidify in the mould and in showing how certain of the casting characteristics of alloys depend on variables like alloy constitution, grain size and gas content. Information on these topics is, of course, of fundamental importance to the founder and, while some progress has been made, there still remains ample scope for further work in this particular field.

To quote two examples, the effects of grain-size in light-metal castings are now understood in some detail and in the light of recent studies of the mechanism by which grain-refinement is brought about the industry is better able to control this variable in practice. The B.N.F. has applied this knowledge to the problem of the grain-refining of copper-base alloys and has developed methods which work consistently in the laboratory at least. The effect of this grain-refinement is now being studied and it is already clear that some of the effects are quite different from those encountered in light alloys.

It is obvious that a good deal more work will be necessary before the effects are understood sufficiently well to know whether grain-refinement will offer in copper-base alloys the advantages which are well known to accrue in light metals. Again, the B.N.F. established some years ago, what quite a lot of people already suspected, that a certain amount of gas in cast copper-base alloys is often a boon rather than a disadvantage and has shown how, in alloys of the bronze and gunmetal types, gas may be picked up from the mould in controlled amounts when its presence is desired. Similarly, it is known that gas is often useful in light metals, but to date

* Symposium held by the London branch of the Institute of British Foundrymen, Mr. D. G. Bisset presiding. The speakers are, respectively, research manager, British Cast Iron Research Association; chairman, Research and Development Division, British Steel Founders' Association, and research manager, British Non-Ferrous Metals Research Association.

Research for the Foundry Industry

the B.N.F. has not been able to devote to the subject the effort necessary to establish the effects of gas quantitatively or to develop practical methods of exploiting them.

Thermal Gradients and Solidification

In more recent years, the B.N.F. has devoted a good deal of attention to thermal gradients in solidifying castings and to the correlation between these and the soundness of the castings; current work is concerned with means of maintaining the desired steep gradients in freezing castings. There is much scope for work in this field, where the industry needs basic information, and there is equal or even greater scope in the study of moulding materials and other factors affecting the surface finish of castings, studies of the influence of impurities, development of quick methods of analysis and so on. The only real obstacle to progress with these outstanding problems is lack of money, and if the industry desires to increase its research effort—as all seem to agree it should—the facilities for co-operative research are there and all that is necessary is to pay for their employment.

In this connection, a word on the present scale of co-operative research for the ferrous metals foundry industry is appropriate. The B.N.F. spends about £125,000 per annum, of which about £40,000 is devoted to information and technical advisory services to its members and the balance, £85,000, to research. Of the latter, less than £10,000 is devoted to research on non-ferrous founding and even this modest effort is not entirely paid for by the foundry industry.

The foregoing comments are confined to the industry's needs for research on problems affecting the quality of its products, but of course there are other directions in which an expansion of the industry's research and development efforts would quickly pay handsome dividends. Not the least important of these is an immediate and intensive effort to apply in practice the information already available. The B.N.F. has attempted some efforts in this direction in the last few years, but, for financial reasons, this has only been possible at the expense of its research effort.

Application of Findings

However, the most urgent problem facing the industry to-day is to develop and apply methods of production which will lower the cost of its products. In this connection, the foundry productivity teams which have visited the United States in recent years are all impressed with the value of simple mechanical aids and standardization of materials, and, bearing in mind that the non-ferrous founding industry includes many units of modest size, there seems to be a good case for a co-operative effort in this field also. Clearly these problems can only be tackled by works studies and, if the industry would finance the work of a team of metallurgists and production engineers and permit them to compare practices and results in individual companies' works, the information so gained would be invaluable to the sponsors. There are obvious snags in this proposal. Many firms might well fear that their own special "know-how" would be acquired and disclosed to all and sundry by these roaming experts, but personal experience of co-operative research encourages the opinion that this difficulty could be avoided and that the efforts of the liaison men could be confined to subjects of common interest to the ultimate benefit not only of the industry as a whole, but to the individual firms concerned.

DISCUSSION

THE PRESIDENT (Mr. D. Graham Bisset), in opening the discussion, said the speakers had obviously had to labour under the handicap of being obliged to condense their remarks into a relatively short space of time, though it was evident that each could have spoken for the whole evening. They had, nevertheless, given a great deal of general information, and were no doubt prepared to give still more by answering questions.

MR. J. F. CHAMBERS thought in the limited time available, Mr. Morrogh had given a very lucid description of what the British Cast Iron Research Association was doing, and he found himself comparing the present with the past. It had been said that there were fourteen research workers, and if one took into account that number and an adequate number to service them, in a total staff of ninety it showed there must be a very high proportion of men engaged on problems and development work. It showed to what extent the industry was being serviced on members' individual problems. Such problems were stripped to their fundamentals and tackled on that basis. It was that analytical approach, guided by practical knowledge of foundries' day-to-day problems, that was refreshing and was most likely to be of assistance.

Neglect of Fundamental Research?

DR. A. B. EVEREST continued the thoughts of Mr. Chambers with regard to the place of the research association in the industry. He thought he was right in saying that the three Associations represented at the meeting came under the Department of Scientific and Industrial Research. There seemed to be some evidence these days of a tendency to swing from scientific research to industrial research within the Associations. Progress in the foundry industry was going to depend upon improvement in the materials they made. Like Mr. Chambers, he paid tribute to Mr. Morrogh for the fundamental work he had done, but the report that had been given on behalf of the cast-iron section, as well as that on behalf of the steel section, seemed to deal more with the industrial aspect, and did leave one wondering if there was enough effort being given to fundamental sides.

Considering the research force of the country as a whole, it should not be forgotten that the Association represented only a part of the total effort. On the fundamental side, Dr. Everest certainly thought that university research departments must be included. They could do very good fundamental work, though they sometimes suffered from the disadvantage that there might be a lack of continuity. There were also sections of industry, like his own (nickel), and tin and zinc, which had their own research and development organizations. He particularly wished to emphasize that the Institute also had its own technical committee doing quite a lot of the "good-housekeeping" type of research which seemed to be undertaken now to an increasing degree by the research associations. He questioned whether that was quite right. He would not say that anything the research associations were doing should be dropped, but he wondered if they had enough facilities, money and men, to do everything they ought, and he would like to see more effort being made on the fundamental side to reinforce some of the work that could be done by the Institute's technical committee.

Generally speaking, neither the time that was given by the various technical sub-committees in the Institute to research, nor the wide scope of the work undertaken, were realized. Industry would benefit, however, from a closer liaison with the research associations so that their work could be more closely integrated. Reference had been made to the need for studying the properties of new materials. Here again, there should, of course, be a link-up with the various engineering research associations and institutes.

Mr. Baker thought there was a great deal in what had just been said. At the moment he was less concerned with the direction in which the non-ferrous association's effort was expended than he was with the fact that the effort was not large enough. If works laboratories could deal with the sort of problems that Dr. Everest had described under the heading of good-housekeeping practices, and if the effort in the co-operative research associations could be freed to do fundamental work, that would be a step forward, but finance was needed for both types of work and there did not appear to be enough of it at the moment.

Mr. Lloyd said that those in the steel foundry industry, with so much on their hands to do and with so few resources, had naturally concentrated first on the industrial side of research, but they had also sponsored research projects on various subjects in the universities. Twelve universities to-day were working on researches they had sponsored and which they were very largely financing. The idea had been to leave the more scientific side to the universities while the Association concentrated on the industrial side.

Research in Universities

Mr. Pendrey said that, in his opinion, the universities—he was thinking in particular of Birmingham and Cambridge—had a share in fundamental research on physical metallurgy and that kind of thing. The point to remember about the associations represented was that they were combinations of industry and those "who paid the piper called the tune." Research organizations were paid to do a job and there it ended, but there should be "Chairs" well endowed and universities should have equipment at least as good as the industrial associations, perhaps better. Then there would be a place in which the resources of the whole country could be concentrated and used for research.

One thing the speakers had not said was how to radiograph to-day the casting to be made to-morrow. That was a problem to which each of the associations could contribute something. He wanted this country to have direct radiographic viewing of castings, and to see some research done on that so that one could have a 200 kv set independent from the foundry, and have the work done cheaply.

As to direct spectrography, why was more expected from direct reading than from traditional methods? He could not see that direct reading would improve the sensitivity of detection.

Mr. Williams thought that by now members were pretty well agreed about the value of research. What struck one about the subject, however, was the large number of people who supported the idea compared with the very small number who did something about it. There were perhaps foundries in this country in which there had not yet been applied the results of research work done at the time of the first world war. People looked upon research as something mysterious which could be left to other people in laboratories, but there was not enough individual work being done which was based on curiosity to find how a thing should be done in a practical way and to make a better profit. At the present time there was much need for application of the results of researches already completed.

The President thought the lecturers would agree with what had just been said. It was not much use for research to be carried out if founders did not put it into practice. One of the difficulties of the research associations was how to get the results of their work put into general service.

Co-operation Between the Associations

Mr. A. R. Parkes, having in mind the unification of research for the industry rather than its existence to serve separate interests, asked if there were any liaison between the three Associations represented so that before they started a project they discussed it amongst themselves and said, "We know this or that much about the question, you start from here." Was there any such detailed co-operation? For example, there appeared to be some overlapping on the dust problem in foundries and perhaps there were other instances.

Mr. Baker replied that there was co-operation between not only the three Associations represented but between all research associations. That was understood; the directors of the research associations had a standing committee to ensure that close liaison was maintained between them. Information was exchanged, and it was agreed that there should be consultations when one research association could help another. For example, his organization was at the moment working on refractories for lining certain non-ferrous melting furnaces. The problem was one which the Refractories Research

Research for the Foundry Industry

Association was not particularly concerned to tackle itself but had given his Association the benefit of advice.

Mr. Lloyd, speaking for the steel side, said there was certainly co-operation. Numerous committees that were set up ensured that, and there was an element of competition, which was a good thing. The steelfounders were certainly in the course of setting up a much bigger organization than they had started out with, and no doubt one reason for that was the healthy competition of every research association operating in the field. Co-operation would be automatic, but he did not think it was desirable to eliminate an element of friendly competition.

Mr. B. Levy said that he would like to see a greater use of the X-ray camera. Much useful knowledge could be obtained by film studies of moulding while the metal was running in and while it was cooling.

Mr. Baker said he was quite certain, so far as non-ferrous metals were concerned, that one would not learn very much about what was going on in the solidifying casting by this means, but one would learn a great deal about how the metal flowed into the mould, and that was quite important.

Mr. Gladwell said one reference had been made to grain-refinement, and although the meeting was hardly one for a detailed study of the subject he would be interested to hear Mr. Baker give a further explanation on the desirability or undesirability of grain-refinement.

Secondly, it would be very interesting to hear in connection with fundamental research if anyone had ever thought of trying to find at least one new material which, when it was introduced to the foundry to supersede an existing material, did not entail a more difficult job for founders.

Mr. Baker gave an assurance that his organization was not unmindful of the difficulties. On the non-ferrous side, it was an unfortunate fact—the cussedness of nature—that materials which were attractive from the mechanical-strength point of view were frequently constitutionally unsuitable as casting alloys. In saying that, he was referring to the manner in which the material crystallized.

As regards Mr. Gladwell's first point, Mr. Baker said he could not go into the matter at length, but could assure the speaker that he had come across cases where grain-refinement was not a good thing.

The President, in bringing the discussion to a close, said he was not going to attempt to sum up, it was indeed beyond his capacity to do so, but he was happy to feel that the visitors who had spoken would not think their time had been wasted. The Institute and the Associations would have to consider some of the points carefully, particularly those of Dr. Everest about whether work could be better sub-divided and better results achieved by more concentration on scientific research as opposed to industrial research.

Vote of Thanks

Mr. G. C. Pierce, in proposing a hearty vote of thanks refrained purposely from asking additional questions, but said that Mr. Morrogh's remarks had reminded him of an illustration he had seen some years previously of the best way of testing the suitability of moulding sand. The mechanized foundry plant he was visiting appeared to be complete, but on investigation he had noticed a couple of old men sitting at two points on the conveyor belt and they had told him that they were in fact testing the dampness and bond of the sand by "feel" before it went into the machine, despite all the scientific work that was going on down below. It was pleasing to learn from Mr. Morrogh that this process had now become more a question of instrumentation.

Rather analogous to Mr. Baker's endeavour to put coarse-grain metal where it could be least harmful were the remarks of a very prominent engineer, who had given the foundry full credit for placing blowholes where they did not matter in the casting. Similarly, a number of years previously one of the branch presidents had dropped a bombshell by saying he was inclined to the theory that it would be far more beneficial to introduce some gas into non-ferrous metals than totally to exclude them. Perhaps the new theories meant investigators had been running round in circles!

Mr. Beresford, in briefly seconding, said that a lot of lip-service had been paid to research in the past and he was very glad to see that that was now being changed into action. At one of the big research establishments in America there was a large sign over the door saying, "Research Pays Dividends," and that was perfectly true.

The vote of thanks was carried by acclamation, and the meeting then terminated.

Head Wrightson's Spanish Contract

With reference to the brief statement in the Journal recently regarding contracts secured by a group of British heavy engineering manufacturers for the supply of iron and steel works equipment for a new works to be built at Aviles in the Asturias on the Biscay coast of Spain, Head Wrightson & Company, Limited, of Teesdale Iron Works, Thornaby-on-Tees, announce that theirs is one of the largest shares in the project. Seven years' anxious effort which might, conceivably, have been in vain, brought them a £3,500,000 contract. They are also responsible for the design and supervision of a further £2,000,000 worth of work which will be supplied from Spain. About a dozen experts from Tees-side will go out to Spain on this job. It was in 1945 that the firm's Spanish agents first heard a "whisper" about the proposed iron and steel works, and only on February 7 last was final agreement reached with the Spanish company.

