FOUNDRY TRADE JOURNAL

EST. 1902

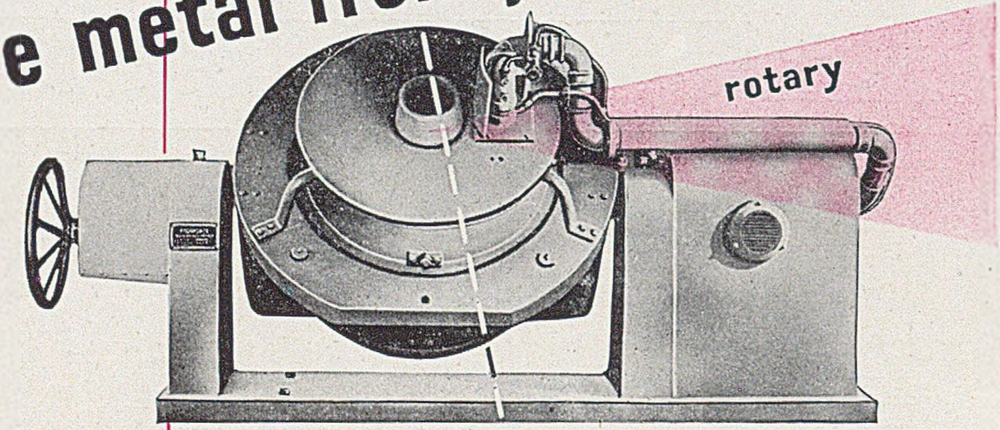
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. 94
No. 1903
Registered at the G.P.O. as a Newspaper

FEBRUARY 19, 1953
Offices: 49, Wellington Street, Strand, London, W.C.2

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

more metal from your swarf



...CRUCIBLE MELTING

1. maximum flexibility
2. minimum oxidation and volatilisation
3. cannot cause porosity in casting
4. no contamination of the charge
5. accurate control of temperature

The efficient melting and reclamation of swarf or metal residues present their own special problems. The inevitable high metal losses which occur when using conventional methods become even more serious when considering the increasing price of metal. Swarf, with its tendency to overheat; its low bulk/weight ratio and its impurities makes special demands on the furnace.

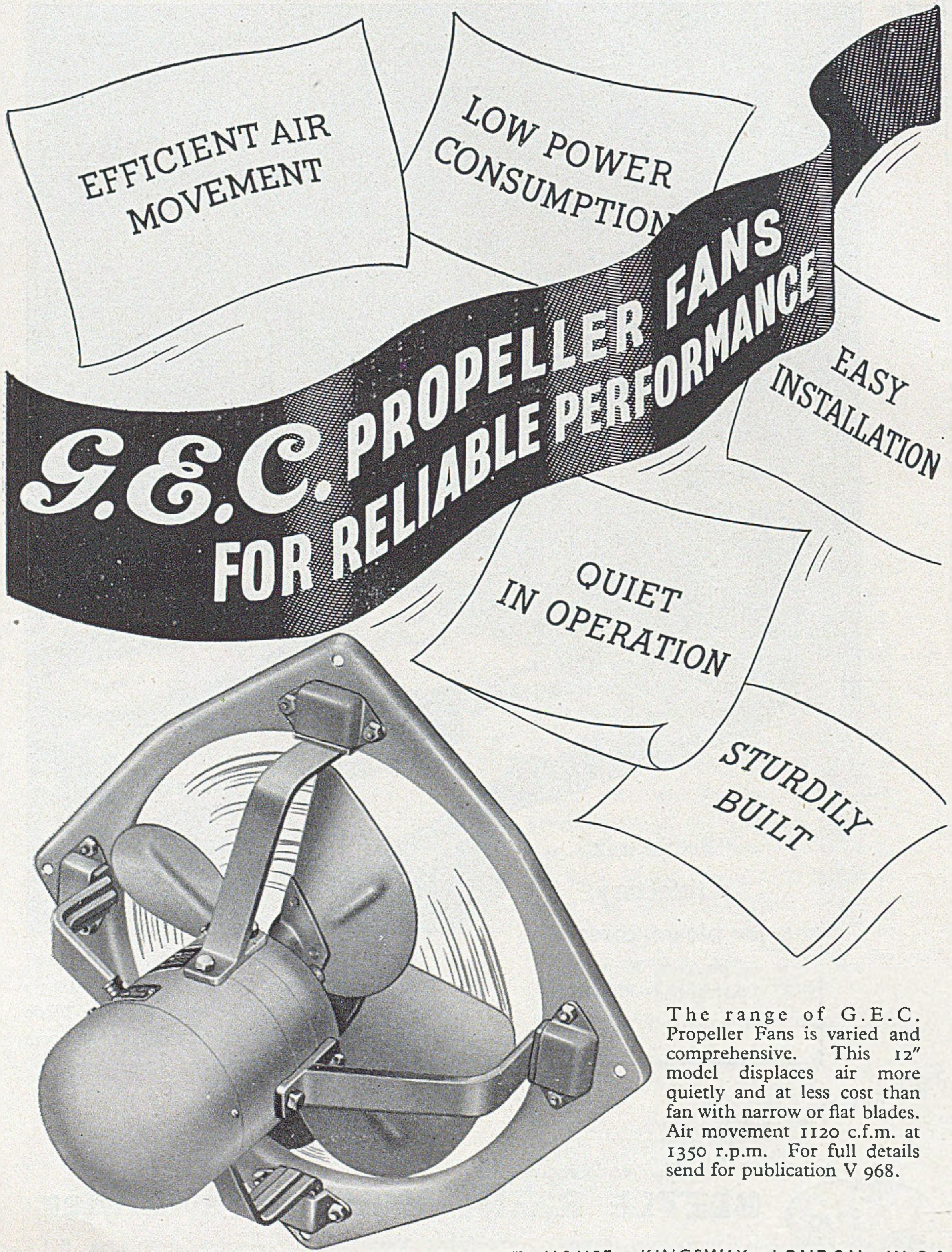
The MORGAN ROTARY CRUCIBLE FURNACE has been specially designed to overcome these and other difficulties; what is more important, it has produced, in service, recovery figures hitherto impossible under routine conditions.

Write for further details and Folder F.D.2.

THE MORGAN CRUCIBLE COMPANY LTD

BATTERSEA CHURCH RD., LONDON, S.W.11

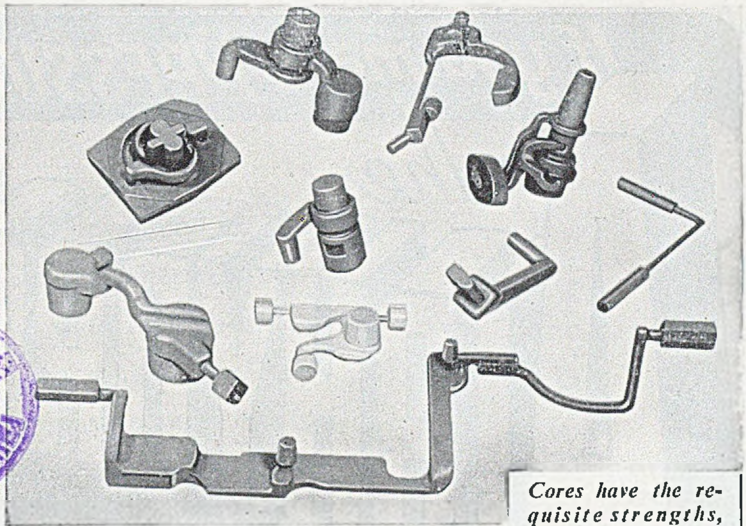
Telephone: BATtersea 8822 | Telegrams: Crucible Souphone London



The range of G.E.C. Propeller Fans is varied and comprehensive. This 12″ model displaces air more quietly and at less cost than fan with narrow or flat blades. Air movement 1120 c.f.m. at 1350 r.p.m. For full details send for publication V 968.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2.

THE CORE-MIX IS AS GOOD AS ITS BOND



(PHOTO BY COURTESY OF MESSRS. WESTINGHOUSE BRAKE & SIGNAL CO. LTD.)

Cores have the requisite strengths, both green and baked, when the sand is bonded with Glyso, mixed in the Fordath 'New Type' Mixer.

GLYSO Core Bonding Compounds

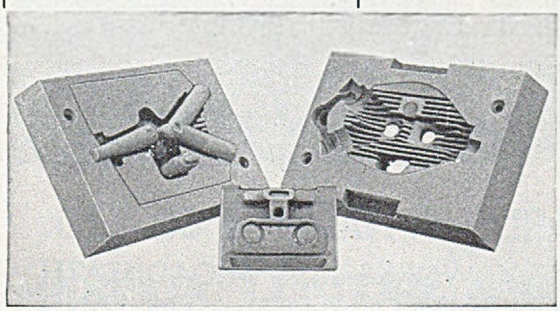
A RANGE TO MEET EVERY NEED

High green bond, free flowing mix with high baked strength, quick drying without stoving—what are the requirements? The GLYSO range of Core Bonding Compounds provides every characteristic specified in the core-shop. Famed for their substantial contribution to core-making technology, GLYSO binders are widely used in foundries near and far.

Semi-Solid Compounds give a high green bond covering a wide range of sand characteristics.

Creams combine a lower green bond and free-flowing mix with high baked strength; unsurpassed for core-blowing mixtures.

Intricacy and accuracy with Glyso in the sand mix for this mould and core assembly.



(PHOTO BY COURTESY OF MESSRS. CENTRAL FOUNDRY CO. LTD.)

Dark Compounds provide a lower priced range giving excellent results for general work.

Permol Core Oils are in seven grades, selection being governed by relating dried strength requirements to binder cost. Permol bonded cores have good knock-out after casting.

Glyso XL Core Powder, a pure film-dried cereal, produces high green strength in the mix and is best used with Permol Core Oil.

Glyso — Exol Core Powders, a range of cereal powders impregnated with core oil in accurate quantities for different classes of core work.

Glyso Airbond, quick drying without stoving, or stove-dried in half the usual time.

Glyso Resyns. A range of synthetic resin binders for quicker drying of cores by short-period stoving, or by dielectric heating. Excellent knock-out. Enquire also about Glyso Spray Oils, Fordavol, Fordath Parting Powder, Fordath Moulding Sand Regenerator and Fordath Paint Powders.

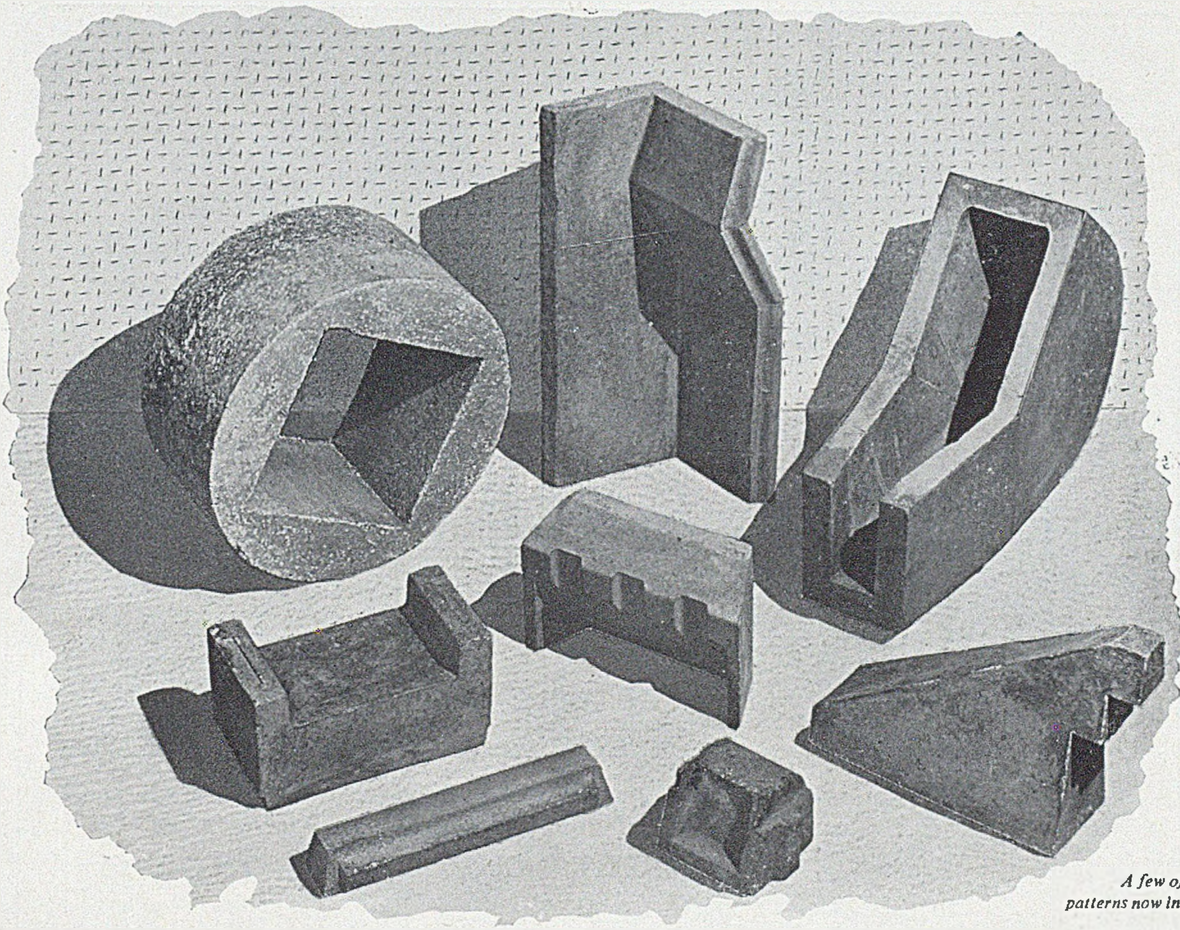
Make certain that the right binder is used for every job in the shop.

GLYSO CORE OIL COMPOUNDS

Full details obtainable from,

THE FORDATH ENGINEERING CO. LTD.
HAMBLET WORKS, WEST BROMWICH
STAFFS.

PHONE: *West Bromwich 0549, 0540, 1692*
GRAMS: *Metallical, West Bromwich*



A few of the patterns now in use.

Success depends upon perfect register—perfect register depends upon the accuracy of the method of closing. Foundrymen everywhere depend on Sterling experience to supply the most satisfactory answer for the work in hand. With parting faces ground level and true, with pins and pin centres accurately aligned, Sterling boxes combine in perfect partnership . . . . for better, faster casting.