Mr. Peter Wrightson, the firm's deputy managing director, has been to Spain twice and Mr. T. H. Stayman, chief engineer of the Head Wrightson McKee Iron and Steel Division, three times. Since the "whisper" developed into talk and the talk into deeds, many members of the staff have put in long hours on design and estimating, and latterly, in preparation of the tender and contract. The managing director of the Spanish company for which the works are to be built toured America, Germany, France and Switzerland before deciding to place to the order with Head Wrightson. Head Wrightson's plan to complete shipment of all equipment from Thornaby in 42 months, which means that progressively during that period the drawing office, purchasing branch, and constructional shops will be kept busy.

Avoidance of Blowholes when Welding Cast Iron

By "Manutention"

Blowholes in a welded joint are an arresting and immediately condemning feature and next to actual cracking this is perhaps the most serious defect, which assumes maximum significance where parts must be pressure- or liquid-tight. Some metals are more prone to it than others, cast iron being a case in point, and the proficiency of cast iron repair men is frequently assessed directly according to their ability to produce dense and pore-free deposits. Cast-iron repair welding to-day embraces work of a most varied type, much of which must conform to quite a high standard. Rebuilding of valve seatings, for instance, allows no latitude whatever in the matter of porosity and even pinholes spread across a narrow working face will condemn the repair from the outset. Similar conditions apply in the refacing of sealing rings, building up worn plastic and glass moulds, resurfacing of index plates and discs, etc.

Causes

Most forms of porosity in welding cast iron are caused by gas becoming entrapped during the process of weld solidification, but shrinkage is sometimes responsible. The two types are quite distinctive, however, gas holes being smooth and fairly regular, whereas voids resulting from shrinkage are generally rugged and shapeless. Blowholes are the main concern in welding cast iron. A simple demonstration of welding with a rusty cast-iron welding rod will produce a weld full of holes which promptly emphasizes the need for initial cleanliness both in filler metal and parent casting. The blowholes in this particular case are caused by reaction between the oxygen in the rust and the carbon in the melt immediately the rod is plunged in. Liquid cast-iron weld metal contains carbon dissolved in iron and reaction between the former and the oxygen content of the rust produces bubbles of carbon monoxide which immediately rise to the surface on account of their buoyancy and are expelled ultimately at the surface as carbon dioxide. As welding proceeds, however, metal immediately behind the flame is solidifying and gas then in the act of rising is trapped; hence the familiar blowholes which appear as spherical or ellipsoidal cavities of silvery appearance. In certain cases, such as when solidification is delayed slightly, "worm" holes are produced owing to the gas having forced its way further upwards through the pasty melt, but becoming arrested ultimately by abrupt solidification. Steam, developed from any moisture present, can also be responsible for blowholes and both hydrogen and carbon monoxide if absorbed in any quantity from the reducing zone of the welding flame (as with an overheated or superheated melt) may also be an underlying cause. Entrapment of air during actual deposition of weld metal is yet a further contributory factor.

Remedies

Blowholes are not curable once the work has cooled, but a great deal can be done at the welding temperature and the problem of their removal will not, of course, arise if conditions are correct at the start and if a proper welding procedure is employed. The question is really one of examining various factors in cast-iron fusion welding and thereafter to regulate procedure towards avoiding blowholes, rather than to study means for their elimination once formed. Unclean material can easily give rise to the trouble and the casting to be welded should therefore be locally clean; that is free from rust, paint, grease, etc., and it is advisable to remove the casting skin top and bottom for about ¾ in. back from the joint. The vee edges should afterwards be rounded to prevent local hot-spots during welding. Where there are casting flaws, these should be opened right out to sound and clean metal, as such cavities will invariably contain some sand and other occluded matter which may give rise to blowholes. Flame-gouging and cutting, if used as a means of preparing iron castings, should always be followed by grinding in order to remove oxide from the weld faces. This is very important. Equally important is the use of a clean cast-iron iron filler rod which for grey cast iron should be of the "Super-Silicon" type and for important work the skin should be removed altogether, by grinding. A good flux is necessary, but must be used sparingly, its purpose being to detach oxides formed during welding and to retain them as a liquid slag out of harm's way on the surface; otherwise they will sink into the weld metal and react with carbon to form gas. A powder flux is best for cast iron and should always be used and kept dry. Water mixed pastes are not recommended in this instance.

Welding Procedure

Flame condition should on no account be oxidizing and since a neutral flame, when used over a long period, will tend to approach the former state, the adjustment should show a faint "haze" of acetylene and be maintained so throughout welding. A soft flame is to be preferred. Jet size should be ample, bearing in mind the high specific heat of cast iron. Too little input of welding heat will invite poor fusion and the possibility of encountering cold shuts. Preheating, at least around the weld area, is absolutely essential.

During welding, the tip of the flame cone should be kept at least ⅜ to ½ in. back from the molten-pool surface. "Digging-in" is the surest way to obtain blowholes, since this part of the flame contains free oxygen which will immediately react with the constituents of the melt. Filler metal is added progressively with a "feeding" action and lifted out of the molten metal only when a little more flux is required; in this way oxidation is kept at an absolute minimum and transfer of the filler metal takes place under well-protected conditions. On no account must the filler be added in droplets, as the effect is then one of introducing heavily-oxidized particles of molten cast iron directly into the melt. "Puddling" is totally unnecessary; any form of mechanical agitation favours gas absorption and merely creates an excessively turbulent melt in which fresh areas of the surface are being continuously exposed to oxidation. Melting must take place smoothly and quietly always. As the weld metal is melted off, the flame should periodically be played over metal which has just solidified; that is to say the flame is passed back slightly in order to release any gas which may have become trapped and this item of procedure is important in the case of metal which is naturally "dirty" in spite of being cleaned as thoroughly as possible beforehand. Indication of an internally dirty melt is given when melting is accompanied by sparking and foaming effects and it is then the welder's job to clean it by removing impurities with his welding rod and making sure that gas content in the weld is at minimum before allowing his melt to solidify. Superheating of the weld must always be avoided, as gas absorption is much more pronounced with increasing temperature of the molten iron. Thus, the heat from the welding flame should be well distributed and the torch not held at any one point for too long. *Local* superheating may be brought about by the presence of sand particles which quickly become white-hot under the action of the flame and the operator should watch for these impurities and either skim or pick them off the melt on the end of his filler rod. Above all, the metal should solidify slowly, continuously and without any tendency to chill.

Where heavy work is involved and preparation has been carried out "hot" there will be a continuous, unbroken layer of oxide over the entire joint surface and where welding is carried out forthwith there is no opportunity for its removal. The solution for this is certainly not in adding copious supplies of flux, which is almost as bad as applying too little, but in the intelligent utilization of the method already described for the effective removal of gas which must inevitably be present in this case. Preparation of castings by heat may frequently be very useful, but it is undoubtedly the province of the expert to employ considerable skill in order to produce welds which are in every way clean and sound.

The foregoing remarks concerning procedure, if put into practice, will enable any welder of cast iron who possesses average ability to produce good welds consistently without blowholes—however difficult he may have found it hitherto—and will enable him to tackle the more important repairs to cast iron with greater confidence of success.

The Duke of Gloucester is to open a two-day "Gas Sales and Service Conference," which the Gas Council is organizing at the Seymour Hall, London, W.1, on March 11 and 12. An exhibition of domestic gas and coke appliances is being arranged at the hall.

Foundrymen Visit Clarke Chapman & Co., Ltd., Gateshead

Although the weather was far from being tempting, nearly a hundred members of the Newcastle branch of the Institute of British Foundrymen accepted the invitation of the directors of Clarke, Chapman & Company, Limited, to visit their foundry at Gateshead recently.

Originally founded in 1864 by Mr. William Clarke to manufacture marine auxiliary machinery, the firm moved to the present site in Gateshead in 1884, when Mr. Clarke was joined by Capt. Chapman. Ten years later, the Hon. Charles A. Parsons entered the company and during his five years there developed his turbine and eventually formed his own Company in 1889. It was during this latter period that Clarke Chapman's commenced to manufacture electrical gear, which still forms a large part of present-day activities. Since those early days, progress has been continuous and to-day, in addition to ship's auxiliary gear and electrical machinery, the Company manufactures colliery haulage gear, coal-crushing machinery, conveyors, steam boilers, ship's lighting installations, pumps, capstans, winches and windlasses. To meet the increasing needs the works have been greatly extended from time to time.

The foundry, although not designed on modern lines, is very efficient, judging by the present output of about 60 tons of metal cast per day. The moulding and core-making floor space has an area of 41,310 sq. ft., with a cleaning floor of about 10,000 sq. ft. Some idea of the output in relation to the floor area is indicated by the fact the area used per annual ton is 5.75 sq. ft. while the average for the United States is 9 sq. ft. and for the average foundry in Britain 17 sq. ft.

Melting Plant

The melting equipment comprises two cupolas (each fitted with inclined hoist charging plant) one 48-in. dia. and the other 30-in. dia. giving 8 and 3 tons, respectively, of molten metal per hour. A Stein and Atkinson rotary furnace of 1-ton capacity is also installed together with a 1-ton side-blown converter. Several moulding machines are also installed in the ferrous foundry. In the non-ferrous section, where a considerable quantity of aluminium-bronze castings is made, there are several pot furnaces each capable of taking 200-lb. pots, and gas-fired tilting crucible furnaces are also installed.

Of the 334 employees, 60 are hand moulders, 30 coremakers, 44 machine moulders and the remainder apprentices, dressers, and labourers. While the bulk of the castings produced in the iron foundry comprised the various grades of B.S.1452 (1948), several grades of alloy iron are produced including austenitic, Nicro-Silal, low nickel/chromium types, and also those containing molybdenum and vanadium.

Naturally, there was much to engage the interest and attention of the visiting foundrymen and since specialist staff were available for consultation in each section of the foundry and in the excellent metallurgical laboratory and chemical laboratory, the visit proved to be exceptionally interesting. It was reported that the staff were full of enthusiasm and anxious to answer the many questions levelled at them. Not only did the Company open their works to the visiting foundrymen, but a very substantial luncheon was provided. At the conclusion, the President of the branch, in thanking the directors and all those who had freely given their time to make the visit both interesting and informative, said what a great advantage it was to foundrymen to be able to visit foundries and to discuss the problems of castings production in familiar language with experts.

Cores for a Cooling Table

By W. Gudgeon

The hollow cooling-table casting, represented by Fig. 1, presented no problems from the moulding angle, but a little thought and care were necessary when making the four cores which go to make the complete mould. Initially, one or two suggestions had to be dropped after the first set of cores had been made, as they were found to be impracticable. For example, a core-iron was cast for making the first core, but this was later considered uneconomical as it had to be broken to get it out of the casting, and as the first order was for thirty castings that would have entailed 120 core-irons. Instead, a number of single

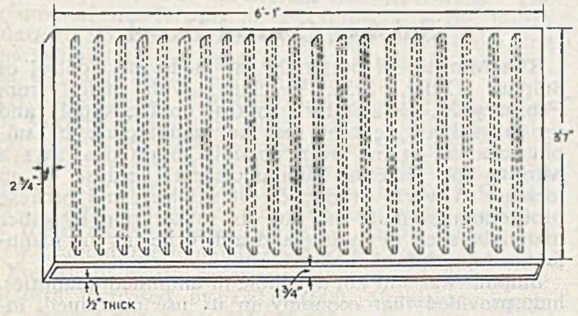


FIG. 1.—*Hollow Cooling-table Casting, the Making of which is Described.*

irons were cast in open-sand moulds, of $\frac{1}{2}$-in. square section. These were found to be much easier to handle and could be released from the casting with little trouble. After being used seven or eight times, however, most of them became distorted and had to be replaced.

Setting Core-irons and Venting

To bind the six irons, after the first course of ramming, a piece of wire, bent over $\frac{1}{8}$ in. at each end, as shown in Fig 2, was bedded across them. This method made a firm core which allowed them to be handled several times before being set in the mould. Fine ashes were used to vent the first four cores but this method proved both clumsy and a failure as the air and gases were too long in escaping, so that the metal was blown out of the mould with great force and a waster casting resulted.

Six holes were then bored at each end of the corebox to take a vent wire $\frac{1}{8}$ in. dia. and when the cores were dry a rod $\frac{1}{4}$ in. dia. was run through every vent as a precaution. Chaplets were not required to hold down the four cores at the time of pouring, as the $\frac{1}{2}$-in. slots, along with four risers placed on top of the casting, relieved the pressure.

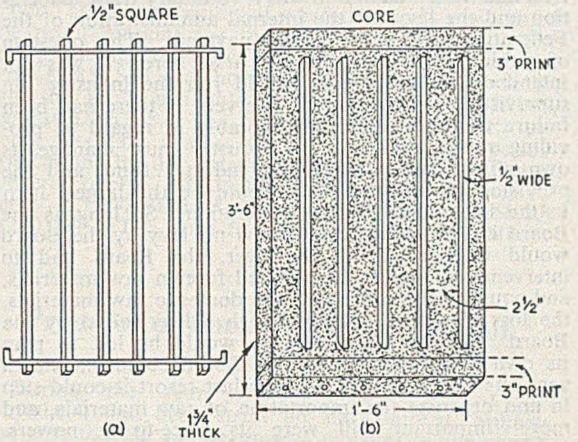


FIG. 2.—*Core Design and Reinforcement for the Cooling Table.*

The metal entered the mould through four flat gates at the bottom and, as the overall thickness of the casting was only $\frac{1}{2}$ in., the job was poured at a high temperature. No facing sand was used on top of the mould. Each casting weighed 8 cwt. 3 qr. 18 lb. A water pressure test was applied, for the purpose of revealing any patches of porosity, as this was a cause for rejection. More than fifty of these cooling-tables were made and gave every satisfaction.

House Organs

Ruston News, Vol. III. No. 54. Published by Ruston & Hornsby, Limited, of Lincoln and Grantham.

This issue carries the first of four instalments of the presidential address given by Mr. R. C. Shepherd to the Lincoln Engineering Society. His subject was Founding, Past, Present and Future. This first part covers the beginnings of the industry.

Craven Machine Tool Gazette, Vol. XIII, No. 4. Issued by Craven Brothers (Manchester), Limited, Vauxhall Works, Reddish, Stockport.

In the Editorial, Mr. J. R. Greenwood establishes a claim, to refute gossip about the Hanover Fair, that Britain can make heavy machines equally as well as any Continental country. This issue also carries an article describing and illustrating the firm's foundry apprentice department, which it is satisfactory to note is making excellent progress.

New Catalogues

Foundry Sand Preparation. Herbert Morris, Limited, of Loughborough in Book No. 235 describe and illustrate various types of sand-preparing plants. The first to receive attention is the Speedmuller, a fast-working machine turning over the sand, so it is stated, 200 times per minute. Next to be considered is the "Sand Preparator," a modernized version of the now out-moded riddle, giving sand suitable for charging into the muller. Indeed in one illustration they are shown as an integrated unit. The third machine dealt with is the Mulbaro, which, as its trade name indicates, is a muller mounted on a wheelbarow for use in a jobbing shop. Finally there is the "Screenarator" which sieves sand and expels it in a stream to fill the sand bunkers. The catalogue is really handsome and is of such a character that it makes a more than useful addition to the bookshelf of trade literature covering foundry machinery. It is available to readers on writing to Loughborough.

Parliamentary

Iron and Steel Bill

Minor changes in the Iron and Steel Bill affecting the powers of the new Board were agreed to by the Minister of Supply during the consideration of the Bill in Committee last week. Utilization of the levy to be made by the new Board which is to be set up and in particular the levy on production paid by the steel companies to the British Iron and Steel Federation was the subject of some discussion.

MR. SANDYS, Minister of Supply, said that the industry would not be asked to pay contributions to meet any extraneous expenses of the Board. The basis of that scheme of contributions was a matter for the Board to decide, subject to the approval of the Minister. The Iron and Steel Federation was a voluntary trade association and the levy for the internal administration of the Federation was a voluntary payment. The question of public supervision did not arise here. It was not intended that the Board should run the industry but supervise it, with power to intervene if there had been failure to run it efficiently, notably in regard to providing raw materials. The industry must manage its own affairs and run its own industry fund, and the provision of raw materials would be the largest item in the levy raised by the Federation. So long as the Board did not have to intervene no levy by the Board would be needed. If, however, the Board had to intervene and import high-priced foreign raw materials, and equalize the price with the domestic raw materials, the loss would be borne through a levy raised by the Board. Normally the industry would be left to plan its own arrangements, but the Board could exercise a very effective influence. In the last resort it could step in and organize the importation of raw materials, and more important still were its price-fixing powers, because the Federation, in fixing the levy, would be dependent on being able to reckon that levy as part of the cost of production.

The Minister said that the Iron and Steel Federation was an important, unusual and influential trade association. It was a voluntary organization composed of firms which made up the industry and which was supported by their voluntary contributions. Neither the Board nor Parliament should require to know how money raised by the Federation was spent. It would only be in relation to its duty of ensuring efficient production and fair prices for the consumer that the Board would have the right to task for that information.

Foundry Coke Returns

Asked if he would abolish the weekly fuel returns required from foundry firms and substitute quarterly returns, MR. GEOFFREY LLOYD said that foundry coke was a highly specialized product and supplies were strictly limited. It would not be possible to ensure an equitable system of distribution without up-to-date information regarding consumers' usage and stocks.

THE COST, during the past year, of the work of the Fuel Research Organization of the Department of Scientific and Industrial Research in the field of atmospheric pollution was approximately £3,000, stated the Parliamentary Secretary of the Ministry of Works.

THE MINISTER OF SUPPLY, Mr. Duncan Sandys, is discussing with the President of the Board of Trade what relaxations in the prohibited list of end uses of nickel could be safely permitted. In a written reply, he stated that there was still insufficient nickel to allow restrictions to be removed entirely.

R.T.B.'s £10,500,000 Profit

After providing depreciation of £1,475,407, but before tax, the net profits of the group of Richard Thomas & Baldwins, Limited, for the year ended September 27, are £10,560,302. After taxation of £6,845,211 the balance of profits is shown as £3,715,091. For the previous half-year, the profit balance was £1,570,035, after tax provisions of £2,861,286.

The balance available to the parent company, after including provisions no longer required of £1,228,346, against £681,514 for the previous half-year, was £4,605,585, compared with £2,121,205. Dividends paid and recommended amount to £770,850 (£385,425), and £1,252,039, against £2,987,961, is allocated to general revenue reserve, carrying forward a profit and loss account surplus of £3,799,029 (£1,216,333).

Sulphur Control Eased

The Minister of Materials has made the Control of Sulphur Order, 1953, revoking, with effect from February 23, all statutory control on the supply and use of sulphur, except for the manufacture of sulphuric acid. It has been possible to do this, says a Ministry of Materials announcement, because of an increase in world production of sulphur, and because of economies in its use and its substitution by other materials, such as pyrites and anhydrite, in the manufacture of sulphuric acid.

Sulphur was still not available in unlimited quantities, but, provided that economy in its use continued, including all possible means to ensure its recovery in industrial processes, sufficient should be obtainable to meet the essential needs of the U.K.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference E.P.D. or C.R.E. can be obtained from the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, London, S.W.1.

CANNOCK, March 2—Manhole and gully covers and frames, for the Urban District Council. Mr. E. Lomax, engineer and surveyor, Council House, Cannock.

ELLESMERE PORT, March 2—Cast-iron manhole covers and frames and gully gratings and frames, for the Urban District Council. The Engineer and Surveyor, Council Offices, Ellesmere Port.

GREAT HARWOOD, March 14—Street ironwork, for the Urban District Council. The Engineer and Surveyor, Town Hall, Great Harwood.

HARTLEPOOL, March 2—Metal castings, for the Borough Council. Mr. J. S. Miles, borough engineer, Corporation Depot, Burn Road, West Hartlepool.

KIDSGROVE, March 12—Iron castings, for the Urban District Council. Mr. O. L. Hurst, clerk of the council, Town Hall, Kidsgrove.

KING'S LYNN, March 14—Gully gratings, manhole covers, etc., for the Borough Council. The Borough Engineer, Clifton House, 17, Queen Street, King's Lynn.

LEEDS, March 3—Iron and steel and iron castings, for the City Council. The Director of Public Cleansing, Dock Street, Leeds, 10.

LEYLAND, March 6—Iron castings, for the Urban District Council. Mr. F. D. Howe, engineer and surveyor, Council Office, Leyland.

LLWCHWR, March 2—Castings, for the Urban District Council. The Engineer, Council Offices, Gorseinon.

LONDONDERRY, February 28—Metal castings, etc., for the Town Council. The City Surveyor's Department, 5, Guildhall Street, Londonderry.

MERTHYR TYDFIL, March 7—Iron castings, for the Borough Council. The Borough Engineer and Surveyor, Town Hall, Merthyr Tydfil.

STEVENAGE, March 7—Cast-iron manhole covers and frames, for the Urban District Council. Mr. J. D. Marshall, engineer and surveyor, Council Offices, Stevenage.

WORSLEY, February 28—Manhole covers and frames, for the Urban District Council. Mr. L. T. Broome, engineer and surveyor, Town Hall, Walkden, Manchester.

Slight Drop in 1952 Metal and Engineering Exports

The volume of goods exported from the United Kingdom in 1952 was just over 6 per cent. less than in 1951, while the volume of imports fell by about 8 per cent. compared with 1951.

Among manufactures, the volume of exports in the category of metals and engineering products declined least compared with 1951; a reduction of 8 per cent. in the volume of vehicles exported and smaller reductions in exports of cutlery, hardware, implements and instruments, and of iron and steel were largely offset by increased exports of non-ferrous metals, electrical goods, and machinery. Shipments of iron and steel in the fourth quarter were, however, higher than in the first quarter of 1952 or the average for 1951, and were within 4 per cent. of the average reached in 1950. The volume of non-ferrous metals shipped in the fourth quarter also recovered to almost the rate of the first quarter, and 16 per cent. above the average for 1951, but still well below the 1950 rate.

A reduction of £22,000,000 in exports of vehicles to the sterling area, all of which fell in the second half-year, was more than accounted for by Australia and India, but exports of other engineering products to the sterling area were £36,000,000 more than in 1951, and metals were also up by £31,000,000; nearly a quarter of these increases was shared by South Africa and New Zealand, the remainder being well distributed.

Imports of North American iron and steel and manufactures increased by £32,000,000, aluminium ingots etc., from Canada by £15,000,000, and machine tools from the U.S. by £20,000,000.

There were useful increases in exports of machinery to the dollar area of which £6,000,000 was to North America, encouraging features being an expansion of £2,000,000 in machine tools and nearly £1,000,000 in office machinery, goods of which the U.S. is one of the chief producers.

Australian Import Relaxations

The Australian Prime Minister, Mr. Menzies, announced last week that his Government had decided to allow a further £A50,000,000 of imports in the financial year 1953-54. Most types of imports would be included, he said. This will make a total relaxation equivalent to a 25 per cent. increase in the rate of flow of imports in about 12 months.

The changes will apply from April 1. Raw materials for industry will be licensed freely, and administrative controls on other goods will be eased. Among category A imports which are to be increased from 60 per cent. to 70 per cent. above those in 1950-51 are completely knocked down motor chassis, wire netting, barbed wire, bolts, nails, and many chemicals. Category B imports, which increase by 10 per cent. to 30 per cent. of the base year, include motor-car bodies and assembled chassis, and motor cycles.

Tinplate is included in the items to be freely licensed. The new adjustments are designed to prevent shortages as well as to help exporters from Great Britain and other European customers.

THE FIRST MACHINES have started running in the new extension to the works at Aldersley, Wolverhampton, of the Laystall Engineering Company, Limited. About 90 per cent. of the crankshaft output of the factory goes to export and defence orders.

John Summers' Progress

Referring to progress on the scheme for complete integration of the Shotton Works, the directors of John Summers & Sons, Limited, in their report for the year ended September 27, 1952, state that certain sections of the plant came into operation in August and that further units are now in operation. It was hoped that, during the next few months, all the plant included in the first stage of the scheme would be completed and in full-scale production.

A second stage, covering the installation of further coke ovens and a second blast furnace, had been approved, and construction, which had already started, would continue without interruption after the completion of the first stage.

Despite the shortage of raw materials, states the report, close supervision of operating costs maintained the profit margins for the year under review. The group trading profit, etc., totalled £3,572,782, compared with £2,851,830 for the previous period of 39 weeks, and the profit available to the parent is £1,335,045, against £886,938. The ordinary dividend was 8½ per cent., less tax, against 6⅜ per cent. for the period. Allocations by the parent company were as follow:—General reserve £800,000 (£200,000), contingencies reserve £25,000 (£75,000), and stock reserve £150,000 (£200,000). The carry forward remains at £160,316.

Progress of Consett's Modernization Scheme

During the year ended September 27, 1952, £4,900,000 had been spent on development, bringing the cost to date of the present modernization scheme, commenced in 1942, to over £17,000,000, stated the chairman of the Consett Iron Company, Limited, Mr. Clive Cookson, at the annual general meeting held recently. The company's loans amounted to less than £5,000,000 at the date of the balance sheet. Steady progress had been made with the scheme.

The new battery of 17 Wilputte ovens at the Fell Coke Works would be ready for coke production towards the end of March. The new slabbing and blooming mill and the continuous billet mill were nearing completion and would go into production in the first half of this year.

After charging £2,133,683 to cover all remuneration, loan interest and depreciation, and providing for taxation in full, there remained a net available balance of £434,334 for the year. It was agreed that payment of a further dividend of 8½ per cent. be made on the ordinary stock, making a total of 12½ per cent. for the year, in addition to the 8 per cent. on the preference shares.

Westinghouse Record Profit

A record figure of £1,183,732 in consolidated trading profits, in the year ended September 27, an increase of £482,592 over last year, is announced by the directors of the Westinghouse Brake & Signal Company, Limited, who recommend a 15 per cent. dividend, against 14 per cent. paid in each of the previous nine years.

The company proposes to create 1,000,000 new £1 ordinary shares, to be offered to existing stockholders at a premium on a rights basis when consent of the Capital Issues Committee has been obtained.

Pig-iron and Steel Production

Statistical Summary of November Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table I summarizes activities during the previous six months; Table II gives production of steel ingots and castings in November, and Table III, deliveries of finished steel. Table IV gives the production of pig-iron and ferro-alloys in November, 1952, and furnaces in blast. (All figures weekly average in thousands of tons.)