ROLLED STEEL *Sterling* **MOULDING BOXES**

STERLING FOUNDRY SPECIALTIES LTD., BEDFORD, ENGLAND

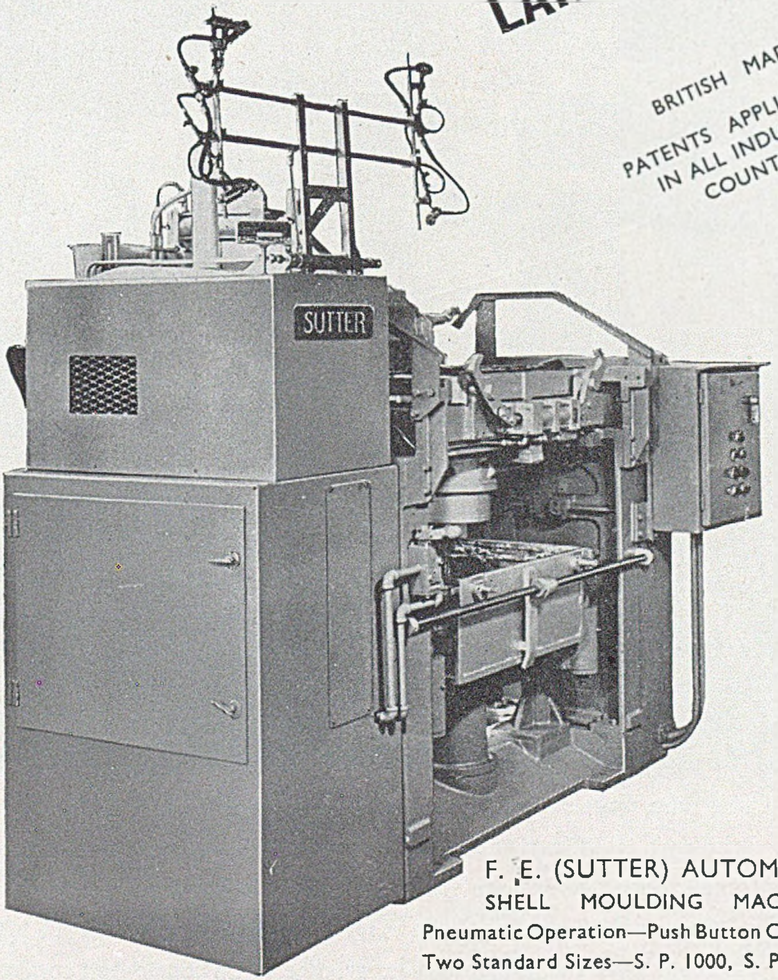
Cogent

SUTTER

for HIGH SPEED PRODUCTION of LARGE SHELLS

BRITISH MADE

PATENTS APPLIED FOR. IN ALL INDUSTRIAL COUNTRIES.



F. E. (SUTTER) AUTOMATIC SHELL MOULDING MACHINE.
Pneumatic Operation—Push Button Control
Two Standard Sizes—S. P. 1000, S. P. 1100.

FE for Foundry Efficiency TRADE MARK

FOUNDRY EQUIPMENT LTD

LEIGHTON BUZZARD, BEDS, ENGLAND.

'PHONE: LEIGHTON BUZZARD 2206-7-8. 'GRAMS: "EQUIPMENT" LEIGHTON BUZZARD


Newcon Foundry Type Heavy Duty
Gravity Roller Conveyor
NEW CONVEYOR
COMPANY LIMITED
BROOK STREET
SMETHWICK, 40.

D

INDEX TO ADVERTISERS

301/17

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.

FOUNDRY TRADE JOURNAL
Established 1902

Vol. 94 Thursday, February 19, 1953 No. 1903

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"

Let's get this Straight!

We are constantly being perturbed by the action of the dissident ironfounders claiming to be part of the engineering industry. They are neither that nor a section of the iron and steel trades. The steelfounders make a similar assertion, with probably even less justice. Taking the case of the ironfounders first, we would point out that one of the leading firms in the grouping referred to manufactures boot-protectors and it would require a large stretch of imagination to associate this activity with engineering. The argument that, because wage rates paid to moulders and coremakers are arranged through the Engineering and Allied Employers' National Federation, there is an integration so strong as to identify them as a part of that industry is no stronger than the one which relies on the fact that during the last war the iron castings control was within the iron and steel control. Obviously, both engineering and the iron and steel industries are customers of the foundry.

If it is to be accepted that a manufacturer is in nomenclature to classify his interests with his customers, then a Grimsby foundry becomes a part of the fishing industry; a Cornish foundry throws in its lot with the quarry owners, whilst "Allied" and "Federated" are merely builders' merchants! Only last week, we received a Press notice from a roll foundry reporting the sad loss the "iron and steel industry" had sustained through the death of one of their staff. One's customers are important, but their importance does not carry the right to include the trade of the supplier as being the designation of the supplying industry.

The case of the steelfounders making themselves out to be part of the engineering industries is weaker than the section of the ironfounders, as in the latter case, a huge engineering works may have quite a small foundry department, but we cannot recall a similar size relationship for a steel foundry—though, of course, one may exist, and possibly steel castings production at Cornwall concern may be the exception. Normally, the steel castings production of any firm assumes equal, if not greater importance to that of the other lines of business undertaken, and is never regarded merely as a convenient source of supply. In plain English, they are not just "tied" foundries, but units serving a wide range of customers. Unquestionably, every maker of castings should proudly assert that he is a foundry owner; that there is no need—nor is it desirable—to claim to be part and parcel of any other industry but that of founding; that his industry is older than engineering; and that it is still fundamental not only to engineering, but to the very existence of civilization and modern life. Without castings every other industry would eventually have to close down. Surely then the industry is big enough and sufficiently enterprising to stand on its legs and face the world and the Government as an entity worthy of separate consideration quite independent from either its suppliers of raw materials or its customers.

Manchester Ironfounders' Dinner

The Manchester and District Ironfounders Employers' Association held its annual dinner on February 10, at the Midland Hotel, Manchester, following the annual general meeting. Eighty members were present, and the Lord Mayor of Manchester and Mr. B. H. Tripp, of the Council of Ironfoundry Associations, also attended.

Mr. J. E. Smethurst, J.P., who earlier in the day had been re-appointed president of the Association for a further year, proposed the toast of the City of Manchester. In doing so he referred to Manchester which, 150 years ago, was little heard of (and then mainly as a health resort) and compared it with the large important city which it is to-day. He referred to it as a city of free trade, of cotton, music, news, shipping and railways; a city of the traditions of the Manchester Regiment, and especially as an engineering centre of which ironfounding formed a large part.

In reply to the toast the Lord Mayor referred to the kindliness and friendliness of the members who had invited him, of his pleasure to hear of the industry's great interest in its apprentices, and, in closing, stressed the need for freedom in trade.

Mr. Storey who, in the earlier meeting had been re-appointed vice-president of the Association for 1953, introduced Mr. B. H. Tripp as the man who was charged with publicizing the foundry industry. Mr. Tripp, in reply, outlined the plans that were in hand for the near future. He referred to the constitution of the C.F.A. and the heavy responsibility which fell on local associations.

LATEST FOUNDRY STATISTICS.—In 1952, the total output of heavy non-ferrous castings (brass and bronze) was 66,306 tons as against 67,713 tons in 1951. The decline was no doubt due to the restrictions imposed on the use of raw materials during a prolonged period. Additionally, according to the Bureau of Non-ferrous Metals statistics, about 6,000 tons of pure copper castings were made during 1952.

British Standards Institution

Aluminium Filler Alloys for Brazing (B.S. 1942 : 1953)

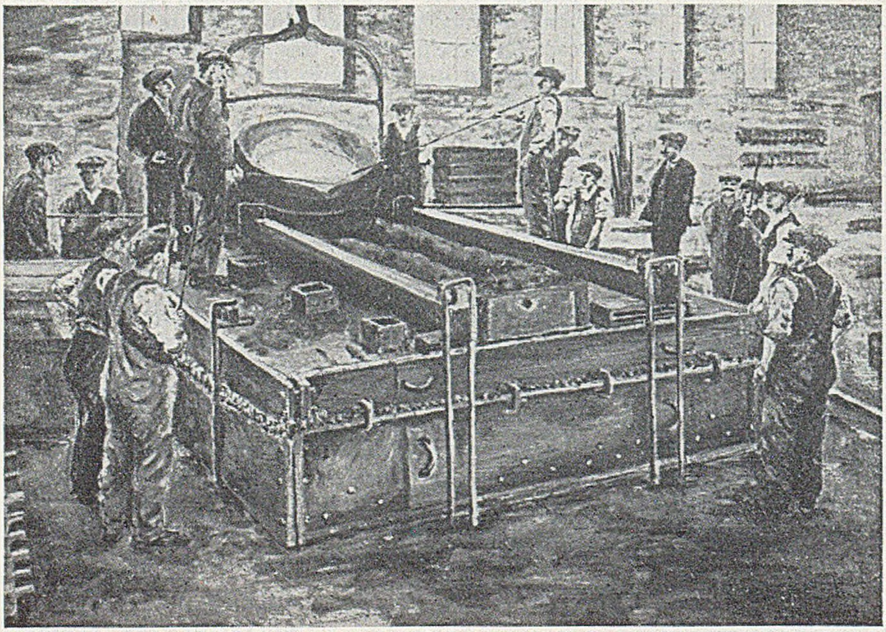
A new British Standard for aluminium brazing, just issued by the British Standards Institution, is complementary to B.S. 1723, "brazing," and to B.S. 1845, "filler alloys for brazing (silver-solders and brazing solders)." The standard covers four types of aluminium alloy suitable for brazing a number of alloys complying with the series of British Standards for aluminium and aluminium alloys, namely, B.S. 1470 to 1477, and 1490. Chemical composition and limits of impurities, together with the form of material, are specified, and the approximate melting ranges are given for information. Copies may be obtained from the British Standards Institution, Sales Branch, 24, Victoria Street, London, S.W.1 (price 2s.).

Brass Rods and Sections (B.S. 249 : 1953)

The British Standards Institution has just issued a revised edition of B.S. 249, "Free-machining brass rods and sections." The range of sizes covered has been extended to include material $\frac{1}{16}$-in. dia., the chemical composition has been slightly altered, rolled material has been omitted, and tolerances have been amended, to bring them into line with present-day practice. Copies may be obtained from the British Standards Institution, Sales Branch, 24, Victoria Street, London, S.W.1

TWO GERMAN GEOLOGISTS, who at the invitation of the Pakistan Government have been surveying the salt range in the Mianwali and Sargodha districts, are understood to have submitted their preliminary report to the Government. According to Press reports, their statement confirms the presence of iron-ore deposits in these areas of "about 14,000,000 tons."

Presentation Painting



At a recent meeting of the Council of the Institute of British Foundrymen, Mr. John Bell, on behalf of the Scottish branch, passed over to the president of the Institute a painting of the interior of a Scottish foundry which is reproduced here. The painting is by Mr. J. Mitchell, teacher of patternmaking at the Technical College, Dundee. Mr. Mitchell felt that the painting should be in the keeping of the Institute, and he therefore passed it to the Scottish branch, who in turn handed it over to the president. Pending a decision with regard to a permanent home, the painting is at present hung in the Institute's offices in Manchester.

Tolerances and Specifications for Grey-iron Castings*

By Charles O. Burgess

[ABRIDGED]

As-cast Tolerances

By far the greatest percentage of grey iron is produced by static casting in conventional green- or dry-sand moulds. The average contraction of grey iron on cooling from solidification to room temperature under such conditions is considered to be 1 per cent. or approximately $\frac{1}{8}$ in. per ft.—about one-half that shown by steel or non-ferrous materials such as aluminium or brass. The wood or metal pattern used in preparing the mould is deliberately made oversize so as to allow for this normal contraction of $\frac{1}{8}$ in. per ft. This is known as the patternmaker's shrinkage. Since the amount of shrinkage varies with the size of the casting and the resistance offered by the mould materials, this allowance obviously cannot be constant, and it is customary in the case of miscellaneous castings for the purchaser to allow dimensional tolerances approximately one-half the maximum shrinkage possessed by the cast metal, *i.e.*, $\pm\frac{1}{16}$ in. Thus, a dimension allowance of $\pm\frac{1}{16}$ in. (0.06 in.) is a common specification with castings approaching one foot in final length. At this point, it should be observed that it is by far best for the buyer not to specify closer tolerances than are absolutely necessary, as delay and increased pattern and casting costs may result.

Clearly, a study of production operations, including the preparation of sample castings, will permit closer tolerances to be used than the indicated figure of one-half the maximum shrinkage. Based on experience with a particular product, many foundries are producing grey-iron castings to a tolerance of $\pm\frac{1}{32}$ in. (0.03 in.). Small textile machinery parts, small cams, camshafts and intake manifolds are regularly held to similar tolerances. In fact, certain castings are directly put into use without requiring machining or special finishing. It should be realized, however, that a foundry cannot make a casting to closer tolerances than the quality of the pattern equipment will allow. If such close tolerances are required, it is necessary to use increased care in pattern preparation, usually to the extent of using aluminium matchplates or similar durable material.

Again, the foundrymen should be consulted in making the pattern since he is mainly responsible for maintaining tolerances. Wide experience with the grade of iron to be employed and the characteristics of his moulding sands places him in the best position to advise the patternmaker as to the correct contraction allowance or patternmaker's shrinkage that must be provided. This shrinkage is not constant but depends on the number of cores used in a mould; on the overall length of the casting; and varies also with the casting weight. Table I shows how unit shrinkage, *i.e.*, contraction of grey iron on cooling from the liquid to room temperature, varies with casting length.

TABLE I.—*Pattern Shrinkage Allowances for Grey Iron.*†

Pattern dimension.	Contraction, in. per ft.
Up to 24 in.	1/8
25 to 48 in.	1/10
Over 48 in.	1/12

† A standard patternmaker's shrinkage for common grey cast iron is $\frac{1}{8}$ in. per ft. For white cast iron, the shrinkage allowance averages $\frac{5}{32}$ in. per ft. Allowances given in Table I are quoted from "Specifications for Wooden Patterns" formulated by a special committee of the Milwaukee branch of the National Metal Trade Association, and published as A.F.A., preprint 32-1 (1932).

Thus, total contraction and, therefore, dimensional tolerances do not increase numerically with increase in length. For example, although a tolerance or an allowance of $\pm\frac{1}{16}$ in., *i.e.*, one-half the contraction shown in Table I, may be allowed on a casting one foot in length, the dimensional tolerances on a casting three feet in length would not be $\pm\frac{3}{16}$ in. but probably closer to $\pm\frac{3}{20}$ in. provided that distortion was not a factor. The effect of cores is even more marked, and in a heavily cored casting, such as a cylinder block, the shrinkage along the length may be $\frac{1}{10}$ in. per ft. but yet zero in height, because of the resistance offered by cores in the water-jacket section. With certain repetitive jobs, again, such as cylinder blocks, etc., it has been found possible to hold tolerances up to an 8-in. span to $\pm\frac{1}{64}$ in. (0.015 in.). Over 8 in., tolerances of $\pm\frac{1}{32}$ in. are considered normal. The foundryman will also attempt to keep the controlling dimension entirely within one section of the mould and avoid crossing the mould parting line. Attainment of these closer tolerances are an example of the beneficial effect on tolerances of close co-operation between the foundryman, the patternmaker and the designer. In a few cases, tied foundries, working with very low expansion sands and small parts, have been able to produce materials with remarkably close tolerances. For example, one producer of agricultural machinery reports that he is regularly casting grey iron carburettor bodies of an average weight of $1\frac{1}{2}$ lb. to within 0.004 to 0.005 in. of final dimensions.