TABLE I.—*General Summary of Pig-iron and Steel Production.*

Period.	Iron-ore output.	Imported ore consumed.	Coke receipts by blast-furnace owners	Output of pig-iron and ferro-alloys.	Scrap used in steel-making.	Steel (incl. alloy).			
						Imports.[2]	Output of ingots and castings.	Deliveries of finished steel.	Stocks.[3]
1951	284	170	206	380	175	8	301	244	585
1952[4]	306	190	228	663	171	29	310	—	739
1952—July[1]	306	194	233	513	150	38	274	221	762
August	300	194	232	646	151	31	280	213	816
September ..	318	198	234	670	184	30	330	279	783
October[1]	302	196	227	670	182	31	328	271	725
November	312	194	229	651	189	23	345	276	717
December[1]	296	189	227	663	166	26	314	—	739

TABLE II.—*Production of Steel Ingots and Castings in November, 1952.*

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derby, Leics., Notts., Northants and Essex ..	—	3.8	11.8 (basic)	1.7	0.2	16.5	1.0	17.5
Lancs. (excl. N.W. Coast), Denbigh, Flints. and Cheshire .. .. Yorkshire (excl. N.E. Coast and Sheffield) ..	1.8	17.9	—	1.7	0.6	20.9	1.1	22.0
Lincolnshire	—	36.0	—	—	0.1	36.0	0.1	36.1
North-East Coast	1.8	60.2	—	1.1	0.5	61.9	1.7	63.6
Scotland	3.9	35.3	—	1.4	0.7	39.3	2.0	41.3
Staffs., Shrops., Worcs. and Warwick	—	14.3	—	1.1	0.6	14.4	1.6	16.0
S. Wales and Monmouthshire	5.9	58.7	5.4 (basic)	1.1	0.1	70.6	0.6	71.2
Sheffield (incl. small quantity in Manchester) ..	7.7	22.2	—	8.8	0.5	37.1	2.1	39.2
North-West Coast	—	1.7	4.6 (acid)	0.4	0.1	6.7	0.1	6.8
Total	21.1	250.1	21.8	17.3	3.4	303.4	10.3	313.7[1]
November, 1952	25.4	273.5	22.5	20.0	3.8	333.5	11.7	345.2
December, 1951	23.2	223.4	22.1	15.5	3.4	278.1	9.5	287.6

TABLE III.—*Deliveries of Non-alloy and Alloy Finished Steel.*

Product.	1950.	1951.	1951.	1952.	
			Nov.	Oct.	Nov.
Non-alloy steel:					
Ingots, blooms, billets and slabs[5]	3.6	4.0	4.2	4.8	4.7
Heavy rails, sleepers, etc.	11.3	10.1	10.3	8.8	11.1
Plates, ⅛ in. thick and over ..	40.0	41.0	42.8	45.7	46.9
Other heavy prod.	40.2	39.9	39.4	42.6	43.5
Light rolled prod.	47.6	47.1	46.3	52.3	52.9
Hot-rolled strip ..	19.4	19.5	19.7	21.4	20.6
Wire rods ..	16.3	16.1	16.4	17.8	17.6
Cold rolled strip ..	5.5	6.0	7.1	6.3	6.3
Bright steel bars ..	6.3	6.6	6.6	7.3	7.9
Sheets, coated and uncoated ..	30.5	30.4	30.2	35.5	34.5
Tin, terne and blackplate ..	14.3	13.8	15.4	16.9	17.6
Steel tubes and pipes	19.5	20.3	21.1	21.6	22.4
Steel tube and pipe fittings	0.5	0.5	0.5	0.7	0.8
Mild wire	12.5	11.9	12.6	13.7	13.2
Hard wire	3.5	3.7	4.0	4.0	4.4
Tyres, wheels and axles	3.5	3.7	4.2	3.8	4.1
Forgings(excluding drop forgings) ..	2.2	2.3	2.7	3.1	3.7
Steel castings ..	3.5	3.8	3.5	3.9	1.9
Tool and magnet steel . ..	[8]	[8]	[8]	0.6	0.5
Total	290.2	280.7	287.0	310.8	316.6
Alloy steel	10.6	12.1	13.8	15.7	17.2
Total deliveries from U.K. prod.[6] ..	290.8	292.8	300.8	326.5	333.8
Add: Imported finished steel ..	5.2	5.8	10.6	13.0	10.3
	296.0	298.6	311.4	339.5	344.1
Deduct: Intra-industry conversions[7] ..	57.0	56.9	59.9	70.3	69.5
Total net deliveries ..	239.0	241.7	251.5	269.2[1]	274.6

TABLE IV.—*Production of Pig-iron and Ferro-alloys in November, 1952.*

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derby, Leics., Notts., Northants and Essex	27	—	16.9	24.2	1.5	—	42.6
Lancs. (excl. N.W. Coast), Denbigh, Flints. and Cheshire .. Yorkshire (incl. Sheffield, excl. N.E. Coast) ..	7	—	8.1	—	—	1.3	9.4
Lincolnshire ..	13	—	30.8	—	—	—	30.8
North-East Coast	25	6.5	42.3	0.1	—	1.6	50.5
Scotland	9	0.8	12.3	2.5	—	—	15.6
Staffs., Shrops., Worcs., and Warwick ..	8	—	7.3	1.5	—	—	8.8
S. Wales and Monmouthshire	9	2.8	27.9	—	—	—	30.7
North-West Coast	8	16.3	—	0.2	—	1.4	17.9
Total ..	106	26.4	145.6	28.5	1.5	4.3	206.3[1]
November, 1952..	104	27.7	145.8	28.6	1.1	3.6	206.8
December, 1951 ..	102	26.9	137.9	28.6	1.1	3.2	197.7

[1] Five weeks all tables.

[2] Weekly average of calendar month.

[3] Stocks at the end of the years and months shown.

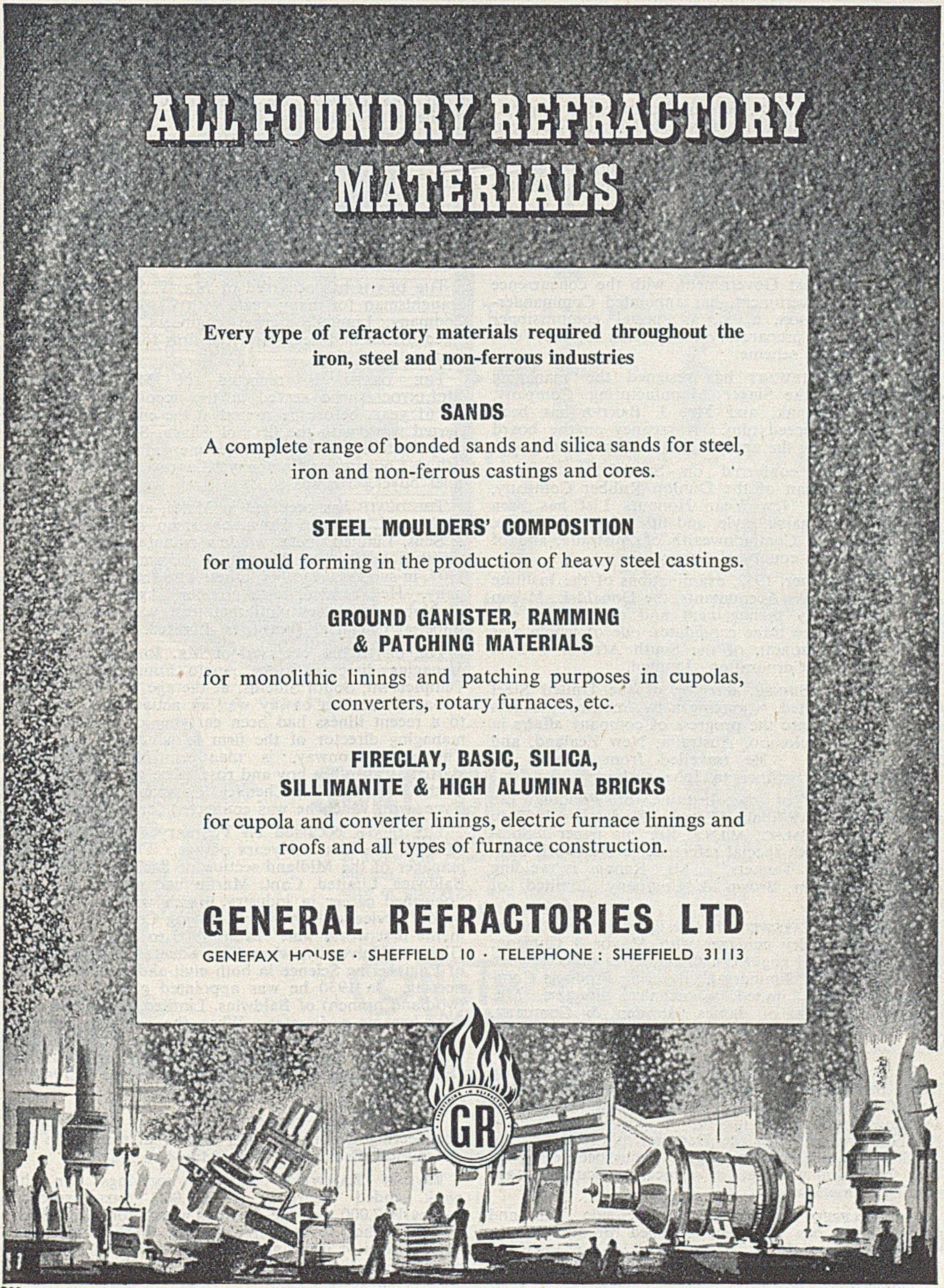
[4] Average 53 weeks ended January 3, 1953.

[5] Other than for conversion into any form of finished steel listed above.

[6] Includes finished steel produced in the U.K. from imported ingots and semi-finished steel.

[7] Material for conversion into other products also listed in this table.

[8] Included with alloy steel.


ALL FOUNDRY REFRACTORY MATERIALS
Every type of refractory materials required throughout the iron, steel and non-ferrous industries
SANDS
A complete range of bonded sands and silica sands for steel, iron and non-ferrous castings and cores.
STEEL MOULDERS' COMPOSITION
for mould forming in the production of heavy steel castings.
GROUND GANISTER, RAMMING & PATCHING MATERIALS
for monolithic linings and patching purposes in cupolas, converters, rotary furnaces, etc.
FIRECLAY, BASIC, SILICA, SILLIMANITE & HIGH ALUMINA BRICKS
for cupola and converter linings, electric furnace linings and roofs and all types of furnace construction.
GENERAL REFRACTORIES LTD
GENEFAX HOUSE · SHEFFIELD 10 · TELEPHONE: SHEFFIELD 31113
GR

Personal

VISCOUNT BRIDGEMAN has been appointed chairman of Vulcan Foundry, Limited, to replace the late Brigadier James Storar.

MR. GEORGE AUSTIN, personnel manager of Imperial Chemical Industries, Limited, Metals Division, has been appointed a director.

MR. T. MEEHAN, former Tees-side divisional organizer for the Iron and Steel Trades Confederation, is to be the next Mayor of Middlesbrough.

MR. J. B. MAVOR, of Mavor & Coulson, Limited, has been re-elected president of Glasgow & West of Scotland section of the Institute of Industrial Supervisors.

THE Gold Coast Government, with the concurrence of the U.K. Government, has appointed Commander R. G. A. JACKSON, R.A.N., as special commissioner in charge of the preparatory commission for the Volta River aluminium scheme.

MR. R. W. STEWART has resigned the managing directorship of the Singer Manufacturing Company, Limited, Clydebank, and MR. J. BAXTER has been appointed to succeed him. A vacancy on the board has been filled by the appointment of MR. J. PLATT.

THE BARONY conferred on SIR CLIVE LATHAM BAILLIEU, chairman of the Dunlop Rubber Company, Limited, in the New Year Honours List has been gazetted by the name, style, and title of Lord Baillieu, of Sefton in the Commonwealth of Australia, and of Parkwood in the county of Surrey.

IN THE December, 1952, examinations of the Institute of Cost and Works Accountants, the Donald L. Moran prize for factory management and distribution was awarded jointly to three candidates, one of whom was MR. B. G. ROXBURGH, of the South African Iron & Steel Industrial Corporation, Limited.

SIR GEORGE BINNEY, director of the United Steel Companies, Limited, is making a two-months' business tour to enquire into the progress of company affairs in South Africa, Colombo, Australia, New Zealand, and South America. He travelled from London by B.O.A.C. Comet jetliner to Johannesburg.

THE COUNCIL of the Institute of Welding has awarded the Sir William J. Larke Medal for 1952 to MR. J. RANNIE, M.SC., M.I.N.A., for his paper "Shipyard Changes, with special reference to Steelwork Construction in Oil Tankers." Mr. Rannie is welding engineer to John Brown & Company, Limited, of Clydebank.

MR. ROBERT CARSWELL has resigned his position as works and foundry manager with Mavor & Coulson, Limited, electrical engineers, Glasgow, in order to join the newly-formed Foundry Engineering Products Company (Glasgow), Limited, as technical director. MR. ROBERT CONNELL of James Howden & Company, Limited, Glasgow, has been appointed as Mr. Carswell's successor.

DR. F. R. N. NABARRO, of the Department of Metallurgy, Birmingham University, has been appointed to the Chair of Physics, Witwatersrand University, Johannesburg, and will take up the post later this year. Dr. Nabarro came to the Department of Metallurgy at Birmingham three years ago and has been occupied with theoretical problems in science, particularly those relating to metallurgy.

MR. ALFRED EDWARDS, the Tees-side iron and steel founder, has been recommended for adoption as Conservative candidate for the Wrekin Parliamentary Division of Shropshire. In the last election Mr. Edwards unsuccessfully contested a seat at Newcastle-upon-Tyne. He joined the Labour Party in 1931, before which he had had no political activities. He represented East Middlesbrough as a Labour member from 1935 to 1948 and as an Independent Labour member from 1948 to 1949. He joined the Conservative Party in the latter year.

Obituary

MR. W. G. SIMPSON, chairman and managing director of Easterbrook, Allcard & Company, Limited, makers of engineers' small tools, of Sheffield, died on February 17. He was 79.

THE DEATH has occurred of MR. T. S. BROWN, chief draughtsman for many years with Clarke, Chapman & Company, Limited, marine engineers, of Gateshead. Aged 67, he had been with the firm for more than 50 years.

THE DEATH is reported of MR. ARCHIBALD MCLINTOCH, who served in the locomotive industry for 61 years before he retired at the end of 1946. He started work with the firm of Sharp, Stewart & Company, Limited, which was later merged into the North British Locomotive Company, Glasgow, and became its chief buyer. He was 80.

THE DEATH has occurred in Malta, at the age of 84, of MR. H. DONALD HOPE, chairman of Henry Hope & Sons, Limited, metal window manufacturers, etc., of Smethwick (Staffs). Mr. Hope became chairman in 1909, in succession to his father, who founded the company. He was also, for a number of years, a director of Nobel Industries until that firm was merged with Imperial Chemical Industries, Limited.

THE DEATH has occurred of MR. JOHN MCCONWAY, managing director of the Anglo Foundry Company, Templetown, South Shields, at the age of 84. Despite his age, Mr. McConway was an active man, and up to a recent illness had been carrying on his duties as managing director of the firm in which his son, Mr. Charles McConway, is manager. Mr. McConway started as an office boy and rose to be general manager of the Bede Metal & Chemical Company, Hebburn-on-Tyne, with which he was connected for 50 years.