Other Casting Methods

Alteration of the casting method from static to centrifugal does not normally alter the usual toler-

* A Paper presented at the Centennial of Engineering—A.S.M.E., Chicago, Illinois, and available as a preprint at the cost of 10 cents a copy from Gray Iron Founders' Society, Inc., 210 National City, E. 6th Building, Cleveland, Ohio. The Author is technical director, Gray Iron Founders' Society, Inc., Cleveland, Ohio.

Tolerances and Specifications for Grey-iron Castings

ances as above noted. As might be expected with such a method, the outer surface dimensions are held much closer than is possible with inside dimensions. One manufacturer reports that the outside of a 4-in. dia. cylinder can be held to ± $\frac{1}{64}$ in. and the inside diameter to ± $\frac{1}{32}$ in.

Shell-moulding

One recently-developed method that shows promise for concerns producing reduced as-cast tolerances that approximate to finished dimensions is the so-called shell-moulding process. Unusually-close tolerances of 0.001 to 0.002 in. per inch are claimed for this method. Tolerances of ±0.003 to 0.004 in. on the diameter of an 8-in. gear have been reported. The shell method possesses potentialities as a means of eliminating rough machining and permitting use of only light grinding or honing operations in order to make grey-iron castings meet exacting tolerances. It should be stressed, however, that although shell moulding has reached commercial proportions for certain types of automotive castings that are produced repetitively in large quantities, it still must be considered in the development state for the vast majority of standard grey-iron castings. In addition, there are limitations as concerns the maximum casting weight or section size that can be readily handled in shell moulds. The economies of shell moulding need to be studied in any given case to determine if the need for extreme dimensional accuracy in the unmachined form, and the number of castings to be produced, are sufficient to justify the expense of preparing the costly patterns necessary for this type of production.

Finish or Machine Tolerances

The tolerances so far outlined are those permissible for unmachined castings. If the castings require machining, it is common practice to allow $\frac{3}{32}$ to $\frac{1}{8}$ in. over the normal tolerance for removal in the machining operation. This permits two cuts being taken—a rough cut and a fine finishing cut. The amount of extra stock allowed depends to some extent on the degree of machine finish required and the size of the casting. In the machine-tool industry where castings of 1 to 10 cwts. are common, machining allowances of $\frac{3}{16}$ in. to $\frac{1}{4}$ in. are usually specified. This additional machining allowance is also advisable in the case of castings with one very long dimension where warpage may occur. In general also, the larger the casting the more metal must be allowed for removal in machining since the increased heat of a large casting tends to promote burnt-in sand and a rougher than normal as-cast surface. Table II shows some common machining tolerances or allowances.

As in the case of as-cast tolerances, the foundryman, in collaboration with the customer, should continue to work to decrease machine-shop costs. With developing experience with a job, finish tolerances or allowances of less than the indicated $\frac{1}{8}$ in. are possible. Cast bearings in the automotive field, for example, that must be turned down and ground are frequently made with finish tolerances of $\frac{1}{32}$ to $\frac{1}{64}$ in.

TABLE II.—*Guide to Pattern Machine-finish Allowances (Per Side) for Grey-iron Castings.*

Pattern size.	Bore, in.	Finish, in.*
Up to 12 in.	$\frac{1}{8}$	$\frac{3}{32}$
13—24 in.	$\frac{3}{16}$	$\frac{1}{8}$
25—42 in.	$\frac{1}{4}$	$\frac{3}{16}$
43—60 in.	$\frac{5}{16}$	$\frac{1}{4}$
61—80 in.	$\frac{3}{8}$	$\frac{5}{16}$
81—120 in.	$\frac{7}{16}$	$\frac{3}{8}$
Over 120 in.	Special instructions required	

* Surfaces to be machined should be located in the lower or "drag" sections of the mould for minimum machine tolerances. Additional finish allowances of $\frac{1}{32}$ in. to $\frac{1}{16}$ in. greater than shown may be desirable if certain upper or "cope" surfaces are to be machined.

The quantity of metal that must be removed from a casting by machining becomes of considerable economic importance if a great number of castings are handled per day. It is not unusual, therefore, after a foundry has had experience with a given casting, for the casting purchaser to ask that the normal $\frac{1}{8}$ in. allowance for machining be held to within an accuracy of $\pm\frac{1}{32}$ in. even in the case of comparatively large castings weighing several hundred pounds. Quite often the amount of metal to be removed is designated on blueprints by special symbols such as f1, f2, f3, etc., indicating, for instance, $\frac{1}{8}$ in., $\frac{1}{16}$ in., $\frac{1}{32}$ in., etc., is to be removed by machining or grinding. Incidentally, it is unfortunate that to date there has not been any standardization of these symbols by designers.

If the part is simply to be disc ground, the grinding allowance is always much less than the usual machining allowance, and at least for comparatively small castings may be specified as only $\frac{1}{32}$ in.

The only way minimum machine tolerances of this order can be met is again by full understanding between the foundryman and the customer. Durable metal patterns must be available if any large number of moulds are to be taken off the pattern, and even in the case of cast-iron matchplate patterns, it may be necessary to provide them with replaceable steel strips to prevent indentation on continued contact of the plate with the rim of the flask and thereby a change of dimension across the parting line. Too often a trial order has been run using a wood instead of metal pattern, the desired dimensional accuracy obtained and then on a bulk order the castings fail to show the original accuracy and definition because of pattern wear.

Jig Locations

The establishment of jig locations on castings to be used as reference points for machining operations is a critical process. These may be in the form of one or more locating pads or specially ground, machined or otherwise marked areas on the casting. Their exact location must be considered as a joint project of the casting user and foundryman. Only if the foundryman is informed (preferably by a drawing) how the casting is to be employed and how it must fit into other operating parts, can he arrange the best and most intelligent jigging points. For example, he will preferably select locations on the casting that can be readily held to the closest possible tolerances. To assure maximum accuracy, the pattern design should also be reviewed, the location of gates and risers, the effect of cores, and the possibility of placing jig points on one side of the parting line, all with the purpose of facilitating the final machining operation. In special cases where extreme dimensional accuracy justifies the extra cost, gauges are employed for setting cores and for final measurements on ground areas. Using such precautions, it has been possible to hold jigging points within ± $\frac{1}{32}$ in. in moderately sized castings.

BIBLIOGRAPHY

Engineering Properties of Cast Iron, *American Foundrymen's Society*, Chicago, 1950, pp. 39-40.

Neilson, L. M., "Determinable Variations in Close Tolerance Castings," *Foundry*, vol. 76, Feb., 1948, pp. 72-73.

Cast Metals Handbook, 3rd edition, American Foundrymen's Association, Chicago, pp. 9-13.

Horner, J. G., and Gates, Phillip, Pattern-making for Engineers, 8th edition, Technical Press, Limited, London, 1950, pp. 62, 63, 69.

Tool Engineers' Handbook, American Society of Tool Engineers, Detroit, 1949, pp. 414-418.

Iron and Steel Bill

During the consideration of the Iron and Steel Bill in Parliament last week, Mr. Sandys, Minister of Supply, moving his own amendment to exempt the foundries from the application of the Board's power of veto in respect of certain development schemes under clause 5 of the Bill, said that in the last six years foundry development schemes had numbered 2,000, of which more than 90 per cent. had cost less than £50,000. The amendment made it clear that the Board was not intended to concern itself with minor schemes of this kind. On a division the amendment was carried by 238 votes to 218.

On Tuesday of this week, the Minister agreed to a number of minor changes in the Iron and Steel Bill affecting the powers of the supervising Board with regard to maximum prices and the import of raw materials and finished products.

During the resumed debate on the Committee stage of the Bill the House agreed to Government amendments making it clear that price control did not extend over exports. These amendments also blocked any loopholes that this freedom for exports may have opened up for the evasion of internal price controls.

Raw Materials

Mr. Sandys also accepted an amendment to Clause 9 giving the Board power to investigate the position regarding the import of the industry's raw materials where it thought the arrangements were unsatisfactory. The clause to require the Minister to consult with the industry before authorizing the import of finished steel is to be revised.

Mr. T. Low, Parliamentary Secretary to the Ministry of Supply, undertook to reconsider the powers of the Board regarding its duty to import iron and steel. He had been urged to give the Board authority to make such imports when it thought there was likely to be a shortage in the future rather than wait until the shortage actually occurred. Further discussion is expected on these clauses.

JOHN WHITEHEAD ENGINEERING (WILLESDEN), LIMITED, announces that, as from March 16, its business will be carried on from Industrial Estate East, Harlow New Town (Essex) (telephone: Harlow 2001-3).

Furniture Exhibition

The fourth post-war annual exhibition organized by the British Furniture Manufacturers' Federated Associations and the National Federation of Bedding and Allied Trades opened last Tuesday at Earls Court, London, and continues until February 27. The public are admitted all day (10 a.m. to 9 p.m.) on February 20 and 21 and in the afternoons and evenings (2 to 9 p.m.) from February 23 to 26. There are 299 exhibitors and the whole of the ground and first floors of the exhibition building are occupied. One of the trends of interest to managers of industrial canteens and indirectly to patternmakers is the "marriage" of plastics and wood, instead of the substitution of one for the other. This is apparent in the number of tables of all kinds with plastics tops, and in kitchen furniture. The increased scope in design allowed by the use of laminations bonded with synthetic resins is evident.

£25 Damages Awarded

Mr. Bertie McArdle, machine moulder, of Arbroath, was awarded £25 in the Court of Session on February 11. He had claimed £700 from Keith, Blackman, Limited, as damages for personal injuries, and the trial was before Lord Guthrie. On October 7, 1949, McArdle was operating a moulding machine when the third finger of his left hand was caught and the tip amputated. He said the firm had failed to provide a reasonably safe plant and system of working. The firm said the accident was caused or contributed by McArdle's failure to take reasonable care. The jury found unanimously for McArdle; they assessed total damages at £100, but held that McArdle contributed 75 per cent. to the accident.

Economical Use of Metal

Papers on the subject "making the best use of metals" will be presented at a symposium being arranged by the Birmingham local section of the Institute of Metals on February 27 at the College of Technology, Birmingham. Mr. H. H. Symonds will preside and Dr. V. Kondic will speak on "Thermodynamic Aspects of the Refining of Non-ferrous Metals"; Mr. H. J. Miller has for subject "The Preparation of Refined Copper and Copper-base Alloys from Scrap Metal Charges" while Dr. E. Scheuer has taken "Re-melting and Refining of Aluminium and Aluminium Alloys." Mr. W. H. Hall and Mr. E. C. Mantle are to submit a paper on "The Economical Use of Metals"; Mr. T. Burchell on "The Aluminothermic Process and its Variants" and Mr. S. Hands on "The Recovery of Copper and Zinc from Liquid and Gaseous Effluents."

Head, Wrightson Long-service Awards.—The happy relationship existing between management and workpeople in the various departments of the engineering firm of Head, Wrightson and Company, Limited, Thornaby-on-Tees, was exemplified last Wednesday night when in the firm's Teesdale Hall, Thornaby, presentations of chiming clocks and gold watches were made to long-service employees. After a celebration dinner, in all, 145 employees were handed the tokens of their long service by Mr. Richard Miles, chairman and managing director, who was supported by several directors. Thirty-four men with over 50 years' service received chiming clocks and gold watches and those with over 40 years' were given gold watches.

Book Review

The Casting of Non-ferrous Ingots, by Leslie Aitchison, M.SC., D.MET., F.R.I.C., F.R.AE.S., M.I.MECH.E., F.I.M., and V. Kondic, B.SC., PH.D.; published by Macdonald & Evans Limited, 8, John Street, Bedford Row, London, W.C.1. Price 42s.

The majority of readers of these columns will be misled by the title of this book. The "ingots" to which reference is made are the finished products of the foundry and not the raw material. The authors, in their search for a term to embrace the forms of "billet" or "bloom" (to which might be added skillet, plate and slab, not uncommon in the Midlands), seek to justify and indeed to popularize their encroachment on the terminological preserves of the non-ferrous foundry proper. They do not give sufficient weight of argument to be convincing to those who regard the ingot as a raw material, a term probably in well-established and unmolested use at the time that the scientifically-nurtured billet was but a babe. Any attempt to re-christen at this mature age will lead only to confusion and possible chagrin at the purchase of a "pig-in-a-poke" at the bookstall.

So far as the contents of the book are concerned, the 366 pages are divided approximately equally into three sections, the first on theoretical background, the second on metallurgical aspects and the third on production aspects. The theoretical background will interest technicians in all places where metals are cast. It deals with an extremely elementary metallurgical approach to the preparation of liquid metal for casting. Some of the terms may be new to some readers, but they are given sufficient explanation in the text to be readily understood. In the "States of Aggregation," the solid and liquid states are given fair treatment; heat content, heat energy, specific heat and the laws of thermo-dynamics are also given sufficient detail to prepare the reader for that which follows. Having given the whole subject matter of this book such rudimentary treatment, it is surprising that the authors do not go just that little bit further and explain one or two of the symbols used in their equations. They have to be complimented in qualifying the accepted table of heats of formation of some metallic oxides by admitting that these do not always follow in practice the order of preference. A very interesting page or two on the application of viscosity and surface-tension data to foundry practice will fill a gap in many of the books already on the foundryman's shelves. In dealing with solidification, the authors consider the physical factors involved, first with ideally-pure metals and then with liquid and solid solutions. The absence of highly academic jargon in their explanations, together with diagrammatic illustration, makes this subject appear very easily understandable. Temperature gradients, nucleation, chemical composition and homogeneity are treated in ample detail.

There is a very interesting chapter devoted to segregation, both micro and macro; segregation by gravity, by division, normal and inverse; secondary solidification phenomena, exudation (sweating, liquation), summed up by the various theories on segregation. Twenty-four pages are devoted to volume changes which include solidification, shrinkage and their feeding, solid contraction, hot-cracking, residual stresses and their measurement. This section is concluded by a few pages on the cooling of "ingots" and the methods adopted, and rate of cooling.

Whereas the first section was devoted to metallurgy in its widest sense, the second section on metallurgical aspects compares the various metals and industrial alloys. In this section melting and casting characteristics are reported, as are those of moulds, "ingots" and mould dressings. There is a very interesting and illustrated explanation of the growth of cast iron (as a mould material) in the decomposition of cementite. Choice of mould materials, mould dressings and their characteristics will be just as interesting to the jobbing foundryman as they will be to the metallurgist.

If the reader can cope with the authors' interpretation of the word "pouring"—as "In common English usage the word 'pouring' denotes the operation of transferring a liquid, normally by gravity, from a higher to a lower situation, usually into a vessel or container of some kind," and at the same time take no exception to the description of the pouring operation as—"The metal is poured over the lip of the ladle or crucible into the mould in much the same way as milk is poured into a tea-cup from a jug," then he should have no difficulty in his approach to the really interesting part of the chapter devoted to pouring. Among the various methods of pouring are included centrifugal, suction, vertical, side, bottom and revolving-mould-and-ladle (Durville). The sand foundry moulder may find some explanation for his variable crystal size and types for his gunmetal runner from the same pot of metal, in the diagrammatic representations by the authors of the differences on macrostructures produced by (*a*) quiescent and (*b*) turbulent pouring at low and high pouring temperatures. The last chapter in this section deals with the examination of "ingots" and plasticity.