THE DEATH occurred on February 12 of CAPT. N. MARTIN, who was 69 years of age. Formerly general manager of the Midland section of Richard Thomas & Baldwins, Limited, Capt. Martin had a long and distinguished career in industry, which was only broken by his service with the Royal Flying Corps and R.A.F. in the first world war. From 1905 to 1908 he was at Glasgow University, when he graduated as a Bachelor of Engineering Science in both civil and electrical engineering. In 1930 he was appointed general manager (Midland branch) of Baldwins, Limited, and nine years later became a director. When the company merged with Richard Thomas & Company, Limited, in 1945 Capt. Martin was appointed a director of Baldwins (Holdings), Limited, retiring from the board in 1947.

THE NATIONAL COMMITTEE of the Amalgamated Engineering Union will hold its annual meeting in the Town Hall, Eastbourne, from May 4 to May 15.

BRITISH RAILWAYS' iron-ore carryings for the week ended February 7—330,000 tons—exceeded by nearly 7,000 tons the previous week's tonnage, which was the highest for over five months. In the same week 219,040 tons of iron and steel were conveyed from the principal steelworks.

News in Brief

THE GENERAL ELECTRIC COMPANY, LIMITED, announces a further reduction in price of its 80 w. single-channel fluorescent-lighting fittings.

A TANKER of 32,000 tons dw. is to be built by R. & W. Hawthorn Leslie & Company, Limited, Newcastle-upon-Tyne, for the British Tanker Company, Limited.

THE BUILDING of the new Woodhead tunnel to carry the electrified railway between Manchester and Sheffield is expected to be completed by British Railways this summer.

THERE WAS A DECLINE of 7,000 in the number of people employed in the engineering and metal industries during December, 1952, according to statistics issued by the Ministry of Labour.

H.M.S. FORMIDABLE, the 23,000-ton fleet aircraft carrier, is expected to arrive in the Firth of Forth within the next few weeks for breaking up at the Inverkeithing yard of Thos. W. Ward, Limited.

A NEW SCOTTISH COMPANY, GATHERAL & COMPANY (BRASSFOUNDERS), LIMITED, 51, Masterton Street, Glasgow, N., founders, moulders, casters, etc., has been registered in the names of James Gatheral and Horace C. Littlechild.

AN ENTIRELY NEW model, the New World "Eighty Four" gas cooker will be featured on the stand of Radiation, Limited, at the *Daily Mail* "Ideal Home" exhibition which is this year being held from March 3 to 28 at Olympia.

THE NORTHAMPTON POLYTECHNIC, St. John Street, London, E.C.1, are organizing a course of evening lectures on corrosion testing. They are to start at 7.0 p.m. on March 18 and thereafter on five Tuesday evenings before May 5.

BIRMINGHAM UNIVERSITY is to launch an appeal to industry for funds, and hopes to raise an additional £80,000 annually which will be mainly devoted to the support of research departments, the work of which is at present jeopardized by rising costs.

THE General Electric Company, Limited, have an-announced that MR. F. R. LIVOCK, T.D., B.SC., A.M.I.MECH.E., is to be controller, education and personnel services, and MR. G. B. L. CHIVERS, B.SC., has been appointed staff manager of the sales organization.

THE DERBY SOCIETY OF ENGINEERS held their annual dinner at the Grandstand Hotel, Derby, last Friday. Among those present were the Mayor of Derby (Councillor T. Dennis), Mr. F. A. Duncan, president of the Leicester Association of Engineers, and Dr. T. Heap, principal of Derby Technical College.

SRES. TERC. C. POR A., of Avenida Mella No. 63, Ciudad Trujillo (P.O. Box 13), Dominican Republic, wishes to contact U.K. manufacturers of electric motors in general, electric generators, metal working and wood working machinery, etc. Interested makers should communicate with the company at the address given.

THE Institute of Industrial Supervisors have announced a week-end residential course for foremen and supervisors on work-study for supervisors from March 13 to 15 at Missenden Abbey, Great Missenden, Bucks. Details are available from the Institute at Bank Chambers, 47, Temple Row, Birmingham, 2.

THE TOTAL SUPPLY of home-bought scrap to the iron and steel industry is estimated to have risen by 470,000 tons in 1952 as the result of the collection drive. Blast furnaces, iron foundries, and wrought-iron works benefited, as well as the steelworks. Steel manufacturers themselves found an additional 268,000 tons of scrap last year. The drive is to be continued throughout the current year.

GIRLING, LIMITED, Birmingham, who employ 4,000 workers in two factories and produce 40,000 brakes and 15,000 telescopic dampers each week, are celebrating their 21st anniversary with a dinner-dance and cabaret at the Grand Hotel, Birmingham, tomorrow. Among the 500 guests will be well-known leaders of the motor industry, and racing drivers. The company claim that their brakes are now fitted to 52 per cent. of the private cars made in Britain; to 80 per cent. of vans and lorries and to almost 100 per cent. of tractors.

STERLING METALS, LIMITED, of Coventry, have placed through the Vaughan Crane Company, Limited, of Manchester, an order for one of the radio control systems developed by Heenan & Froude, Limited, of Worcester, for the remote control of overhead cranes. This equipment will be used in a magnesium foundry at Nuneaton for emergency and remote control of a furnace crane in the event of melting-ladle failure, so that the appropriate crane control could be effected remotely and no operators need be near the leaking ladle.

THE SOUTH DURHAM STEEL & IRON COMPANY LIMITED, Malleable Works, Stockton-on-Tees, expeditiously carried out an order for 1,000 metres of 24-in. pipe needed to help clear the flood waters in Holland. The order was completed in little more than a day, and the pipes were loaded into the Trompenburgh at Middlesbrough for Rotterdam. The Cargo Fleet Iron Company, Limited, Middlesbrough, has received orders for more than 2,000 tons of pipes for the flooded areas. Repair work at the oil refineries and other industrial plants damaged by the floods has brought most undertakings concerned back to normal working.

THE BIRMINGHAM EXCHANGE, with the approval of the Public Works Committee of the Birmingham Corporation, the Ministry of Supply, and many prominent industrialists, has now decided to go ahead with the proposal for establishing on its premises a permanent Engineering Exhibition to be known as the Birmingham Engineering Centre. Its chief functions will be to provide a constantly changing exhibition of products of the light and medium engineering and allied trades; a bureau to serve as a clearing house of engineering knowledge; a rendezvous for engineers, and an opportunity for apprentices to study current developments. The Centre will also compile a capacity and agents register and will seek means to encourage export trade. It is to be run on a non-profit-making basis and no goods will be sold on the premises.

THE IRON AND STEEL CORPORATION of Great Britain have asked the Minister of Supply, Mr. Duncan Sandys, to authorize an immediate increase in maximum iron and steel prices to reflect in full the additional costs which will fall on the iron and steel industry as a result of the increase in the price of coal. The Corporation point out that, when iron and steel prices were adjusted a year ago, a substantial part of the increased manufacturing costs was not passed on to the consumer. Since then there has been a further substantial cost increase, only part of which has been reflected in prices. In view of the Corporation it would, therefore, not be right to ask the industry to bear the increase in coal price without a corresponding increase in iron and steel prices. As a result of the higher price of coal, the average cost of producing steel will increase by about 1 to 1½ per cent.

Raw Material Markets

Iron and Steel

The higher prices for coal which come into operation next week presage a further advance in iron and steel prices. The Iron and Steel Corporation has, indeed, already asked the Minister of Supply to authorize an increase, which it is expected will be conceded. Any fresh advance will follow quickly on the heels of the Order which became operative on February 11, under which common foundry iron was advanced by 6s. 6d. per ton in the Middlesbrough area and 6s. delivered Birmingham. About 60 per cent. of the pig-iron used by the ironfoundry industry was affected by this price change, and as the current demand for iron castings is subdued, the still higher price level now foreshadowed is viewed by foundrymen with not a little apprehension. The market in common foundry irons meanwhile remains slow. On the other hand, the steel plants are taking up all the basic iron produced, and the demand for hematite exceeds the supplies at present available.

The record output of steel ingots has enabled the rolling mills to operate at something like full capacity and there has been a steady increase in the outward flow of finished steel products. The re-rollers, however, do not seem to be benefiting from the progressive expansion of production. Neither home-produced nor imported material is available in sufficient quantities to liberate them from recurring anxieties. At some of the plants there is an acute shortage of slabs: at others difficulties arise through deficient deliveries of billets.

Non-ferrous Metals

The British Bureau of Non-ferrous Metal Statistics has published the usual monthly figures, which now complete the picture for 1952. Total consumption of copper, virgin and scrap, during the year was 571,839 tons, against 550,721 tons in 1951 and 526,889 tons in 1950. During December last usage was 40,069 tons, some 5,600 tons lower than November, which was in turn below October. Stocks at December 31 were 131,968 tons, compared with 126,394 tons a month earlier. Of the December total about 112,000 tons was in the ownership of the Government. Total lead stocks were 75,510 tons, compared with 88,574 tons a month earlier, while consumption, virgin and secondary, in December stood at 24,056 tons. This compared with 26,996 tons in November. For 1952 the total was 293,320 tons. Stocks of zinc at the year end stood at 166,050 tons, of which the Government owned approximately 159,000 tons. At the end of November the total was 152,129 tons. Consumption, all grades, totalled 18,256 tons, against 19,570 tons in November. Consumption of tin in December was 1,834 tons, which was practically unchanged in November. Total stocks of tin in the country were shown as 4,225 tons. According to the Copper Institute in New York, deliveries of refined copper to U.S. consumers in January were 125,200 short tons. Stocks of refined copper in producers' hands at January 31 were 59,835 short tons, compared with 58,860 at the end of December.

Business in non-ferrous metals in the United Kingdom has been on rather a reduced scale, even scrap, which is relatively cheap, not being in anything like good demand at the present time. As will be seen from the figures quoted above, copper is not going very well, and, therefore, no one was much surprised to learn that the Ministry of Materials had given permission to the Rhodesian producers to sell to the United States for domestic consumption some 8,000 tons of blister copper for shipment during the second quarter of this year. There is still no further news of any decision to give copper its freedom.

Official zinc prices were:—

February—February 19, £81 15s. to £82; February 20, £81 5s. to £81 10s.; February 23, £81 17s. 6d. to £82 2s. 6d.; February 24, £81 to £81 2s. 6d.; February 25, £80 to £80 2s. 6d.

May—February 19, £82 to £82 5s.; February 20, £81 12s. 6d. to £81 17s. 6d.; February 23, £82 5s. to £82 10s.; February 24, £81 7s. 6d. to £81 10s.; February 25, £80 10s. to £80 12s. 6d.

Refined pig-lead official prices were as follow:—

February—February 19, £92 15s. to £93; February 20, £92 15s. to £93; February 23, £93 5s. to £93 10s.; February 24, £93 5s. to £93 10s.; February 25, £91 15s. to £92.

May—February 19, £92 to £92 5s.; February 20, £92 to £92 5s.; February 23, £91 15s. to £92 5s.; February 24, £92 to £92 10s.; February 25, £91 to £91 5s.

The following official tin quotations were recorded:—

Cash—February 19, £958 to £959; February 20, £959 to £961; February 23, £962 to £964; February 24, £959 to £960; February 25, £957 to £958.

Three Months—February 19, £937 to £938; February 20, £939 to £940; February 23, £940 10s. to £941 10s.; February 24, £938 to £939; February 25, £937 to £938.

Correspondence

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

LET'S GET THIS STRAIGHT

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—Your leading article of the current issue (February 19) of the JOURNAL is quite off the mark. The number of foundries attached to the engineering industry is large. As soon as a firm of engineers is large enough to take the output capable to run a foundry on a profitable basis, they generally start their own foundry for the following reasons:—

(1) To obtain a higher quality than supplied by the jobbing foundries.

(2) The firm can arrange their programme of production to meet customers' requirements.

Generally little or no outside orders for castings are accepted. This arrangement permits the foundry to concentrate on castings to meet the requirements of their own business as cheap as the quality required permits. The quality is improved, wastage lowered, and consequently production cost is lowered. The numerous articles in your JOURNAL generally taken from these foundries show the improvements they have made in methods of production. The firm you refer to as a maker of boot-protectors actually have a larger output of machined specialities for the engineering industry. It is my opinion that over 90 per cent. of the foundries desire to keep out of the political arena.

—Yours, etc.,

WALTER SLINGSBY,
Governing Director,
Walter Slingsby & Company, Limited.

Woodhouse Road,
Keighley.
February 20, 1953.

[The point of our leader was that because one supplies castings to a certain industry, one does not become part and parcel of that industry.—EDITOR.]


HAVE YOU SEEN..
"THIS STRIPPING JOB IS A LOT EASIER SINCE WE STARTED USING 'SUPINEX R.' NO NEED FOR CROW BARS, EH!"
"YES, AND I CAN USE THOSE CORE IRONS AGAIN"

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

(Delivered unless otherwise stated)

February 25, 1953

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2:—Middlesbrough, £13 8s.; Birmingham, £13 1s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £16 8s., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £16 12s. 3d.

Scotch Iron.—No. 3 foundry, £16 1s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £17 18s.; South Zone, £18 0s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £18 18s.; South Zone, £19 0s. 6d.

Cold Blast.—South Staffs, £18 2s.

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, £16 2s.; Scotland (Scotch iron), £16 8s. 6d.; Sheffield, £17 3s.; Birmingham, £17 9s. 6d.; Wales (Welsh iron), £16 8s. 6d.

Basic Pig-iron.—£13 19s. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered).

Ferro-silicon (6-ton lots).—40/55 per cent., £57 10s., basis 45 per cent. Si, scale 21s. 6d. per unit; 70/84 per cent., £86, basis 75 per cent. Si, scale 23s. per unit.

Ferro-vanadium.—50/60 per cent., 23s. 8d. to 28s. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 10s. to 11s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £204 to £210 per ton; 38/40 per cent., £235 to £265 per ton.

Ferro-tungsten.—80/85 per cent., 22s. 10d. to 23s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 25s. 9d. to 28s. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent. C, £85 4s., basis 60 per cent. Cr, scale 28s. 3d. per unit: 6/8 per cent. C, £80 17s, basis 60 per cent. Cr, scale 26s. 9d. per unit; max. 2 per cent. C, 2s. per lb. Cr; max. 1 per cent. C, 2s. 2½d. per lb. Cr; max. 0.15 per cent. C, 2s. 3½d. per lb. Cr; max. 0.10 per cent. C, 2s. 3¾d. per lb. Cr; max. 0.06 per cent. C, 2s. 4d. per lb. Cr.

Cobalt.—98/99 per cent., 20s. per lb.

Metallic Chromium.—98/99 per cent., 6s. 5d. to 7s. 6d. per lb.

Ferro-manganese (blast-furnace). — 78 per cent., £48 12s. 11d.

Metallic Manganese.—93/95 per cent., carbon-free, £262 to £275 per ton; 96/98 per cent., £280 to £295 per ton.

Ferro-columbium.—60/75 per cent., Nb + Ta, 40s. to 70s. per lb., Nb + Ta.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft, u.t., £25 4s. 6d.; tested, 0.08 to 0.25 per cent. C (100-ton lots), £25 14s. 6d.; hard (0.42 to 0.60 per cent. C), £27 12s.; silico-manganese, £33 8s.; free-cutting, £28 8s. 6d. Siemens Martin Acid: Up to 0.25 per cent. C, £32 4s.; case-hardening, £32 12s.; silico-manganese, £34 9s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £29 8s.; basic, hard, over 0.41 up to 0.60 per cent. C, £30 8s.; acid, up to 0.25 per cent. C, £32 12s.

Sheet and Tinplate Bars.—£25 3s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £29 14s.; boiler plates (N.-E. Coast), £31 1s. 6d.; chequer plates (N.-E. Coast), £31 3s.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £27 17s.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £31 15s. 6d.; flats, 5 in. wide and under, £31 15s. 6d.; hoop and strip, £32 10s. 6d.; black sheets, 17/20 g., £41 12s. 6d.; galvanized corrugated sheets, 24 g., £51 1s.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £50 18s. 3d.; nickel-chrome, £71 7s. 9d.; nickel-chrome-molybdenum, £79 2s. 6d.

Tinplates.—57s. 1½d. per basis box.

NON-FERROUS METALS

Copper.—Electrolytic, £285; high-grade fire-refined, £284 10s.; fire-refined of not less than 99.7 per cent., £284; ditto, 99.2 per cent., £283 10s.; black hot-rolled wire rods, £294 12s. 6d.

Tin.—Cash, £957 to £958; three months, £937 to £938; settlement, £957.

Zinc.—February, £80 2s. 6d.; May, £80 10s. to £80 12s. 6d.

Refined Pig-lead—February, £91 15s. to £92; May, £91 to £91 5s.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £109 7s. 6d.; rolled zinc (boiler plates), all English destinations, £108 7s. 6d; zinc oxide (Red Seal), d/d buyers' premises, £110.

Other Metals.—Aluminium, ingots, £166; magnesium, ingots, 2s. 10½d. per lb.; antimony, English, 99 per cent., £225; quicksilver, ex warehouse, £70 10s. to £71 (nom.); nickel, £483.

Brass.—Solid-drawn tubes, 26d. per lb.; rods, drawn, 34½d.; sheets to 10 w.g., 281s. per cwt.; wire, 32d.; rolled metal, 267s. 9d. per cwt.

Copper Tubes, etc.—Solid-drawn tubes, 32¾d. per lb.; wire, 317s. 9d. per cwt. basis; 20 s.w.g., 346s. 3d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £206 to £218; BS. 1400—LG3—1 (86/7/5/2), £218 to £238; BS. 1400—G1—1 (88/10/2), £320 to £375; Admiralty GM (88/10/2), virgin quality, £325 to £380 per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £350 to £385 L.P.Bl. £250 to £275 per ton.

Phosphor Bronze.—Strip, 412s. 9d. per cwt.; sheets to 10 w.g. 434s. 6d. per cwt.; wire, 49¾d. per lb.; rods, 44½d., tubes, 42¾d.; chill cast bars: solids 3s. 8d., cored 3s. 9d. (C. Clifford & Son, Limited.)

Nickel Silver, etc.—Ingots for raising, 2s. 8½d. per lb. (7 per cent.) to 3s. 11d. (30 per cent.); rolled metal, 3 in. to 9 in. wide × .056, 3s. 2½d. (7 per cent.) to 4s. 5d. (30 per cent.); to 12 in. wide × .056, 3s. 2¾d. to 4s. 5½d.; to 25 in. wide × .056, 3s. 4¾d. to 4s. 7½d. Spoon and fork metal, unsheared, 2s. 11½d. to 4s. 2d. Wire, 10 g., in coils, 3s. 9½d. (10 per cent.) to 4s. 11d. (30 per cent.). Special quality turning rod, 10 per cent., 3s. 8½d.; 15 per cent., 4s. 1¾d.; 18 per cent., 4s. 6½d. All prices are net.

Forthcoming Events

MARCH 2

Institute of British Foundrymen

Sheffield branch:—"Economic Utilization of Non-ferrous Metals," by F. Hudson, joint meeting with the Institute of Metals, 7.30 p.m., at Sheffield College of Commerce and Technology, Department of Engineering, Pond Street.

MARCH 3

Institution of Works Managers

Sheffield branch:—"Time is Money," by J. R. Widdowson, 7.30 p.m., at the Grand Hotel.

Institute of Metals

South Wales section:—"Recent Advances in Furnace Design," by E. S. W. Eardley, 6.30 p.m., at the University College, Metallurgy Department, Singleton Park, Swansea.

Sheffield Metallurgical Association

"Technological Education in Relation to the Iron and Steel Industry," by D. R. O. Thomas, 7 p.m., in the Grand Hotel.

Institute of Industrial Supervisors

Dudley section:—"Motion Study on the Shop Floor," by H. W. Marsh, 7.30 p.m., in the Dudley and Staffordshire Technical College.

MARCH 4

Purchasing Officers' Association

Northern Ireland branch:—"Lubrication," by J. A. S. Gardiner, 7.30 p.m., at the Kensington Hotel, College Square, Belfast.

Tyneside branch:—"Purchasing Procedure," by A. W. Gillespie, 7 p.m., at the Crown Hotel, Clayton Street, Newcastle-upon-Tyne.

Institution of Production Engineers

Coventry section:—"Manufacture of Components from Powdered Metals," by Dr. W. Jones, 7 p.m., at the Church House, Church Street, Rugby.

Nottingham section:—Annual general meeting and film evening, 7 p.m., at the Victoria Station Hotel, Milton Street.

Institute of Industrial Supervisors

Birmingham section:—"Education for Management," by D. H. Bramley, 7.30 p.m., in the College of Technology, Suffolk Street.

MARCH 5

Association of Bronze and Brass Founders

London area:—Informal meeting of members will be held at 12.15 p.m. for 12.30 p.m., at the Clarendon Restaurant, Hammersmith. After luncheon paper, "Aluminium Match-plate Patterns," by E. C. Mantle.

Institute of Metals

Birmingham section:—"Copper and Copper-alloy Development," by Dr. E. Voce, 6.30 p.m., at the James Watt Memorial Institute, Great Charles Street.

Incorporated Plant Engineers

Peterborough branch:—"Modern Refrigeration," 7.30 p.m., at the Eastern Gas Board's Demonstration Theatre, Church Street.

Institute of Welding

North-eastern (Tees-side) branch:—"Hard Surfacing of Steel by Electric Welding," by W. D. Biggs.

MARCH 6

Institution of Mechanical Engineers

Series of papers from the Parsons and Marine Engineering Turbine Research and Development Association dealing with Steam Turbine Research and Development, 10.30 a.m., 2.30 p.m., and 5.30 p.m., at Storey's Gate, St. James's Park, London, S.W.1.

Institution of Works Managers

Doncaster group:—"Planned Maintenance," by J. Heaton, 7.30 p.m., at the Danum Hotel.

Purchasing Officers' Association

Birmingham branch:—Works Visit, in the late afternoon, to Ferguson Tractors, Limited, Coventry.

MARCH 7

Institute of British Foundrymen

Bristol branch:—"Rapid Quality-control Tests and their use in the Foundry," by G. W. Brown, at Exeter. (Further details from the Secretary.)

Burnley section:—Annual Whist Drive, Dinner and Dance, at the Odeon Cinema, Accrington.

CLASSIFIED ADVERTISEMENTS

PREPAID RATES : **Twenty words for 5s. (minimum charge) and 2d. per word thereafter. Box Numbers 2s. extra (including postage of replies).**

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, 49, Wellington Street, London, W.C.2. If received by first post Tuesday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

GENERAL MANAGER, aged 40, married, with family, M.I.B.F., experienced aluminium, yellow metals, iron, mechanised and general, accustomed complete control works and administration, sales, buying, costs, etc., would consider any senior appointment any area. House required.—Box 3297, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER, A.M.I.B.F., desires change; 30 years' experience in all classes of Foundry practice; ferrous and non-ferrous metals; wide knowledge of mechanisation, pattern layout, castings up to 6 tons for M/c tool and marine engine trade; rate fixing and costing ext.; capable of taking complete charge.—Box 3265, FOUNDRY TRADE JOURNAL.

EX-FOUNDRY MANAGER (aged 49), 30 years' experience Textile repetition, C.I. and Brass founding, seeks position with prospects in the South or Midlands with small firm.—Box 3271, FOUNDRY TRADE JOURNAL.

CORE Binders.—TECHNICAL SALES REPRESENTATIVE, well known in trade, M.I.B.F., desires change, Midlands. Commission only, on term agreement, with company able to offer consistent quality at right prices.—Box 3284, FOUNDRY TRADE JOURNAL.

GENERAL MANAGER will shortly be requiring change. Fully experienced in controlling iron foundry, high duty and special irons. Covering accounts, sales staff, estimating, planning and ratefixing, laboratory control, methods, pattern shop, etc.—Box 3282, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN (40) seeks situation. Jobbing, 3 tons, machine, plate, mechanised and sand slinger. Experienced method, sand and cupola.—Box 3280, FOUNDRY TRADE JOURNAL.

PATTERNMAKER (aged 25 years, married), desires progressive post with firm who encourage extra technical education. Housing accommodation necessary.—Box 3274, FOUNDRY TRADE JOURNAL.

YOUNG Man (23), completed National Service. 5 years' general foundry apprenticeship. H.N.C.Prod.E., requires situation leading to executive position.—Box 3275, FOUNDRY TRADE JOURNAL.

PRACTICAL and Technical Foundryman; M.I.B.F.; 45; seeks change where conscientiousness and honesty of purpose would be appreciated. Lifetime's experience in Iron, High Duty and alloying, General, Jobbing, and Mechanised, from ozs. to 8 tons. Accustomed to full control of all depts: Buying, Production, and Sales, etc.—Box 3257, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order 1952.

YOUNG man, with some experience of analytical work, preferable in Non-ferrous Alloys, for Mechanised Foundry in Hillington district. Excellent prospects for person seeking to qualify in metallurgy. State age, experience, and salary expected.—Box 3283, FOUNDRY TRADE JOURNAL.

CHEMICAL LABORATORY ASSISTANT required by Engineering Company, South Birmingham. Good experience of analysis of non-ferrous metals essential. Salary up to £500 per annum. State details, age, experience, to Personnel Manager.—Box 3288, FOUNDRY TRADE JOURNAL.

HEAVY Machine Tool Engineers in the Manchester District require an experienced FOUNDRY MANAGER to take full charge of a Department producing about 100 tons of iron and non-ferrous castings per week up to weights of 40 tons in cast iron. Candidates should state fullest particulars of experience and positions held, age, and salary required, to Box 3298, FOUNDRY TRADE JOURNAL.

ASSISTANT required in Metallurgical Department for the technical control of the Iron Foundry and general metallurgical duties. A knowledge of foundry technology is more important than analytical ability.—Apply giving full particulars, including age and salary expected to Manager, ENGINEERING DEPARTMENT & LABOUR, VICKERS-ARMSTRONGS, LTD., Crayford, Kent.

FOUNDRY WORKS MANAGER required by modern Grey Iron Foundry in Midlands, producing general and repetition engineering castings. Applicant must have thorough experience of general and mechanised production. Ability to introduce new business an advantage. Write stating age, experience, and salary required.—Box 3300, FOUNDRY TRADE JOURNAL.

DIRECTORSHIP available for experienced Foundry Manager in small jobbing iron foundry employing 20 men, in East Midlands. Excellent scope for man with sound Foundry/Commercial experience to use drive and initiative in developing excellent iron connections and also lay down and develop non-ferrous floor. Experience and personality of greater importance than capital investment.—Box 3242, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

METALLURGIST and CHEMIST required for Foundry Laboratory. Familiar with chemical analysis of iron and steel. Duties also include Furnace and Sand control. Only those applicants with the above experience need apply.—Box 3289, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required for new Non-ferrous Foundry, chiefly gunmetal, now being erected. Only person capable of taking full control and with experience in running such a foundry need apply. Equipment now under consideration is for large proportion of mechanisation. Initial load 5 to 8 tons per month.—Apply Box No. 52, W. H. SMITH & SON, LTD., Croydon Airport.

STEEL FOUNDRY FOREMAN required, for small Mechanised and Jobbing Foundry. Only those persons with steel foundry practice required.—Box 3291, FOUNDRY TRADE JOURNAL.

ASSISTANT METALLURGICAL CHEMIST required, age 25-35, for laboratory attached to iron and steel foundry.—Write, giving full particulars of training and experience, stating age and salary required, Box 3277, FOUNDRY TRADE JOURNAL.

QUALIFIED METALLURGIST, between the ages of 25/35, with technical control and research experience, to take charge of laboratory and development Section in progressive Mechanised Grey Iron Foundry in the North-West.—Box 3293, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required for Engineering Works producing light and medium size castings. Good disciplinarian. Knowledge of mechanised moulding, core making, and of sand and cupola control. Capable of training unskilled labour. House available. Apply in confidence, stating age, details of education, experience, and salary required.—Box 3286, FOUNDRY TRADE JOURNAL.

NIGHT shift FOUNDRY FOREMAN required by a large Midlands company, operating a modern heavy cast iron foundry. Applicants must be fully experienced in dry and green sand moulding, and should preferably be between 30 and 40 years of age. Possibility of housing assistance for suitable married man.—Box 3281, FOUNDRY TRADE JOURNAL.