The third section, and possibly the most important so far as the book is concerned, deals with the actual preparation of the "ingots." Batch-type casting from the various types of furnaces for continuous, semi-continuous and moving-ingot processes, are given a fairly liberal treatment, but it might have enhanced the illustration if a few actual photographs had been used instead of diagrams. These and their general metallurgical concepts are followed by an account of practice suited to the various alloys. Those in industry who were interested in the first two sections of the book will not be very interested in the closing chapters of the last. It deals with the lay-out of foundries, which will add nothing to what foundrymen already know and will be of little practical value to those who are thinking about setting one up. Still, for those who are not primarily engaged in the industry and whose interest has been captivated by the two previous sections of the book, this chapter will be a necessary corollary.

Those founders who, when reading through a book, have recourse to turn back a few pages to clarify a point, will have little occasion to do so in this instance. There is so much repetition that sooner or later the misty point will be cleared up in one or other of the pages that follow. The authors have obviously catered for the least informed in the casting of non-ferrous shapes. They have therefore reduced their phraseology to the most elementary form, and only this, coupled with the fact that they have made three self-contained sections in the book, could account for this apparent repetition. Only one photograph is included and that in the frontispiece. While diagrams are more clearly followed, the impressionable uninitiated would have been attracted by a reproduction of a photograph of, for example, a continuous billet-casting machine. The index is not nearly large enough, but this is off-set by the table of contents. There are a few references included throughout the book, but in their claim to have previously digested all published literature on the subject, the authors "make no apology" for having dispensed with a bibliography.

W. G. M.

Sand Reclamation at Lynchburg Foundry*

By Larson E. Wile

[ABSTRACT]

Early foundrymen used natural-bonded sands for cores and moulds. They were restricted, because of transportation facilities, to sands within the immediate vicinity which were not always the best. With the advent of core oils, sands with low percentages of clay were in demand and in recent years the use of synthetic sands has placed the silica sands in the position once held by the natural bonded sands. Great advancements have been made in the past two decades in the handling of foundry sands. The adoption of laboratory control, development of improved and new equipment for processing foundry sands, and the advancement in highway, rail, and water transportation bring better quality sand to the foundryman faster and from farther away than ever before. This account details the arrangements made by one large plant for the conservation of moulding sands, where the somewhat elaborate methods are justified by cost reduction of core-sand mixtures, diminution of waste, elimination of delivery hold-ups, in conjunction with production of better sand properties, enhanced appearance of castings and reduced cleaning.

Why Reclaim?

While sand is one of nature's most abundant materials, it does not always occur in sufficient quantities or in the proper form to be useful in foundries. As a result, it is often necessary to transport the sand many miles, which adds to the cost of the final product. The Lynchburg Foundry Company is in such a position and must bring sand from the New Jersey deposits, a distance of approximately 300 to 400 miles. Transportation costs are several times the initial cost of the sand.

In the present-day complex economic system, accurate control of costs is a most important item. The company which cannot control its costs is apt to find itself out of business. One of the reasons for the decision of the Lynchburg Foundry Company to reclaim sand was to reduce the cost of raw materials which, in turn, would reduce the cost of the finished castings. Another reason was the never-ending endeavour to produce a better quality casting through a well-administered and closely-supervised "quality-control programme." Other advantages to be obtained by reclamation include the elimination of disposal and despatch problems.

Reclamation and its Methods

In modern foundry practice, reclaimed sand refers to that sand which has been used at least once in making cores or moulds, then processed and prepared for re-use.

Several methods are now in effect for preparing the sand for re-use. The principal ones are as follow:—(1) By Hydroblast unit—the Radford, Virginia, plant is so equipped, and its reclaimed sand is blended with other sands in making both cores and moulds. (2) By thermal reclamation—binders and clay are removed by washing, followed by oxidation at temperatures of 535 to 815 deg. C. (3) In preparing sand for re-use the friction of particles driven against each other by an air current can be used. (4) Probably the simplest, but by no means the best way, is to expose the sand to the elements in the hope that the binders and clay will be dispersed.

Brief Review of Studies Undertaken

The investigation into the sand-reclamation problem was begun in the autumn of 1948. Various companies and individuals with experience in sand reclamation were consulted. In conjunction with the metallurgical and engineering staff, many tests were conducted, plans and drawings formulated, discussed, and revised. Suppliers were asked for

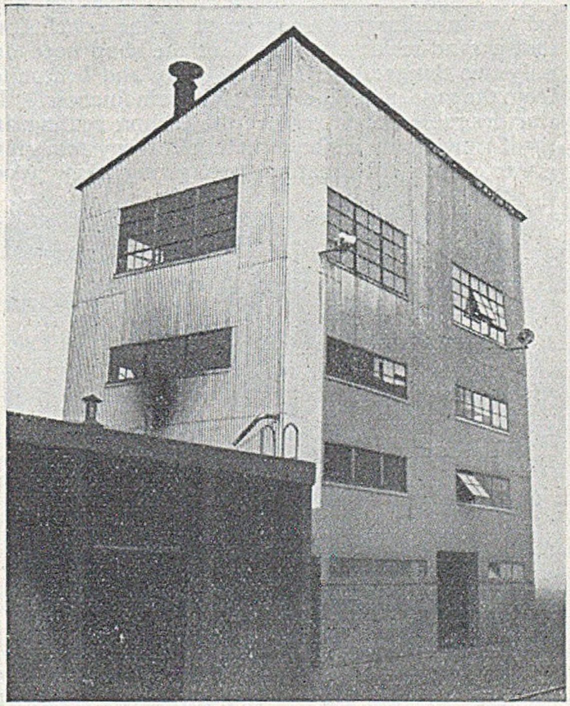


FIG. 1.—*Exterior of the Building Housing the Sand-reclamation Unit.*

*Taken from *The Iron Worker*, the house organ of the Lynchburg Foundry Company, Virginia, U.S.A. The Author is metallurgist at the Lynchburg plant.

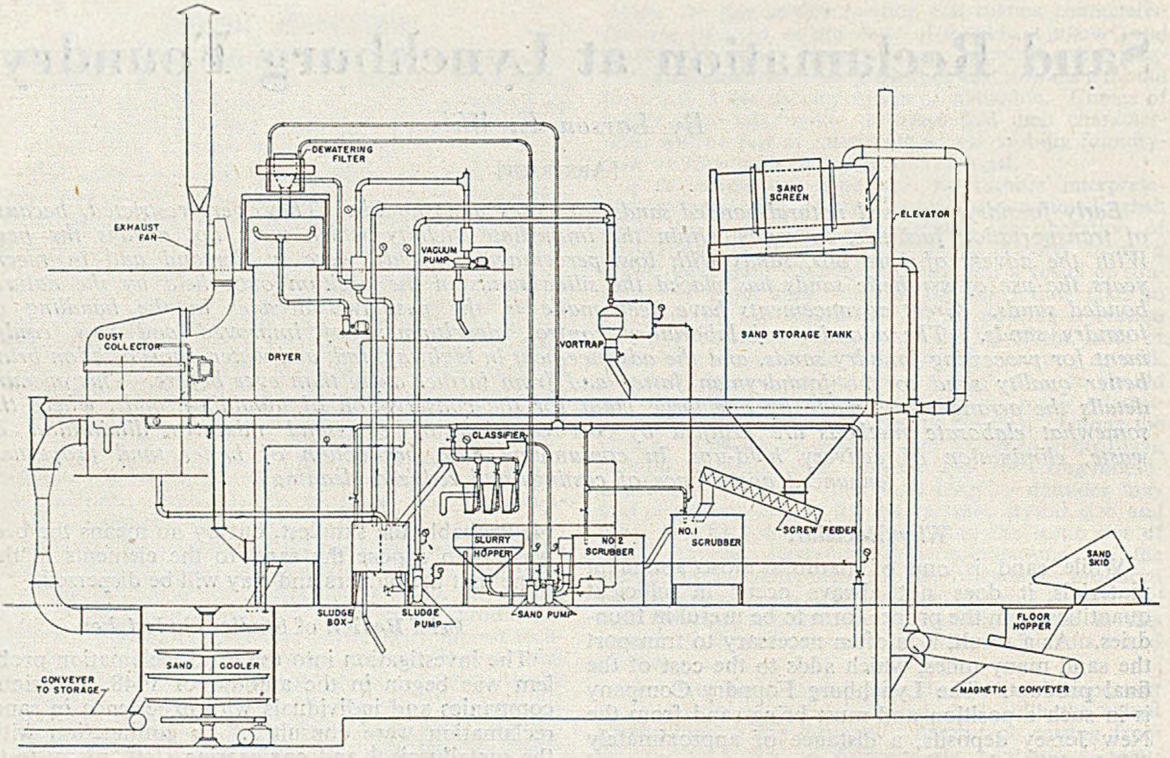


FIG. 2.—*Schematic Layout of the Sand-reclamation Unit at the Lynchburg Foundry, Virginia, U.S.A.*

material applicable to out-of-the-ordinary uses.

The results of the various tests and investigations led the metallurgical department to the conclusion that a sand-reclamation unit for the shop need do only two things: (1) remove all clay and bentonite from the sand, and (2) classify for grain fineness. It was desirable not to remove the carbon coating, in the form of an asphalt material, from the sand grains, since this coating was giving very good results in the system sand and the trend in sand technology seemed to favour a carbon-coated sand.

Sand which was reclaimed was to be used in conjunction with new 40, 60, and 90 mesh silica sand to make a blend for the cores.

The importance of having all clay removed from the sand when making a resin-bonded core is brought out very well by one of the preliminary tests conducted, the results of which are shown (washed sand

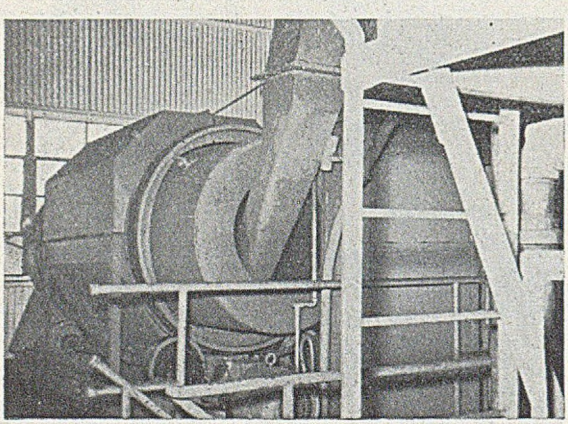


FIG. 3.—*Elevator from Magnetic Separator Screen Discharging Sand into the Rotary Breaker Screen. This contains Baffle Plates which first left the Sand, and then let it fall, thus reducing the Lumps.*

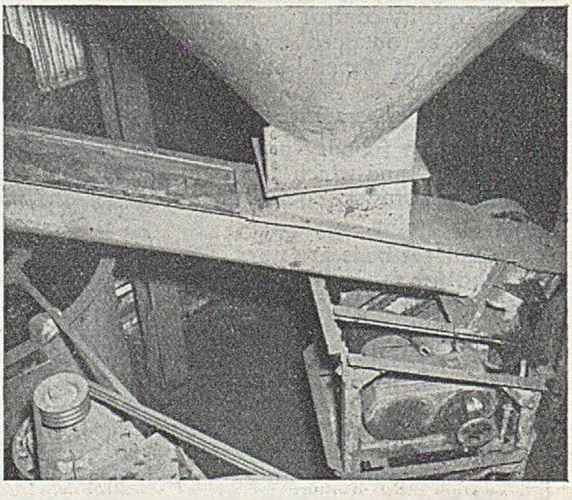


FIG. 4.—*Screw-type Feed Conveyor which moves Sand from the Storage Tank into No. 1 Scrubber.*

contained 1.0 per cent. clay, showing incomplete washing).

New Sand Mix.	*Washed Sand Mix.*
65 per cent. 40 mesh.	100 per cent. reclaimed sand.
35 per cent. 90 mesh.	1.0 per cent. cereal flour.
1.0 per cent. cereal flour.	1.5 per cent. resin binder (powder).
1.5 per cent. resin binder (powder).	1.0 per cent. resin binder (liquid).
1.0 per cent. resin binder (liquid).	3.0 per cent. water.
3.0 per cent. water.	0.03 per cent. release agent.
0·03 per cent. release agent.	

Physical Properties.

Moisture	3.0 per cent.	3.1 per cent.
Green compression ..	1.1 lb. per sq. in.	5.9 lb. per sq. in.
Green permeability ..	185	142
Baked tensile	398	176
At 215 deg. C.—1½ hr. ..	320 lb. per sq. in.	95 lb. per sq. in.

While the green compression of the washed sand mix is high, the low tensile (95 lb. per sq. in.) is not adaptable to local core handling and moulding practice.

Table I shows the effect of washing a sand. The new sand-reclamation system was installed by the combined efforts of the Nichols Engineering Company and the Lynchburg Company's engineering department. After months of test work on the part of everyone concerned and coping with such problems as material shortages and delays in receiving equipment, the first run was made on May 16, 1951. In operating efficiency, this unit acted like any other new piece of machinery or installation, and for some time the log sheet carried such statements as "screen on filter clogged," "air line to No. 2 scrubber clogged," "water building up in classifier," "filter overflowing," "pump broken down," etc. These difficulties were thoroughly studied and the equipment which was giving trouble was replaced by equipment of larger size, more horsepower, a different type, other design, or whatever the specific difficulty called for. At this date the unit is working efficiently, producing between 4½ and 5 tons per hr. of thoroughly washed, well-classified sand.

TABLE I.—*Screening Tests.*

Sieve No.	Unwashed.	Washed.
6	T	T
12	T	T
20	1.0	T
30	1.6	T
40	5.6	4.2
50	18.0	17.0
70	39.0	40.0
100	20.8	26.6
140	7.2	7.8
200	1.2	2.6
270	T	0.4
Pan	T	T
A.F.S. fineness	52	59
Percentage clay	3.6	0
Percentage burn-off	5.10	0.95

The Unit

The unit is enclosed in a steel-framed, aluminium sheeted building 18.5 ft. by 40 ft. (Fig. 1). There is one floor underground and four above. Limited space forced the company to build up instead of on one floor and, while this type of construction added engineering difficulties, such as pumping heavy sludge vertically a distance of 35 ft., it also offered several advantages such as permitting gravity feeds.

Briefly, the unit shown in Fig. 2 operates as follows: sand is dumped through a grating into the floor hopper. From here it passes over a magnetic conveyor, after which it is carried by bucket elevator to the third floor, where it passes through a breaker screen into the sand-storage tank. From the storage tank it is screw fed in No. 1 scrubber, passed by gravity into No. 2 scrubber, and along with water is pumped into the three-stage classifier which occupies part of the first and second floors. After classification, sand and water are pumped from the slurry hopper to the de-watering filter on the fourth floor. A screw removes the sand from the filter and charges it directly into the dryer, while the water flows by gravity to the sludge box on the first floor. From the dryer the sand passes into the cooling tower, which is below ground, and thence by rubber conveyor belt to the storage tank.

Storage Bin, Magnetic Separator, Screen and Scrubbers

The unit and its operation in detail is as follows: sand to be reclaimed consists of the following types: core knockout, excess moulding sand, unused core sand, and sand from the core-dressing operations. The knock-out sand and excess moulding sand make up the bulk of the material to be reclaimed. The sand should be dry, free from iron dust, slag, scale, wood chips, and miscellaneous trash. The sand is

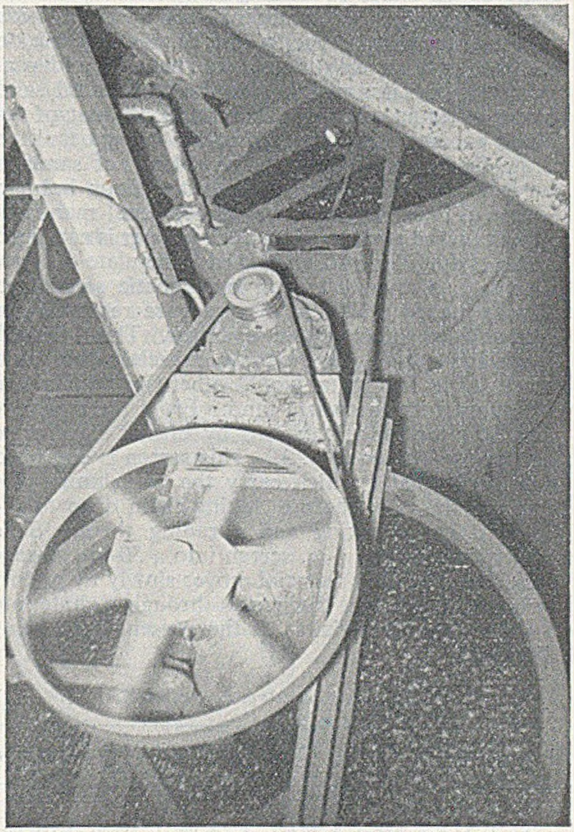


FIG. 5.—*View looking down from above on No. 1 and No. 2 Scrubbers.*

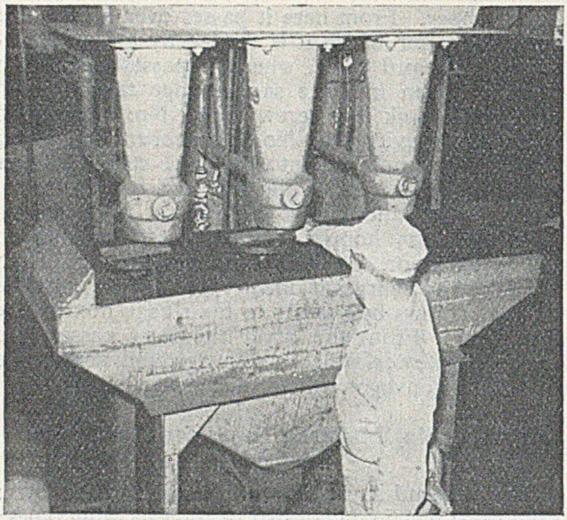


FIG. 6.—*Operator Adjusting an Opening in the Classifier Column.*

transported in skids by electric trucks to the storage shed. Here a car scoop is used to make a blend of the sands containing not over 50 per cent. moulding sand, since moulding sand requires more washing, decreases capacity, and causes clogging on the filter because clay is not removed. In addition, an excessive amount of fine carbon-coated sand causes clogging. If there is a small amount of retained moisture, feeding from the storage tank to screw feeder is difficult. The blend of sands is dumped through a grating into the floor hopper. Some of the larger core lumps are manually broken on the grating. The floor hopper is equipped with a sliding door which is used to regulate the flow of sand to the conveyor to magnetic separator. Approximately 1,320 lb. of scrap are removed per 8-hr. shift by the magnetic separator. This, in itself, is a sizable saving as, without a reclamation unit, nearly all of this metal would otherwise be taken to the dump with the waste sand. From the magnetic separator the sand is carried by bucket elevator to the breaker screen (Fig. 3). This screen is equipped with baffle plates which carry the core lumps part way up the side before letting them drop to the bottom, thus breaking and abrading them. Sand passes through the ⅛-in. screen into a 50-ton storage tank and oversized material moves slowly by gravity to one end, where it discharges through a chute into a skid. This material is at the present time being discarded.

TABLE II.—*Feed Rate at Various Settings.*

Setting.	R.p.m.	Lb./min.	Lb./hr.	Tons/hr.	Cub.ft./min.	Cub.ft./hr.
2	8	97.5	5,850	2.92	1.09	66.00
3	11	138.8	8,325	4.16	1.56	93.50
4	14	177.8	10,665	5.33	2.00	120.00
5	17	220.7	13,240	6.63	2.48	149.00
6	20	280.5	16,830	8.42	3.16	189.00

Beneath the storage tank is a variable-speed screw feeder (Fig. 4) leading to No. 1 scrubber. Table II shows the feed rate in various units for the appropriate settings.

For each setting of the screw feeder there is a corresponding setting of the classifier to maintain the desired fineness of the reclaimed sand.

The screw feeder has also been calibrated with respect to the washing action of the scrubbers. As the percentage of moulding sand in the mixture entering the system increases, the time required to wash the sand in the scrubbers increases so that the feed through the screw feeder must be reduced, and the capacity of the system decreased.

Sand is fed into the top centre of No. 1 scrubber (Fig. 5). Water is also admitted at the centre. The scrubber consists of a cylindrical steel shell containing a belt-driven central shaft to which a downthrust impeller is attached near the bottom of the tank. Surrounding the impeller shaft is a standpipe containing an adjustable weir collar and recirculating openings. The weir collar regulates the amount of recirculation. As it is lowered an increasing volume is permitted to circulate. Near the edge is a sand relief or air lift pipe. Each scrubber is equipped with an overflow pipe. The action of the mechanism promotes both a swirling and rolling turbulence to wet the clay and unburned binder, and separates the silica grains from these lighter materials. As the silica grains are washed free of bonds, they settle to the bottom of the scrubber and are then moved to scrubber No. 2 by the relief pipe or air lift and the process is repeated.

The scrubbing operation is exceedingly important so sufficient time must be allowed for the action of the scrubbers to do their work in separating bonding materials from the silica grains if the reclaimed sand is to be efficiently used in the core mixtures. At the outlet of scrubber No. 2 a screen has been installed to remove some of the small lumps (several grains in an aggregate) and other débris before going to the pumps. A rubber-lined impeller-

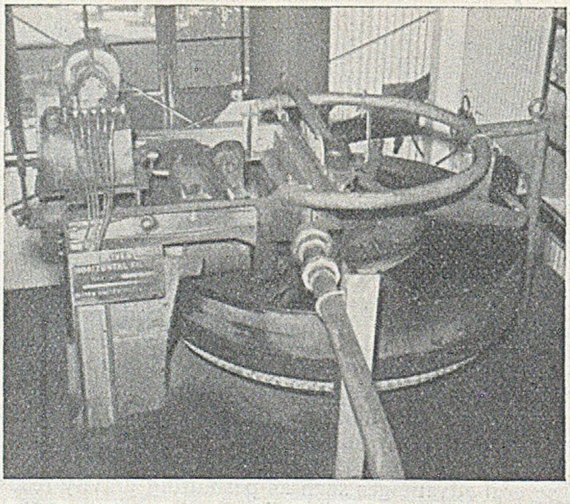


FIG. 7.—*View from above the Horizontal De-watering Filter.*

type pump forces the sand and water into the three-stage classifier (Fig. 6).

Classification

Classification, generally, is an operation in which a mass of grains of mixed sizes and different specific gravities is allowed, or caused, to settle through a fluid which may be either in motion or substantially at rest. Here the grains are sand of the same specific gravity but different sizes, and the fluid is water in motion.

The classifier is of the "hindered settling" type. Hindered settling differs from free settling in that the sorting column is constricted at the lower level. This constriction is obtained not only by design of the sorting column, but also by the use of a circular steel plate (visible in Fig. 6) containing six holes ranging in size from ½ in. to 2 in. The various-sized openings are used in conjunction with the water flow to control the grain distribution and to accommodate the sand load.

The action in a hindered settling column is as follows:—The rising velocity of the water passing the constriction is higher than that in the part of the column above it. Consequently, falling particles here meet greater resistance and some of them can fall no farther. Neither can they rise. As a result, a mass of particles becomes trapped above the constriction and pressure builds up in the mass. The particles thereupon move upward along the path of least resistance, which is usually the centre of the column, until they reach a region of lower pressure at or near the top of the settled mass. Here, under conditions in which they previously fell, they fall again. As particles from the bottom rise at the centre, those from the sides fall into the resulting voids. A general circulation is thus built up. This continual movement, with the particles at all times in intermittent, light moving contact with neighbours, is called "teeter," and that part of the classifier column above the constriction in which the teeter-condition exists is called the "teeter column." A teeter column acts as though it were a liquid in that the lighter particles presented to it cannot penetrate but appear to float on it; heavier particles penetrate and become a part of it, but cannot leave it at the bottom, and the heaviest particles sink through it and fall through the constriction.

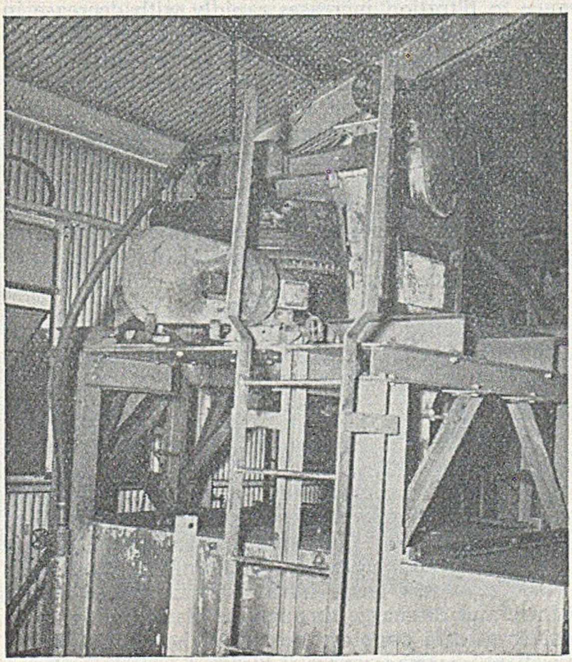


FIG. 8.—*Horizontal De-watering Filter mounted on the Top of the Dryer (side view).*

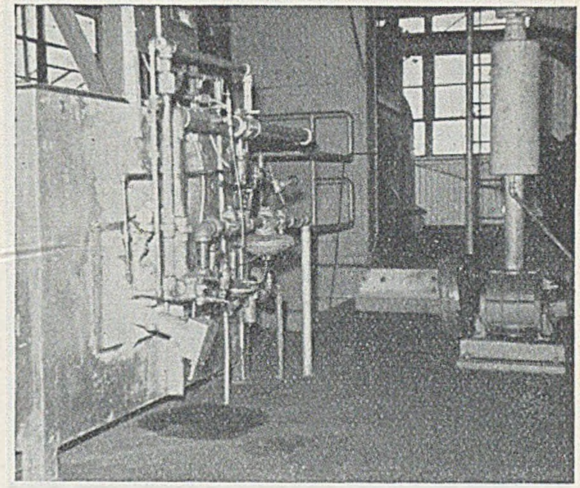


FIG. 9.—*(left) Burner Attachment on the Dryer and (right) Vacuum Pump.*

Each column contains a device which keeps sand from banking against its walls, and each fresh water inlet pipe is equipped with a venturi meter used in controlling the flow of water. Table III shows the relationship between the pressure or rising velocity of the water, the grain fineness, and the percentage of solids (sand) obtained for each column at a specified restriction.

TABLE III.—*Relationship Between the Measured Grain Size and Percentage of Solids.*

Inches mercury.	Fineness.	Per cent. solids
	No. 1 Column ⅝ in. Restriction.	
½	47.6	22.0
1	48.9	17.8
1½	45.1	15.6
2	45.7	12.8
2½	44.2	7.7
	No. 2 Column ¾ in. Restriction.	
½	53.8	17.5
1½	53.2	8.0
2	48.6	5.7
2¾	47.0	2.0
	No. 3 Column ⅞ in. Restriction.	
¾	61.6	32.0
1½	60.0	23.2
2¼	63.0	7.8
3	61.6	4.0

The Table clearly shows that the finer material is moved from column 1 to column 3, where the larger opening (⅞ in.) exists and where the upward current

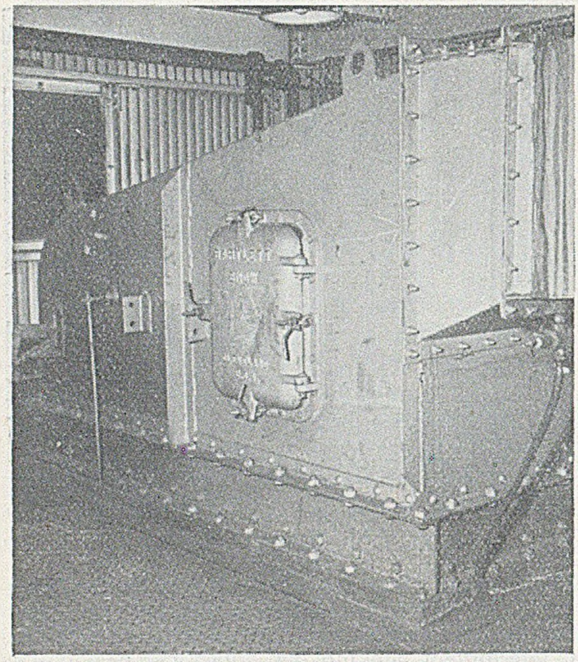


FIG. 10.—*Wet-type Dust Collector which Treats Extracted Gases from the Magnetic Conveyor Discharge, the Dryer, and the Sand Cooler.*

has less velocity. Increasing the pressure reduces the percentage of solids considerably. Proper adjustment and regulation of the size of the restriction and the velocity of the upward current of water in the columns must be carefully controlled if the maximum amount of sand having a good grain distribution is to be recovered.

Sand and water from the classifier are pumped a distance of 35 ft. to the horizontal vacuum filter

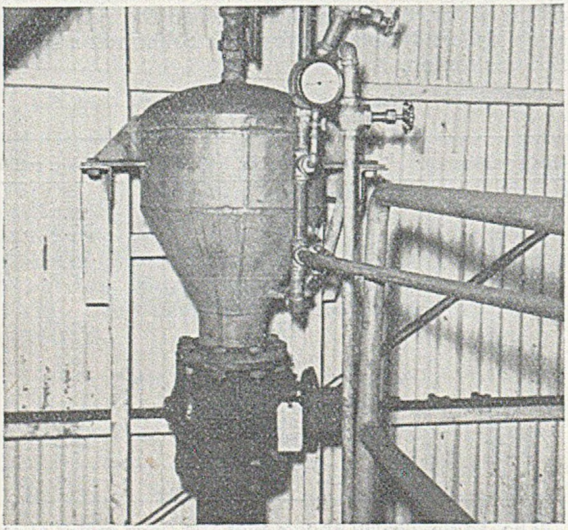


FIG. 11.—*Vortrap Device for Removing Fines (a Small Piece of Equipment with a Big Job).*

(Fig. 7) on the fourth floor. The overflow water containing the clay, some carbon, binders, and fine sand goes to the sludge box.