A METALLURGICAL CHEMIST is required by Allied Ironfounders, Ltd., to take charge of the Chemical Laboratory for the Shropshire Group of Companies. The applicant, preferably between 30 and 40 years of age, will require as minimum qualifications National Certificate, experience in cupola control, an appreciation of the influence of elements on grey and high duty irons, along with the ability to make up cupola charges, and to control small staff in the analysis of cast metal. Salary will depend on qualifications, and help will be given with housing.—Apply, with full details of qualifications, to ALLIED IRONFOUNDERS, LTD. (R.W.S. Dept.), Ketley, Wellington, Shropshire.

EDUCATIONAL

NORTHAMPTON POLYTECHNIC,
St. John Street, London, E.C.1.

DEPARTMENT OF APPLIED CHEMISTRY.

A course of SIX special evening lectures on "CORROSION TESTING," by a Group of Leading Corrosionists, will be given on Wednesday, March 18, and five Tuesday evenings, at 7 p.m.

Fee for the course £1.

Further details and enrolment by personal application or by post.

PREMISES WANTED

WANTED to rent, long or short lease, in Lancashire area, preferably within 10 miles radius of Manchester, Foundry, with or without cupola or building suitable for installation of cupola, approximately 100 ft. by 50 ft. or larger. Must have plenty of storage space; rail and crane facilities desirable, but not essential.—Box 3294, FOUNDRY TRADE JOURNAL.

FINANCIAL

ACTIVE interest in small Foundry wanted by practical Foundry Manager. State capital required and present turnover.—Box 3295, FOUNDRY TRADE JOURNAL.

BUSINESS WANTED

WELL-KNOWN Foundry Executive, with considerable drive and energy and with good trade connections, wishes to purchase a holding in a Foundry and Engineering Company, preferably in the Midlands or the South. Would be prepared to take over complete management and would be prepared to come to an arrangement with present owners to safeguard their interests, particularly in relation to death duties.—Box 3296, FOUNDRY TRADE JOURNAL.

AGENCIES

REPRESENTATION. — Qualified Foundryman, calling on Engineers and Founders, willing to represent reputable Company and/or Foundry with interest in above trades. Expenses and commission basis. London and Southern Counties.—Box 3299, FOUNDRY TRADE JOURNAL.

COMPANY, situated in the centre of London, having well-established business with foundries, seeks additional AGENCIES for London and the Home Counties.—Box 3285, FOUNDRY TRADE JOURNAL.

TRAVELLER required, already calling on Foundries, for Foundry Equipment, etc. All Scotland. Commission only. —Box 3290, FOUNDRY TRADE JOURNAL.

ALUMINIUM Gravity Die Casters invite applications from active AGENTS in all areas.—Please give fullest information to Box 3269, FOUNDRY TRADE JOURNAL.

MACHINERY WANTED

WANTED.—Core Sand Mixer, 5-10 cwt. capacity. 240 volts, 3-phase, a.c.—ERIFO, LTD., Manor Road, Erith, Kent.

WANTED.—Sand Testing Equipment. —HOWARTH & WALTER, LTD., Hamdel St. Foundry, Bradford.

MACHINERY FOR SALE

SAND MIXERS and DISINTEGRATORS for Foundry and Quarry; capacities from 10 cwts. to 10 tons per hr.—W. & A. E. BREALEY (MACHINERY), LTD., Station Works, Ecclesfield, Sheffield.

Two 55 kW. Diesel Generators, 400 volt, 3-phase, 50 period, by J. & H. McLaren, Ltd. Only 12 months old and practically unused. Can be seen at work if required.

Two H.N. type Moulding Machines, 800 capacity, by Coleman Wallwork. Unused except for sample moulds.

One 19 ft. dia. turntable Wheelabrator Unit, by Tilghman's. In good condition. Can be demonstrated if required.

All above plant must be cleared owing to reorganisation.

Apply to:

CHIEF ENGINEER, LLOYDS (Burton), LTD.,
Burton-on-Trent.

FOR SALE.

NO. 16 ATRITOR CRUSHER by Alfred Herbert, complete with Feed Hopper, overhauled and with a quantity of spares. Also a No. 12 Atritor by Alfred Herbert, for which we have available about 6 tons of spares. Both these machines are offered at extremely low prices for quick clearance.

SAVILLE-CALVERT (MACHINERY) LIMITED.
BIRMINGHAM ROAD,
STRATFORD-ON-AVON
Tel.: Stratford-on-Avon 3681.

ACTUALLY IN STOCK.

Immediate delivery.

Broomwade Compressors. Brand new; size D-22; 130 c.f.m.

Also N-5 and N-2 sizes (30 and 16 cu. ft.). Complete with vee belt drives at maker's list prices.

Also 75 new Broomwade Air Receivers, up to 6 ft. by 3 ft.

ELECTROGENERATORS, LTD.,
Australia Road, Slough.
Telephone: Slough 22877.

DELIVERY EX STOCK

New shot blast cabinets complete with Dust Extractors, etc., size 5ft. × 3ft. Also new 8ft. cube room Plants

Low prices.

Please send for our NEW Illustrated catalogue on request

ELECTROGENERATORS LTD.
14 AUSTRALIA RD., SLOUGH
Telephone: SLOUGH 22877
BUY FROM US AND SAVE MONEY

MACHINERY FOR SALE—*Contd.*

FOR SALE.—One R2 Coleman Coreblower, recently overhauled by manufacturer. Price £350.—Box 3292, FOUNDRY TRADE JOURNAL.

FOR SALE.—Good secondhand Planing Machine, 8 ft. 3 in. by 2 ft. 8 in. by 2 ft. 6 in. In good working condition. Further particulars on application.—THE MEADOW FOUNDRY CO., LTD., Mansfield.

20 300-lb. Aluminium Bale Out Furnaces, gas fired, complete with Burners. Morgan, etc. Offers for the lot or part.—ALUMINIUM DIE CASTINGS (BIRMINGHAM), LTD., Charlotte Street, Birmingham, 3.

SHOT BLASTING PLANT by Electrogenerators available for immediate disposal, 8 feet cube working space, complete with one ton capacity shot container, totally enclosed cyclone sieve apparatus, and motorised exhaust fan. In perfect working order, recently overhauled. Can be inspected and offers made to ARTHUR LYON & CO. (ENGINEERS), LTD., Park Works, Stamford, Lincs.

ALBION TWW WORKS

FANS & BLOWERS.

MOTOR DRIVEN BLOWERS
(400/3/50 cycles):

SEVERAL ELECTRIC FORGE BLOWERS. 125 c.f.m., 3 in. w.g., 3½ in. inlet, 2 in. outlet. ¼ h.p. Motor.

KEITH BLACKMAN, TYPE N, SIZE O, BLOWING FANS. Outlet 2½ in. dia., capacity 10,000 c.f. hour, 13 in. w.g. 1 h.p. S.C. Motor, P.B. Starter.

MOTOR DRIVEN BLOWING FAN. 4½ in. by 3½ in. dia. outlet, 6 in. inlet. 3 h.p. S.C. Motor (Brook).

SIZE 20 MULTIVANE STEELPLATE PRESSURE FAN. 1,500 c.f.m. against 18 in. w.g. 10 h.p. S.C. Motor, 12 in. inlet, 8½ in. by 3½ in. outlet.

SIZE 15 MULTIVANE STEELPLATE PRESSURE FAN. 2,500 c.f.m., 10 in. w.g. 10 h.p. S.C. Motor.

SIZE 24 MULTIVANE STEELPLATE PRESSURE FAN. 2,820 c.f.m., 22 in. w.g. 20 h.p. S.C. Motor, inlet 13 in. dia., outlet 12 in. by 4½ in.

BELT DRIVEN:

BELT DRIVEN BLOWING FANS, by KEITH BLACKMAN, TYPE NP4. 8 in. flanged outlet, 2,800 c.f.m. against 24 in. w.g., or 2,200 against 15 in. w.g., and intermittent duties.

STEELPLATE MULTIVANE FAN. 24 in. dia. inlet, 16 in. by 26 in. outlet; grooved pulley for two ⅝-in. vee ropes.

EXHAUST FANS:

SIZE 9 PADDLE BLADE. 450 c.f.m., 3 in. w.g. 0.75 h.p. Motor, inlet 5¾ in. dia., outlet 5¾ in. by 4½ in.

SIZE 12 PADDLE BLADE. 1,000 c.f.m. against 5 in. w.g. 2 b.h.p. S.C. Motor, 8 in. dia. inlet, outlet 9 in. by 9¾ in.

SIZE 15 PADDLE BLADE FAN. 2,000 c.f.m. against 6 in. w.g. 5 h.p. S.C. Motor, outlet 9½ in. by 8 in., inlet 9 in. dia.

SIZE 17 PEERLESS EXHAUST FAN. Capacity 6/7,000 c.f.m., 3 in. w.g., 10 h.p. S.C. Motor, Starter, slide rails, 17 in. inlet, outlet 12 in. by 15 in.

THOS W. WARD LTD
ALBION WORKS : SHEFFIEL
Phone 26311 'Grams: "Forward."

Remember . Wards might have it

MACHINERY FOR SALE—*Contd.*

NO. 1 and 2 "British Rema" Pulverising Units, complete with Hoppers and a quantity of delivery Pipes. Both machines were in operation until recently, when a larger unit had to be installed. No reasonable offer refused for a quick sale.—Box 3272, FOUNDRY TRADE JOURNAL.

B.T.H. very powerful Dust Extractor-Blower. Motorised unit (unused), £15. One-third to-day's cost.—BELLANGER'S, 306, Holloway Road, London, N.7. North 4117.

ONE 75 lb. Titan Core Blowing Unit, by Construction Engineering Company. Seen London.—Write Box 51, c/o WALTER JUDD, LTD., 47, Gresham Street, London, E.C.2.

IMMEDIATE DELIVERY.

Core Making Machine, for multiple round cores; motorised, a.c., 3-phase. £55.
Coleman Core Blower, size R2; as new. £375.
Pneulec Royer; as new; a.c. £85.
Fordath Senior Sand Drier. £90.
New Cupolette, complete. £170.
Plenty of good Core Ovens in stock.
Electric Sieve. £33.
Tilting and Bale-out Furnaces; over 100 in stock; cheap.
Several good Sand Mills in stock; cheap.
Shot-blast Catalogue and full details on request.

ELECTROGENERATORS LTD.,
Australia Road, Slough.
Telephone: Slough 22877.

600

AIR COMPRESSORS.

1,000-C.F.M., ALLEY & McLELLAN, Type 18B. Vert., encl., 2 stage, watercooled, 100 lb. w.p., speed 360 r.p.m. With vert. Intercooler.

1,000-c.f.m., FULLERTON, HODGART & BARCLAY. Vert., double acting, 2 stage, watercooled, w.p. 100 lb., speed 290 r.p.m. With separate vert. Intercooler, and motorised water circulating Pump. Fitted with Flywheel and shaft ext., carrying "V" pulley supported by outer bearing.

665-c.f.m., SULLIVAN. Type WJ3. Vert., high pressure, right angle, watercooled, 125 lb. w.p., speed 188 r.p.m. Direct coupled 170-h.p. auto. synch. Motor, by Crompton, 415/3/50, with Control Gear.

600-c.f.m., TILGHMAN. Vert., single cyl., single stage, watercooled, type F.C.9, speed 365 r.p.m., w.p. 60 lb.

250-c.f.m., REAVELL. Vert., 2 stage, 2 crank, watercooled, 150 lb. w.p., speed 480 r.p.m. Intercooler mounted between stages. "V" belt driven from 80-h.p. S.R. Motor, by E.E.C., 400/3/50, with Control Gear.

GEORGE COHEN
SONS & CO., LTD.
WOOD LANE, LONDON, W.12
Tel: Shepherds Bush 2070
and STANNINGLEY nr. LEEDS
Tel: Pudsey 2241

CAPACITY AVAILABLE

THE ACE PATTERN COMPANY, Hillmorton Road, Rugby. (Tel.: 3638.) First-class patterns in wood or metal. Speedy delivery and competitive prices.

CAPACITY available for castings weighing from 1 lb. to 15 tons, including Quasi-Bessermised ingot moulds up to 10,000 tons per annum.—THE CROSS FOUNDRY & ENGINEERING CO., LTD., Gorseinon, near Swansea.

MECHANISED FOUNDRY.—Malleable and Grey Iron Castings offers 20 tons per week free capacity at early date. Preference for boxes up to 28 in. by 16 in. by 5 in. by 5 in. Snap Flasks up to 14 in. by 14 in. by 3 in. by 3 in. Hand moulding capacity also available. Cast Iron Pipes flanged and specials. Patternmaking facilities if required.—E. J. WALLACE, 39, Constitution Street, Dundee.

PATTERNS and Core Boxes, wood or metal. Keenest prices; early delivery. Approved monthly accounts.—STEVENS, 15, Norwood Road, Reading. 'Phone 61523.

HAYWOOD BROS., Littleborough, Lancs., invite enquiries for all types of Patterns and Scale Models. Highly finished, accurate work of any size. Tel. 8543.

CAPACITY available for Ferrous and Non-ferrous Castings. Competitive prices and quick delivery. Enquiries invited.—FERNHEATH CASTINGS, LTD., Stanley Green Road, Poole, Dorset.

MIDLANDS.—R. J. Harris & Son, Ltd., Rugeley, Staffs., have for many years produced First Class Grey Iron Castings for Machine Tools, Jigs and Fixtures and General Work, and have now additional capacity available for castings from ½ lb. to 5 cwts., in small or large quantities.

CAPACITY available for High Quality Grey Iron Castings, Exhaust Manifolds, Switch Gear, Stove and Grate, and any castings up to 5 cwts. Quality and prompt delivery guaranteed.—Apply CRADLEY CHAIN & MFG. CO. LTD., Mill Street, Cradley, Staffs.