Filtration

A filter is a permeable septum so mounted that the material to be filtered can be brought to one side at a pressure higher than exists on the other side. The pulp (sand and water), upon entering the filter, is dispersed evenly over the bottom by two baffle plates. When a pressure is applied to the pulp by the vacuum pump (one pipe for each quadrant of the filter), the water begins to flow through the pores of the screens at a rate dependent upon the pressure differential on the two sides of the surface and the frictional resistance to flow. The water streaming to the pores carries sand with it and the grains unable to enter the pores are held against the screens by the water flowing against and around them. The phenomenon and the magnitude of the forces involved are familiar to anyone who has placed his hand or foot near the submerged outlet of a discharging container. If the sand grains are smaller than the pores, they go through if they approach singly. If, however, as is usually the case, there are so many that they approach in a loose mass, they suffer the same fate as a crowd of people making a rush to get through a doorway sufficiently wide to pass two, three, or more abreast in orderly array. The result is an arched bridge of the coarse grains formed over each pore, the smaller being flushed through as the jam started. There is a gradual build-up until the particles passing through are extremely small and few in number. Thus the effective filter medium becomes the layer of sand (filter cake) deposited on the original septum (screens). Resistance to filtration increases rapidly with decrease in the size of the particles forming the cake. This resistance brought about, as previously mentioned, by too high a percentage of coated, unburned, fine sand does not permit the filter to remove all the water, and as a result sand which is too wet enters the dryer.

The filter removes moisture to between six and eight per cent. A variable speed permits the filter to revolve according to the water removal. That is, if resistance to filtration is great, slow speeds are used, and vice versa. A water spray is provided for washing the cake when necessary. When filtering becomes difficult, washing will help keep the pores open. Filtered sand is discharged into the top of the dryer (Fig. 8) and water flows to the sludge box.

Dryer

The stationary dryer extends from the fourth to the first floor. It is a vertical-type kiln, consisting of a steel shell lined with refractory. Inside the shell are a series of superimposed hearths. Every other hearth is an " out " hearth, that is, discharges its material on its periphery. Alternate hearths are " in " hearths. These have a circular hole in the centre and discharge through it. Sand builds up in the form of a cone on the " out " hearths, slides to the " in " hearths, where it builds up as an inverted truncated cone and falls to the next " out " hearth where the process is repeated.

Three automatically-controlled burners supply the heat for drying. These burners operate on gas and oil. Two of the burners are located at the top on opposite sides of the dryer. This assures rapid heating of the moist sand. One of the top burners is shown in Fig. 9. The third burner is located just above the centre of the dryer. The heating gases are drawn downward due to the suction created by the exhaust system.

Several bolted-in plate sections permit access to the interior of the dryer for maintenance and repair to hearths and lining.

Four thermocouples have been placed in the dryer, one near the top, one in the centre, and two at the bottom. The thermocouple at the discharge from the tower automatically controls the burners.

Cooling Tower

Dried, hot sand from the dryer discharges by gravity on to the top tray of the cooling tower. The tower is below floor level. It is equipped with four "in" and "out" baffle plates over which the sand moves alternately. A water spray on the top plate aids in the cooling. At the discharge the sand passes through a $\frac{1}{16}$-in. vibrated screen which removes all aggregates and other foreign material that has remained with the sand through the system. A conveyor belt and a two-stage bucket elevator carries the sand to the storage silo.

Accessory Equipment

Dust Collector

Dust-laden air is brought to the wet-type dust collector (Fig. 10) through large ducts from the magnetic separator, elevator, rotary screen, dryer, and cooling tower. This air is thoroughly wetted by spray nozzles in a receiving chamber. It is then drawn upward through bubble caps and passes through successive layers of water which catch the very fine dust particles. The action is automatic.

FIG. 12.—*Operator making an Entry on the Log Sheet. The Electrical Control Panel is in the Background, and the Temperature Control for the Dryer is on the right.*

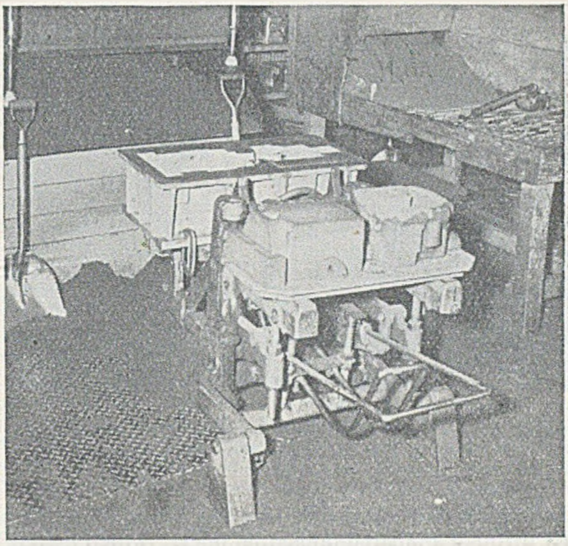


FIG. 13.—*An Air-rammed Transmission-case Core containing 35 per cent. Reclaimed Sand is made on the Roll-over Machine illustrated.*

Vortrap

Overflow water from the classifier, filtration water, and water from the dust collector all flow to the sludge box. These waters contain fine particles of sand, clay, carbonaceous materials, and other binders and are collectively called the sludge.

Sludge is pumped to the vortrap (Fig. 11), which is a device for removing the fine material from the water.

Briefly, the vortrap consists of a cylindrical pipe within which a liquid suspension is made to revolve very rapidly. The swirl is produced by forcing the

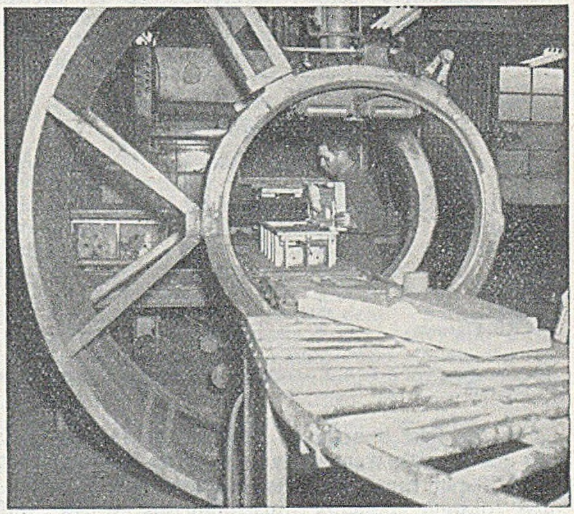


FIG. 14.—*A Radiator Top-tank Core made on a Core-blower (and shown emerging from the Turnover Section of the Conveyor) contains 35 per cent. Reclaimed Sand.*

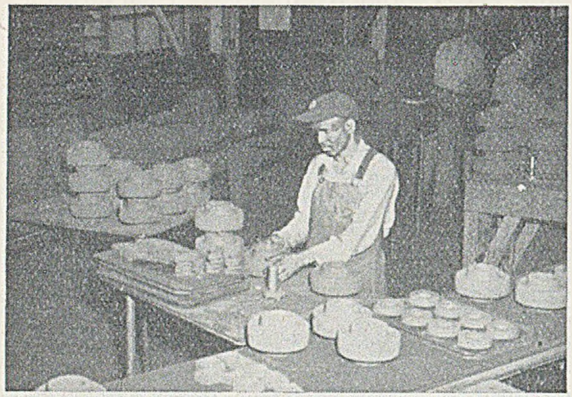


FIG. 15.—*Performing the Finishing Operations on Cores taken from the Conveyor Belts.*

suspension under pressure into the top of the cylinder through a tapered tangential inlet. It then travels downward along a helical path until it reaches the bottom, where it reverses to return, forming a vortex along the central axis to the outlet (which, in this case, is back to the sludge box). Heavy particles are driven by centrifugal force toward the wall and are flung out of the suspension. They continue to settle by gravity into a receiving chamber from which they are periodically emptied. Overflow from the sludge tank is discharged to the river.

Fig. 12 shows the electrical control panel. The system is interlocking; in case of a breakdown, or other trouble, all equipment is automatically shut off up to the particular piece of plant which is out of order.

Facts Pertaining to the Reclaimed Sand

Representative screen analyses are shown in Table IV.

TABLE IV.—*Representative Screen Analyses.*

Sieve No.	Per cent. retained.		
6	0	0	0
12	T	T	T
20	0.2	0.6	0.8
30	0.8	1.6	2.0
40	6.6	5.6	5.8
50	18.4	16.0	15.0
70	38.0	43.8	38.4
100	26.4	26.2	26.4
140	7.8	5.4	7.2
200	1.8	1.0	2.4
270	0.2	0.2	0.4
PAN	T	T	T
A.F.S. Fineness	57.6	55.7	58.2

Clay ranges from 0 to 0.2 per cent. Carbon ranges from 0.5 to 1.0 per cent.

For the first quarter of 1952 an average of 880 tons per month were reclaimed at an average cost of $2.78 per ton. The cost includes labour, insurance, old-age benefits, miscellaneous stores and materials, power, water, gas, labour and materials for machinery, equipment and building. The average water consumption per 8-hr. shift is approximately 54,000 galls. (city water is used exclusively).

The reclaimed sand has been used very satisfactorily in the core mixtures. The percentages used vary from 30 to 75.

Core-shop Improvements

The installation of the reclamation unit and the construction of the sand silos have been tied in closely with improvements in the core shop. The objects of these improvements are to produce a better core and thus a better casting at a lower cost.

Fig. 13 shows a transmission-case core made on a roll-over machine, while Fig. 14 shows a radiator tank top which has been blown. Both cores contain 35 per cent. reclaimed sand.

Two endless conveyor belts for handling cores and a re-dry oven with infra-red radiant heating elements for drying cores have been installed. Fig. 15 shows the conveyor belts. Cores on the belt in the foreground have been removed from No. 1 oven. They are finished and go either to the blacking station or join those in the background coming from No. 2 oven. Various operations such as finning, cleaning, mudding, boxing, loading on skids, etc., are completed at various stations along the belts.

The re-dry oven (Fig. 16) was designed and built by the Lynchburg company. The unit is approximately 20 ft. long with a 3-ft. 3-in. loading and unloading zone. Blackened cores to be dried are placed on the 18-in. wide steel screen belt. The belt has a variable-speed drive, whilst the temperatures may be controlled automatically. The present temperatures being used range from 175 to 195 deg. C.

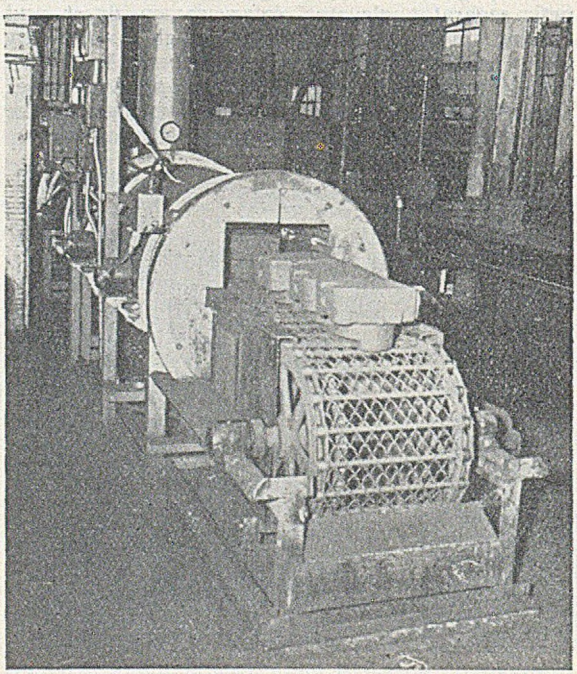


FIG. 16.—*Cores after being Dipped in a Blacking Tank are shown Emerging from the Infra-red Tunnel Oven.*

Pollution Problem

Since the discharge from the unit enters the James River, the problem of stream pollution became important not only to the company, but also to the State Water Control Board and other plants downstream. Materials in the sand to be reclaimed include western and southern bentonite, fireclay, wheat, corn, oats, and silica flours, iron oxide, phenol-formaldehyde resin, linseed oil, Westonite (asphalt), mineral-oil solvent, fuel oil (<2 distillate), and release agent (fatty acid).

Tests by the Mead Corporation showed the bulk of the discharge material to be insoluble and to consist of silica from the sand (53 per cent.), carbon from burned organic material and oils, and iron. The carbon produces a black colouration to the discharge.

On August 28, 1951, the Virginia State Water Control Board found no detrimental water polution under the present operating conditions using the reclaiming system as now designed.

Conclusions

The sand-reclamation unit is closely integrated and requires constant and careful control. Through its successful operation the cost of the core mixtures has been reduced, the waste sand disposal problem has been diminished, and some delivery difficulties minimized.

Reclaimed sand used in conjunction with 40, 60, and 90 mesh in forming a blend has helped to give better green strength to the core mixtures, better suited for blowing machines, and has reduced the number of core mixtures as well as core cleaning and assembly operations. Casting finish has been improved and as a direct result cleaning costs were reduced.

Improvements and additions contemplated for the reclamation unit include a process for reclaiming core butts, recirculation of water from the vortrap to No. 1 scrubber, closer control of water pressures for the classifier, and reduction and closer control of temperatures in the dryer and cooling tower.

The Author wishes to express his deep appreciation and indebtedness to those whose contributions have made this article possible.

REFERENCES.

New Jersey Silica Sand Company and Whitehead Brothers Sand Company for historical information.

Handbook of Mineral Dressing (Section 8), by Arthur F. Taggart, for information on filtering and classification.

Northern Ireland Objections Withdrawn.—Little more is likely to be heard of the Northern Ireland founders' objections to the Iron and Steel Bill. At first they shared in the opposition voiced by founders in Great Britain to the proposal to bring all foundries under the supervision of the Iron and Steel Board. When, however, following concessions and assurances by the Minister of Supply (Mr. Duncan Sandys), representatives of the engineering associations in the United Kingdom withdrew their opposition to the Bill, Northern Ireland founders followed suit. They suggested, however, that provision in the Bill for its application to Northern Ireland should be deleted, though it is now learned that this is extremely improbable.

Bronze and Brass Ingot Association

Meeting in Birmingham Last Week

A general meeting of the British Bronze and Brass Ingot Manufacturers' Association was held on Wednesday of last week at the Queen's Hotel, Birmingham, preceded by luncheon. The president, Mr. G. W. Booth (Tyseley Metal Works, Limited), in the course of his review of the year's activities, mentioned several matters which were causing concern to the Association, and others which had been negotiated satisfactorily. Among the former were the tendency for users not to return scrap through the proper channels, and Government sanction, without reference to the Association, of the export of large tonnages of gunmetal ingots and scrap. Matters which had given satisfaction included co-operation with founders generally and the Association of Bronze and Brass Founders in particular. The social event of 1952 was a success; some controls had been removed and trading was on a more competitive basis, with members' capacity in many cases exceeding demand. As a result of this latter condition, increased propaganda for the industry as a whole should be envisaged.

Technical Report

The president's report was followed by that of the Association's technical committee, which was read by its chairman, Mr. W. G. Mochrie. This described work done towards the revision of the B.S. 1400 specification, re-introduction of a colour-marking code and the liaison between the Association and the Institute of British Foundrymen, especially that body's T.S. 38 (economy of non-ferrous metals) and T.S. 45 (fracture tests) sub-committees.

There was then a short discussion on points arising from these reports, in which it was decided, among other things, to carry further the proposal for securing financial support for research in the industry. To this end, it was agreed that statistics should be collected. On the proposal to issue a booklet setting out the aims of the Association and lists of ingot specifications and other data, a small committee was elected to further the project. Other remarks mainly concerned financial matters.

Election of Officers

At the (7th) annual business meeting which followed, the president, Mr. Booth, on being unanimously requested to continue in office for a further term, agreed to do so, especially so as to provide continuity for the work on which he was presently engaged as the Association's negotiator. Mr. T. C. James (Wolverhampton Metal Company, Limited) was also re-elected as vice-president. Subsequently, the auditors (Kemp Chatteris & Company) and secretaries (Heathcote & Coleman) were re-elected on propositions with which were coupled expressions of thanks for past services. Earlier, of four members of the Council who retired under the rules of the Association, Mr. K. M. B. Baruch (Copper & Alloys, Limited) preferred not to offer himself for re-election and there was one additional nomination of Mr. G. T. Whitehouse (Metal Products, Limited). Mr. Whitehouse was duly elected and Mr. F. Baugh (Alexander Metal Company, Limited), Mr. J. Chalmers (E. Chalmers & Company, Limited), and Mr. T. C. James were re-elected. The meeting concluded with a vote of thanks being accorded to the Chair.

Height-of-charge Indicator for Cupolas

*By R. I. Taylor**

In order to operate a reliable system of cupola melt control by means of the "cupola pyrometer"† it was stressed that the maintenance of the height of the charges well above the thermocouple level was an important pre-requisite. To this end, the same Author describes in the present article a height-of-charge indicator for permanent attachment to the furnace.

A simple apparatus, known as a height-of-charge indicator, has now been developed to work in conjunction with the established "cupola pyrometer" (introduced by the present writer), to record the position of the top of the charges in the cupola stack during operation. This important function can be performed by a simple apparatus, consisting of a lamp indicator actuated by a "thermostat" attached to the cupola stack, and the device is especially useful for cupolas which are mechanically charged from ground level. Referring to the line diagram, Fig. 1, which gives a general arrangement of the device as installed, it will be appreciated that the construction of the equipment is well within the means of all foundries and is not extravagant in material. Points worth noting are that the gadget is set flush with inner wall of the cupola stack and that the distance between the working end of the "height-of-charge" indicator and the thermocouple should be not less than 2 ft. It is not advisable to attempt to construct the thermostat itself, since this part of the equipment should above all be robust and reliable, and it is suggested that a standard thermostat of the type usually adopted for electric cookers should be used. The Author has found that these are very well made, are robust and not unduly costly.

* Chief metallurgist, Suffolk Iron Foundry (1920), Limited, Stowmarket.

† Described in the August 28, 1952, issue of this JOURNAL.

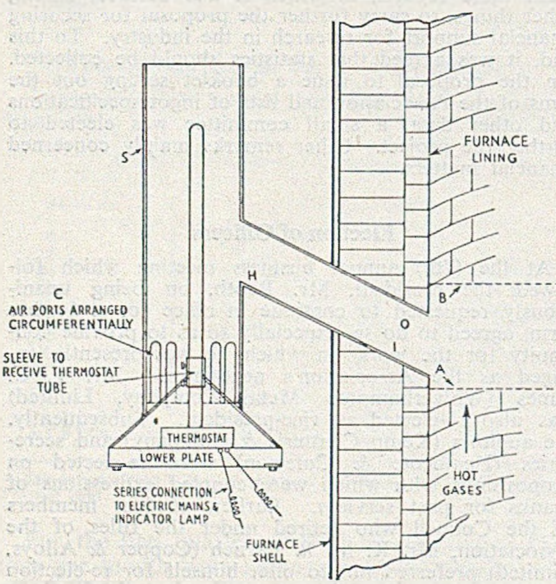


FIG. 1.—*Part Section (not to scale) of the Height-of-charge Indicating Device as installed on the Cupola Shell so as to Bleed-off Hot Gases from inside the Shaft.*

Comparative dimensions are :—Length of Pyrometer Stem, 15 min.; Tube entering Furnace Wall, 2½ to 3 in. dia.; Vertical Tube, 3½ to 4 in. dia.; Gas Inlet to Top of Tube, 24 in.; and Gas Inlet to Bottom of Tube, 4 in.

Operating Sequence

The following notes on the principles of operation of the device will, it is hoped, make clear what can be expected from its installation. Whilst the cupola is blowing, and the charge burden is below level (A), Fig. 1, in the cupola shaft, the hot waste gases will by-pass the instrument orifice (O), and pass directly up the stack. The addition of further charges to bring the level of the burden up to point (B), will cover up the instrument orifice. At this stage, the charge materials offer some resistance to the free passage of the hot cupola gases and some of these take the line of least resistance in passing through the chimney (S) of the "height-of-charge indicator." By this means the thermostat tube contained in the chimney will be raised in temperature and the thermostat is arranged to operate by switching off an indicator light. This indicating light can be located at any suitable position where it is visible to charging personnel. The hot gases have a free outlet at the top of the chimney of the apparatus, or may, if necessary, be led back into the cupola stack or be discharged through the roof to atmosphere. When the light is thus extinguished, charging will be stopped, melting will proceed, and the stack level in due course drops again to the point (A). The thermostat will then cool, as the hot gases again by-pass the orifice (O) and the charging light will again switch "on" to signal that a fresh charge is required to maintain the burden level at the correct height.

One would expect a time lag after the hot gases have stopped passing through the apparatus, because of the heated apparatus maintaining the temperature of the thermostat tube and delaying its cooling. To prevent this, use is made of the natural "draught" induced in the hot chimney (S) to draw in cool air through open ports fashioned at (C). This much improves the response of the instrument and at the same time takes care of the evacuation of pieces of coke breeze, etc., which are blown into the tube, and would otherwise build up on the thermostat. For a similar reason, the mild-steel tube (H-I) is sloped.

This equipment was first installed about 12 months ago and after but slight modification has been in continuous use since September, 1952, without any fault developing. The setting of the thermostat control is a simple matter and does not warrant any explanation. Finally, it must be remembered that the apparatus does not function when the blast is shut off, but for that matter the height of the cupola burden should not fall appreciably during any such period.

Research for the Foundry Industry*

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

CAST IRON

The foundry industry is essentially a craft industry but increasing strides have been made towards scientific control of the metal, the moulding materials and the melting process. The engineering and materials-handling side of the foundry industry is receiving increasing attention. The industry uses materials which are highly complex technically and an understanding of these materials can only be achieved by a vast amount of scientific work. For the ironfounding industry, about one-sixth of the foundries make more than two-thirds of the output. The greatest difficulties arise from the large number of very small foundries. The function of a research association, stated in its broadest term, is to provide technical assistance for the industry which it represents. This technical assistance includes research, development, and advice on problems which the individual units of the industry may not be able to solve themselves. The character of a research association must vary according to the industry which it represents, and according to the size of the production units within that industry.

Research should proceed for every healthy industry and each industry must diligently apply the results of research if it is to remain efficient. American critics have accused the British industries of being passive receptors for research results provided by centralized and subsidized undertakings. However, the British Cast Iron Research Association spends a considerable portion of its resources in the dissemination of research results and experiences, and their general application to industry in relation to the development of new processes and the solving of longstanding or newly arising problems.

In talking of research, some attempt must be made to define the subject—the word has different meanings to different organizations. At the British Cast Iron Research Association it is interpreted to include the obtaining of fundamental data on processes and properties, on the application of existing techniques not yet used by the industry, on the obtaining of data on defects, and in the development of new processes. The Association is also interested in improved methods of control, including improved analytical techniques and improved instrumentation in the foundry.

The Association has a staff of about 90, of which 12 are active full-time research workers. These 12 investigators are supported by approximately 25 people providing routine services such as chemical analysis, mechanical testing, and machine-shop facilities, etc. The remainder of the staff are concerned with members' problems, giving advice on new techniques, advising on productivity, mechanization and obtaining operational research data. Other executives are used for the purpose of carrying out field tests and manning the essential library and literature abstracting service. Also, a team is carrying out work on factors influencing industrial health hazards in the foundry.

Programme Summary

Dealing with the research programme, it will be seen that a considerable part of the effort is concerned with the study of defects in iron castings. An investigation is being carried out on factors which influence the occurrence of unsoundness in iron castings: this subject has already been thoroughly studied and in a broad qualitative sense the occurrence of porosity is well understood. It will be many years before this aspect of the production of iron castings can be put under scientific control. The steps taken to minimize porosity defects in iron castings are largely based on experience and in this respect the craft nature of the industry becomes particularly apparent. It is very doubtful whether scientific investigation can play any decisive part in this matter in the immediate future. However, the subject is of considerable interest to the whole of the industry and work is therefore being carried out on the influence of the stability of mould dimensions on the soundness of iron castings, and also on solidification sequences in iron castings, this data being obtained by temperature-gradient studies.

A very considerable amount of cast iron is vitreous enamelled and in normal times it is possible that this section of the industry will experience a great deal of competition from enamelled sheet steel. Enamelled cast iron is subject to a disturbingly high incidence of defects, one of the most important being that referred to as blistering. Work is being carried out in an attempt to throw light on the origin of this defect. A survey has been made of the production of castings for vitreous enamelling from which a number of useful points have emerged. Further work will be concerned largely with the evolution of gas from castings during the enamelling operation.

In the ironfounding industry, it is perhaps true that there has been too much emphasis on the metallurgical quality of the metal rather than on

* 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 perfection of the finished casting. In this connection moulding materials are extremely important, and work is being carried out in an attempt to obtain some fundamental data in relation to the expansion scabbing defect. Work carried out so far illustrates the importance of pitch, coal-dust, wood-flour and fibrous material in minimizing this defect, but more information is required about the properties of sand at elevated temperatures and for this purpose special apparatus has been constructed by which it is hoped that the properties of sand will be measured at elevated temperatures, using only very rapid rates of heating.

A very interesting investigation has just been carried out on the flowability of sand and this has yielded a novel concept of this property which should ultimately be of great benefit to the foundry industry. In connection with moulding sand, the Association is, of course, very interested in the shell-moulding process, in the testing of foundry sand in the laboratory to obtain better control, and in the development of control techniques for the foundry, such as the continuous measurement of moisture in sand while carried on a moving belt.

Effect of Gases

The influence of the gaseous elements in cast iron is still largely a matter for speculation. In general, the ironfoundry industry will blame defects and anomalies on the gaseous elements when no other solution is apparent. This is an important metallurgical field which will repay investigation. At the B.C.I.R.A. there has been installed a vacuum fusion apparatus, and a suitable method of sampling molten cast iron for the determination of its gaseous element content has been worked out. Considerable work is in hand to assess the variations in gaseous element content in normal cast irons produced by the varied melting techniques of the industry. The influence of nitrogen in cast iron is also being studied, with very promising results. The effect of oxygen in cast iron is probably very complex. When oxygen is added to cast iron at relatively high temperatures it has the effect of reducing the carbon and forming carbon monoxide which escapes; when oxygen is added to cast iron at a relatively low temperature the silicon is oxidized and the silica so produced floats to the surface of the molten metal. On this account the oxygen content of cast iron cannot be varied over a very wide range and is in any case relatively low.

Process Control

Progress in an industry can be assessed by its productivity and by its working conditions. It is perhaps true to say that improvements in these are accompanied by an increased measure of control of raw materials, processes and products. Any foundry must be concerned with the composition of its materials. Analysis by ordinary chemical methods is frequently very slow, but spectrographic methods offer the opportunity of obtaining the necessary information quickly. Until quite recently, the spectrograph was only able to analyse silicon and manganese out of the normal elements found in cast iron, but with the introduction of direct-reading spectroscopy the possibility of determining carbon and phosphorus has emerged. The Association is currently investigating this. If the spectrographic analysis of these two elements can be accomplished, arguments for the wider use of spectrography in the industry will become readily apparent. The analysis of slags by chemical methods is a very time-consuming job and so considerable attention has been paid to the analysis of slags by spectrographic methods and a suitable technique has been worked out. This has now been extended to the analysis of vitreous enamels and refractory materials.

Many chilled iron castings are produced by the ironfounding industry and the factors which influence the chilling tendency of an iron are still largely obscure. An investigation now being carried out on this subject is concerned with the effect of pouring and melting temperatures on the prior condition of the metal, and the influence of sulphur and phosphorus. The results indicate that sulphur and manganese confer some of the characteristic properties on cast iron.

In connection with the new nodular cast irons, the evaluation of their properties is of great importance and the factors influencing ductile and brittle failure in these materials have received study. The fatigue properties of these materials are also being investigated. Surface rolling of cast iron to improve its fatigue properties will probably offer considerable benefits and this subject is also receiving attention.

A few of the research activities of the British Cast Iron Research Association have been referred to and it has been the intention of this summary to illustrate the wide scope of these activities. It is generally true that the time which elapses between the completion of research work and its full application to industry varies between 7 and 15 years. Any research programme for an industry such as the ironfounding industry should cover matters of immediate importance to the industry as well as matters of long-term fundamental importance.

STEELFOUNDRY RESEARCH

Mr. Lloyd prefaced his remarks by saying that his talk would have been given by the director of the British Steel Founders' Association, Research and Development Division, Mr. J. F. B. Jackson, were it not for the fact that he was then in the United States making a first-hand study of how the American steel foundry industry was served by its research organization, the "Steel Founder's Society of America." It was expected that by the end of the year (1952) the British organization would no longer be operating under the existing title and the new title would be the British Steel Castings Research Association. This would not signify any essential change in policy; the only difference being in its relationship with members. There were at the time some 40 full- and part-time research and development projects on the programme. This was a formidable number, but there were still quite a few other projects in abeyance. Considerable use was being made of the research facilities of the universities and there were 10 projects under way in various universities at the present time.

The Division believed that it had a good arrangement for the administrative work whereby it shared executive offices with the British Steel Founders' Association, thus creating a best possible liaison between the commercial and the research sides of the industry. The Association was to hold at Ashorne Hill, Leamington Spa, a third conference on productivity, following the visit of the Steel Founders' Team to America in 1949, when it pioneered work of the Anglo-American Council on Productivity. Some of the work which was referred to below would be given in fuller detail to that convention and discussions would take place after it. He thought that sort of occasion, just like the present one, was the kind of thing which would do a great deal of good for the future of the foundry industry.