H. C. HOPPER (Kingston) Ltd.
HAMPDEN ROAD, KINGSTON
KIN 0177/8/9

PATTERNS (Wood & Metal)
CASTINGS (Iron & Non-Ferrous)
GEAR CUTTING
GENERAL MACHINING

All at our
KINGSTON WORKS

Good Deliveries

CAPACITY AVAILABLE—*Contd.*

NON-FERROUS FOUNDRY. — First-class quality castings in Aluminium, Bronze, Gunmetals, etc., at competitive prices, including patterns if required.—BEESTON LEE & CO., LTD., 33, Swindon Road, Stratton St. Margaret, Wilts.

IMMEDIATE capacity for the complete manufacture of Dies for Aluminium Gravity Die Castings.—R. E. ORMEROD, LTD., Ednall Lane, Bromsgrove, Worcs.

TIVIDALE FOUNDRY, LTD., Local Board Road, Watford. (Tel. 3743.) Non-ferrous Sand Castings, 2 cwt. maximum. Prompt quotations and deliveries.

NON-FERROUS SAND CASTINGS.—Clean, high quality, sand blasted castings in gun metals, brass, aluminium, etc. Necessary patterns if required.—MEYNELL & SONS, LTD., Montrose Street, Wolverhampton.

CASTINGS.—We can save your porous castings, ferrous or non-ferrous, by an approved Impregnation Process; sample castings treated.—RECUPERO, LTD., 66, South Harrow Viaduct, Harrow, Middx. 'Phone: Byron 1178.

STEEL FOUNDRY, Sheffield District, spare capacity available for Stainless, Carbon and Alloy Steel Castings from 8 oz. to 224 lbs. H.F. Melting, Modern Mechanised Plant. Capacity available: 8 tons per week. Prompt quotations and deliveries.—Box 3256, FOUNDRY TRADE JOURNAL.

CAPACITY available for Light Castings weighing from 1lb. to 5 cwts., including Castings for Vitreous Enamelling.—WESTERN LIGHT CASTINGS FOUNDRIES, LTD., Fairwood Foundry, Gowerton, near Swansea, manufacturers of malleable iron castings.

MISCELLANEOUS

FOR all classes of Foundry Engineering, installations, maintenance, overhaul of Plant, consult THE CHEMICAL & FOUNDRY ENG. CO., Winker Green Mills, Leeds, 12. 'Phone 37240.

MANURE, especially suitable for Foundry work and as supplied to the trade for over 25 years. Quotations on request.—FRANK GINSTER, Moxley, Wednesbury. Phone: 0688 Wednesbury.

SEA SAND for Castings, any quantity, by road or rail.—JOHN LIVESEY, LTD., Leamington Road, Ainsdale, Southport.

FOR DISPOSAL, weekly, ex Glasgow, Large quantities Scrap Copper, selected Gunmetal, Heavy and Light Brass, etc., also High Speed Steel.—Box 3287, FOUNDRY TRADE JOURNAL.

C. PROCESS.—Cast Iron Pattern Plates, suitable for Shell Moulding. Made to customer's patterns or drawings.—ROBERT R. SHAW, Falkirk Road, Larbert, Scotland. 'Phone 300.

MISCELLANEOUS—*Contd.*

FIREWOOD for Cupolas. Sleepers and Sleeper Wood in wagon loads.—TILLEY'S (WOLVERTON), LTD., Wolverton Bucks.

PATTERNS for all branches of Engineering for Hand and Machine Moulding.—FURMSTON AND LAWLOR, LTD., Letchworth.

REFRACTORY MATERIALS.—Moulding Sand, Ganister, Limestone, Core Gum; competitive prices quoted.—HENSALL SAND CO., LTD., Silver Street, Halifax.

PATTERNS, any description or size. High-class Patterns in wood or metal for all types of engineering work. Competitive prices. Good delivery.—FRANK MITCHELL (BRIGHOUSE), LTD., General Pattern Makers, Victoria Pattern Works, Aire Street, Brighouse, Yorks. Tel.: Brighouse 1244.

WANTED.—Complete set of Patterns for 4 ft. diameter stationary Pan Mill.—Details to Box 3267, FOUNDRY TRADE JOURNAL.

ANALYSIS, assaying of metals, alloys, residues, etc., ferrous and non-ferrous. Reliable results available promptly at considerate rates. Enquiries invited.—Box 3253, FOUNDRY TRADE JOURNAL.

MISCELLANEOUS—*Contd.*

GRAPHITE / PLUMBAGO.—In all qualities and all meshes for every industry—a personal service and prompt deliveries.—WOODSTOCK (LONDON), LTD., 33, The Little Boltons, London, S.W.10. FREmantle 6646/7.

NEW MOULDING BOXES, Ex. STOCK

48 PAIRS "PAGET" Steel Moulding Boxes, 12 in. by 12 in. by 4 in. by 4 in. Double lugs, "D" handles, drilled and reamed ⅝ in. dia. at 14½ in. centres. 44s. per pair.

16 pairs Boxes, 14 in. by 12 in. by 5 in. by 5 in. Double lugs, "D" handles, drilled and reamed ⅝ in. dia. at 16½ in. centres. 53s. per pair.

49 pairs Boxes 22½ in. by 12½ in. by 5 in. by 5 in. Double lugs, "D" handles, drilled and reamed ⅝ in. dia. at 25 in. centres. 62s. per pair.

24 pairs Boxes 18 in. by 12 in. by 3 in. by 3 in. Single lugs 4 in. by 2 in. used as handles 20¾ in. centres, ⅝ in. dia. fixed pins. 46s. 6d. per pair.

12 pairs Boxes 15 in. by 12 in. by 6 in. by 6 in. Double lugs, "D" handles, drilled and reamed ⅝ in. dia. at 17¾ in. centres. 61s. per pair.

25 pairs Boxes 15 in. by 12 in. by 5 in. by 5 in. Double lugs, "D" handles, drilled and reamed ⅝ in. dia. at 17½ in. centres. 54s. per pair.

Carriage extra on all these items.

THE PAGET ENGINEERING CO. (LONDON), LTD.
Braintree Road, South Ruislip, Middlesex.
Telephone: Ruislip 6011.

MISCELLANEOUS—*Contd.*

THE "SERVICE" Sandblaster's Protective Suit, manufactured by MESSRS. THOMAS BUTCHER & SONS, estab. 1876, 237/9, Stamford Street, Ashton-under-Lyne. 'Phone ASH. 1063.

MOULDING BOXES.

GOOD deliveries of steel Moulding Boxes. Standard or to suit individual requirements.

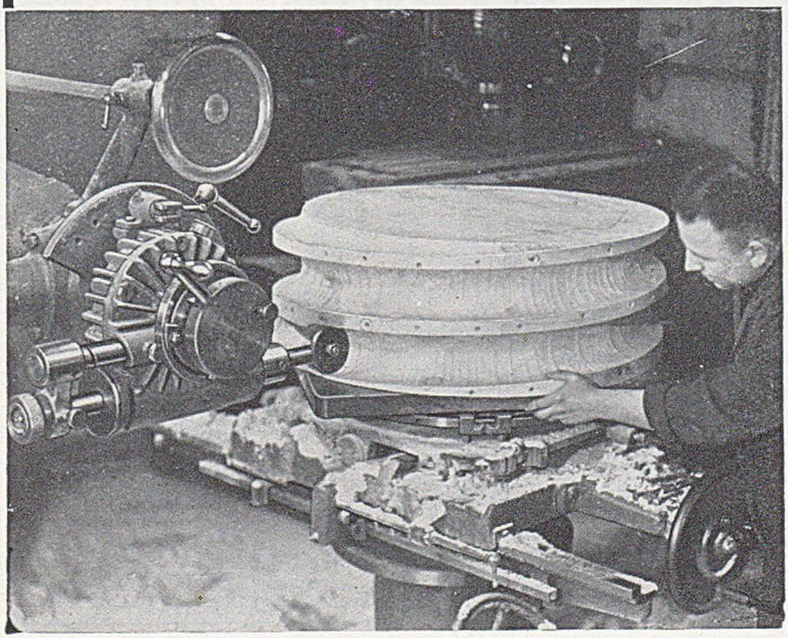
THE CHEMICAL AND FOUNDRY ENGINEERING CO.,
Winker Green Mills, Leeds, 12.
Tel. 37240.

FLAME CUTTING OF STAINLESS STEEL demands an Iron powder specially manufactured for the job which
POWDER METALLURGY LTD.,
59–62, High Holborn, W.C.1
can supply you at approximately 7d. per lb.

PATTERNMAKERS' Section

PATTERNS
WOOD AND METAL

Over 100 Skilled Craftsmen at your service

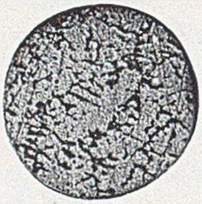


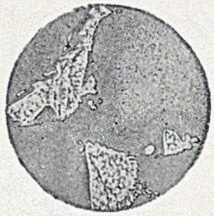
G. PERRY & SONS LTD.

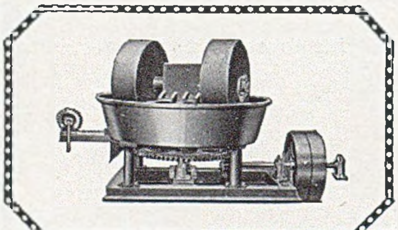
HALL LANE
AYLESTONE
LEICESTER

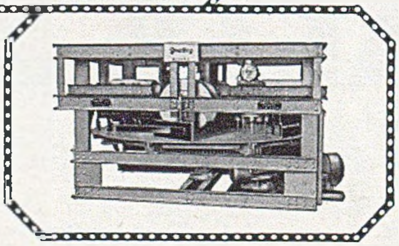
TELEPHONE:—
LEICESTER 32261

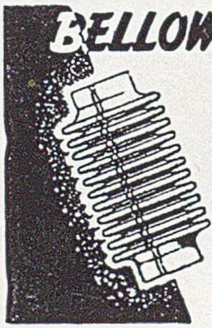
PATTERNMAKERS' Section

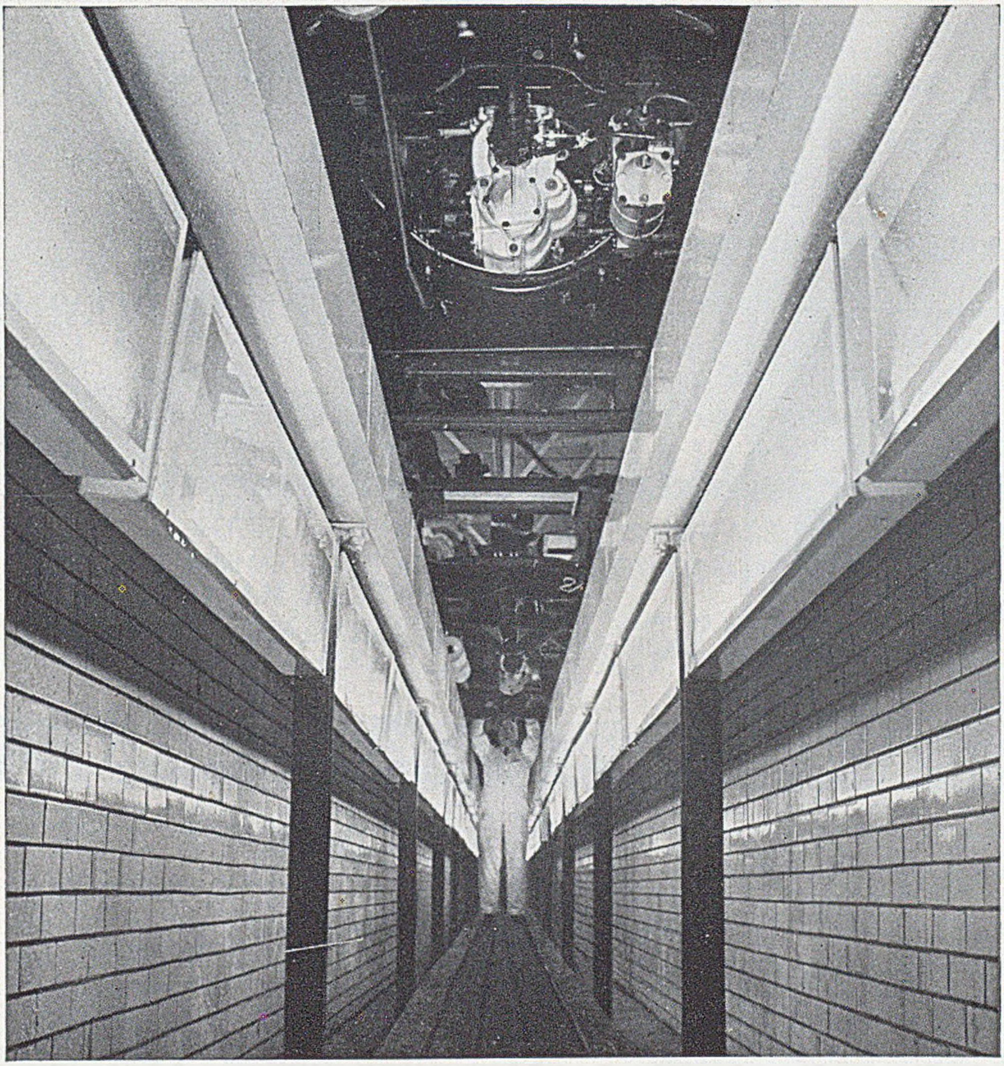












Pit beneath motor car assembly line for under-chassis work

Published by the Proprietors, Industrial Newspapers, Limited, 49, Wellington Street, Strand, London, W.C.2, and Printed in Great Britain, by Harrison & Sons, Limited, Printers to the late King George VI, London, Hayes (Middx) and High Wycombe.

FOUNDRY

EST. 1902

TRADE JOURNAL

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. 94
No. 1904
Registered at the G.P.O. as a Newspaper

FEBRUARY 26, 1953
Offices: 49, Wellington Street, Strand, London, W.C.2

Single Copy, 9d. By Post 11d. Annual Subscription, Home 40/-, Abroad 45/- (Prepaid)