There was a big field—80 concerns making 200,000 tons per annum—to cover, and in order to enlist all available knowledge and experience to the greatest possible extent, the Association had set up a series of standing committees and specialist panels. The Division had aggregated the items of most everyday concern to the practical foundryman under the four main technical standing committees and specialist panels had been created to cover the more specialist functions. The work in connection with industrial health was under a committee jointly set up as between the Division and the British Steel Founders' Association. The projects on which the Division was engaged were selected after taking a public-opinion poll throughout the whole industry on a list of all projects which might have been considered worthwhile. This was done to protect against the possible criticism from the foundry floor that the Division was concerning itself with matters of no practical importance. It had, however, also proved of very great value in ensuring that personal ideas, as to what was worthwhile to do, were also the same as those of the practical foundryman. It was impossible in the time available to attempt even a sketchy review of the whole of the work being done; therefore, five items of major interest had been selected and these would be dealt with severally in the following report.

Properties of Steel Castings

There has for many years been a diversity of opinion regarding the relative mechanical properties of steel castings produced by the acid and basic electric-arc, and by the Tropenas-converter processes in particular, and with the assistance of the metallurgy and quality committee (chairman, Mr. C. H. Kain, A.M.I.MECH.E., F.I.M., of Lake & Elliot, Limited), the Division has conducted a survey of mechanical-test results obtained from various sources. In view particularly of the increasing requirements of engineering design, it was considered important that the inherent performance of steel castings produced from steels of different origin should be established in quantitative terms and in relation to existing British Standard specifications.

For purposes of comparison of steel quality, it was considered appropriate to assess this in terms of the ductility exhibited at various tensile levels. On this basis, it has been shown that the most consistently high ductility figures are exhibited by steels produced by the basic electric-arc process, and that converter steels, while capable of giving excellent figures, tend to be less consistent, although, of course, they satisfy the requirements imposed by the appropriate material specification, *i.e.*, B.S. 592 : 1950. The extent to which such observations are a reflection of the lower sulphur and phosphorus contents of basic-electric steel is being examined further. The chemical compositions of several hundred heats from each steelmaking process are being examined in relation to all the normal elements reported in carbon steels, and it is hoped that statistical treatment may yield data which will indicate the extent to which the observations mentioned above are attributable to the normal differences in composition arising from the steelmaking process, as distinct from such other factors, such as gas content or tapping temperature.

The Division's studies relating to the mechanism of freezing, which clearly exercises a fundamental control upon the mechanical properties of the finished casting, have yielded important results based upon the use of radio-active isotopes. In particular, these findings emphasize the importance of convection in the proper understanding of the freezing process and it is possible to foresee this essentially fundamental work producing information that may well in the next two or three years have application in practice and thus have a direct bearing upon both internal soundness and upon mechanical properties. The technique which is being developed for this investigation can also probably be used in studying the feeding of metal, other than cast steel, wherever an important amount of feed metal has to be put in after pouring is complete.

Non-destructive Testing

The use of radiography, using various sources of radiation, has become an increasingly common practice over the last ten years in particular, but the facts remain that the radiographic exposure of all but the thinnest sections of steel is still a time-consuming operation. Although admitting that time can be saved by means of the modern X-ray plants, they still have the drawback that they are very costly and very bulky and take a long time to instal. There is also not the flexibility of operation that is available with radio-active sources. It has been appreciated that the availability of an alternative recording technique, not subject to the limitations of film cost and exposure time, would be a matter of considerable importance, particularly insofar as castings of relatively heavy section are concerned, and the Division has during 1952, and previously, been examining the possibility of employing an entirely different technique.

Instead of attempting to reproduce a complete radiographic shadow pattern on a film, screen or plate, the new experimental technique has involved a procedure of "scanning" a casting progressively, area by area, using some suitable form of radiation detector cell capable of recording such changes in the transmitted intensity as may arise from internal or external change in sectional thickness. On the one hand, a scheme has been visualized in which the radio-active source (or X-ray tube) is stationary, and at some distance from the specimen the detector cell is made to scan the radiographic image formed behind the test specimen. Alternatively, the radiation source can be arranged to move in sympathy with the detector cell.

It will be appreciated that the development of a technique based upon this principle is primarily dependent upon the availability of a suitable radiation detector cell, which must not only be capable of resolving small changes in radiation intensity, but must also be of small enough size to permit geometric resolution of the shadow pattern. Fortunately, of recent years the development of various devices for detecting and measuring radioactivity has been proceeding and while the Geiger-Muller counter has proved to be insufficiently sensitive to be of value for the "radiological scanning" of steel castings, a device originating in Germany (Berthold) based upon the use of a bank of small Geiger-Muller tubes, operating a single rate of count meter, has shown promise. In preliminary tests, using a small source of cobalt "60," it has been shown that the Berthold-type tube is capable of detecting a 5 per cent. cavity in as much as 8 in. of steel. The further development of the technique is in the hands of the Division's staff in the Broomgrove Lodge laboratories and is a matter of particular interest to the Division's non-destructive testing panel (chairman, Mr. G. T. Harris, M.A., F.INST.P., A.I.M., of William Jessop & Sons, Limited).

Fettling and Dressing of Steel Castings

While an important series of the Division's investigations is directed towards improvements in the surface finish of steel castings, including the elimination of adherent metal-penetrated moulding sand, the magnitude of the problem in general is such that, although improvements are not unreasonably anticipated, it would be quite unrealistic to suppose that the need for final dressing or fettling operations will disappear entirely in all foundries within the measurable future. A parallel series of investigations is therefore in hand simultaneously to examine in detail each of the several methods of fettling that are at present applied, with a view to their improvement in speed, cost and effect upon the operator.

The use of the pneumatic chisel is common to most steel foundries and, while its effectiveness in relation to the hand hammer and chisel which preceded it, is not in question for most purposes, its noise, its production of fatigue in the operator, and its production of dust, have caused this tool and its operator to receive preferential attention. For immediate purposes, the attack upon the problem has not been directed towards the pneumatic chisel itself, but rather towards seeking an alternative means of performing the same fettling operations. Of the several possible alternatives considered when this work was commenced during 1950, the technique which uses an oxy-acetylene flame into which is injected a flux, such as iron powder, was judged to offer attractive possibilities, provided that a modified type of burner could be developed which would be capable of removing thin layers of metal-penetrated sand from the flat surfaces of steel castings.

Recent developments in this country, achieved by the British Oxygen Company, Limited, in conjunction with the Division, have led to the availability of what was originally termed a "flame chisel," employing an oxy-acetylene torch, into the flame of which iron powder is injected by a gas stream. The intense heat generated by the oxidation of the iron and the combination of its oxide with the adherent silica sand, have proved successful in many applications and, as the technique finds extended application within the industry, it is likely that the use of the pneumatic chisel will be proportionately and increasingly superseded.

It is probable that other techniques under development will supplement the "flame chisel" in further limiting the need to employ the pneumatic chisel.

Dust Research

The suppression of dust in steel foundries, both by its prevention and by its control, has continued to represent a field of research of major importance. Towards the latter end of 1951, the Division established a dust research station in Sheffield solely devoted to this problem and in particular to the study of local exhaust systems. Studies have been made of stand or pedestal grinding units employing grinding wheels up to 24-in. dia. and of various forms of swing-frame grinder, and it has been established beyond question that both these basic types of foundry equipment are amenable to modification and improvement in such a way that their local exhaust systems can be rendered very much more effective than hitherto. Experimental work continues, with the object of defining the optimum form which the new systems should assume, but the work already done indicates qualitatively, but nevertheless impressively, the extent to which the output of dust to the atmosphere from this type of plant can be reduced.

In its researches upon the stand-grinder problem, the Division has had the wholehearted co-operation and assistance from the ventilation committee (chairman, Mr. G. E. Lunt, of Bradley & Foster, Limited), of the Foundry Trades' Equipment and Supplies Association, which has without cost and at short notice made available various stand-grinder and dust-collector units. As a matter of policy, it is felt to be specially important that, where it is found necessary from the steelfounder's point of view to modify or improve any particular type of foundry plant or equipment, that the manufacturers concerned should from the start be associated with the investigations that are to be put in hand. In the particular instance cited, the F.T.E.S.A. has not only responded generously with equipment, but with advice and help towards the solution which both industries wish to see established and applied.

At the instance of the committee on industrial health (chairman, Mr. D. W. L. Menzies, Bonnington Castings, Limited), of the B.S.F.A., the Division is proceeding to consider the design and efficiency of foundry mould knock-out systems which, particularly from a practical standpoint, involve problems of considerably greater magnitude than those presented by the two types of equipment mentioned earlier. In the steel foundries, therefore, local exhaust systems are being given priority over general ventilation, as it is with good reason believed that the quickest and the greatest improvements will be forthcoming in this way. The attack upon the steelfoundry dust problem is being carried out by the Division on a broad front. A [displayed] chart, in addition to giving a simple breakdown of the main problem of dust suppression, provides a standard terminology which has been adopted by the Division and by its plant engineering committee (chairman, Mr. R. F. Ottignon, of K. & L. Steelfounders & Engineers, Limited).

Translation of the Results into Practice

It is not regarded as sufficient that the Division should rely upon its own printed publications for putting to its members information which arises either from its own work or from the work of others. The written word is regarded as providing a necessary detailed record, but, however attractive, interesting and intelligible it may be in its presentation, it is known that it goes only a very little way towards bridging *the gap between the finding of information and the putting of it into practice.* The spoken word in the form of lectures goes perhaps a little further, but in this important operation of "gap bridging," it is realized to be very far from successful. The spoken word, however, in the form of *discussion* among the Division's permanent staff and those in industry responsible for applying research and development is regarded in an entirely different light. Discussion of this sort is considered to achieve a significant effect, and for this purpose during its third year of operation the Division has stimulated, on a regional basis, technical discussion groups for the particular purpose that has been described.

Meetings of the discussion groups are attended not only by the senior technologists and shop superintendents of member firms, but also by staff and operators from the shop floor in whose hands, literally, the ultimate application of research and development findings is known to lie. It is felt that where all concerned can discuss and can preferably be shown, by film or by direct demonstration, the value of a technique or process, then there is at least a chance that that process will be understood and applied.

Personal Outlook

For developments which would arise, the Author would look forward, personally, to the industry becoming more plant conscious, being better informed as to what plant it needs and the performance that it should expect from foundry plant. He also hoped that through the co-operation of plant makers and research associations plant makers would not be lacking in furnishing these requirements as soon as they became available to the industry. On developments generally, the industry could expect to see important developments as a result of a research, not only in plant, but also in processes, products and productivity.

As to limitations to research, these were only prescribed by the available resources for carrying out research and by the industry's capacity to avail itself of the results of research when completed. The Author could certainly speak from experience in steelfounding and say that there was no danger of the supply of unsolved problems running out for a long time to come. Far from this, the field for research seemed to be widening out constantly the further it went, whether on the purely research side or on the industry side of putting the results into practice. The only limitations were purely human ones—of supplying people with the necessary training and experience to do the job.

(*To be continued*)

Slush-casting of Light Alloys*

Mechanizing the slush-casting process, controlling quality, and modifying the method to produce aluminium and other light-alloy castings has raised output of gramophone tone-arms from 100 to about 900 per man-shift at Engineering Arts Limited, Hirwaun Trading Estate, Wales. This productivity increase is the result of three years' experiments by the firm. Little had been done in slush-casting of alloy metals; traditionally a slow and laborious process, involving a considerable amount of manual movement, it was not thought suitable for repetition-type products and even less so for a very light and highly-finished type of casting demanding strict quality control. A process was finally evolved which balanced the thermal and mechanical aspects of slush-casting, giving exact metal and mechanical control.

Molten aluminium is poured into water-cooled moulds, the outside form of the casting being thus immediately chilled and solidified. By a quick movement of the hand, superfluous metal is drained away. Slush-casting has been adapted in the manufacture of other products of aluminium and light alloys, including a large variety of formers and moulds for rubber gloves, hot-water bottles, toys, overshoes, and articles for the plastic and latex industries. Price reductions followed the increased output of tone-arms.

* Reprinted from "Target."

ARRANGEMENTS HAVE BEEN COMPLETED whereby Sir W. G. Armstrong Whitworth & Company (Ironfounders), Limited, will manufacture at its Close Works, Gateshead-upon-Tyne, the wide range of machinery of the Oil Well Supply Division of the United States Steel Corporation under licence from its subsidiary, the Oil Well Supply Company of London, which will act as the sole selling organization for "Oilwell" products.

National Foundry College

New Buildings to be opened in September

Since 1948, the National Foundry College has operated by using the limited accommodation generously provided by the Governors of the Wolverhampton and Staffordshire College, an institution maintained jointly by the two local education authorities under the regulations of the Ministry of Education. It has been, however, the intention of the governors that the college should occupy its own premises as soon as this could be achieved, and a year ago an expenditure of £60,000 was sanctioned by the Ministry of Education and is now being incurred in erecting a three-storey building comprising a model foundry, the several necessary laboratories, classrooms and all the ancillary accommodation, with funds provided from the national exchequer and within the development precincts of the post-war extensions to the Wolverhampton and Staffordshire Technical College. It is confidently expected that these buildings will be completed and available for occupation in September, 1953. A further sum of £35,000 is required to provide the essential equipment.

The Minister, in consultation with the governors, takes the view that the development of the college can only fulfil the objects of its founders if it engenders active interest from the foundry industry in the form of practical financial support. Accordingly, the Minister has informed the governors that she will agree to provide the balance of the money required if industry will provide £10,000. In view of the fact that a government department can only sanction expenditure against a specific schedule of items, it has been agreed by the governors that they should seek the co-operation of the industry to furnish the requirements of the model foundry which is included in the buildings now being erected; the cost of the equipment required would amount to £10,000 approximately and a list of the items is appended. The governors of the college are of the opinion that those who are really interested in training future executives for the industry will be acting in their own interests by giving their support. Accordingly, they would be glad to hear from foundry concerns who would be prepared to help, either by presenting one or other of the items in the appended list, by making a financial contribution to cover a purchase, or by making a donation to a general fund now inaugurated for this purpose (cheques being payable to "The Governors of the National Foundry College" and crossed Barclays Bank Equipment A/c). It is proposed that a permanent tablet should be set up close to the main entrance of the new building to acknowledge the support given in this way.

LIST OF EQUIPMENT REQUIRED

(1) 1 High-frequency melting furnace, approximately 10-lb. capacity, arranged to enable melting to be carried out both in the usual furnace, or by means of a lift-coil attachment.
(2) 1 Rocking-arc furnace, approximately 10-lb. capacity.
(3) 2 Gas-fired crucible furnaces, up to approximately 120-lb. capacity, complete with fans, crucibles, etc.
(4) 1 Small jolt-squeeze, pin-lift pneumatic moulding machine.
(5) 1 Down-sand-frame strip magnetic moulding machine, with control panel, rectifier, etc.
(6) 1 Small jolt-squeeze turn-over pneumatic moulding machine.
(7) 1 Small snap-flask pneumatic moulding machine.
(8) 1 Small stationary core-blowing machine.
(9) 1 Cartridge-type bench core-blowing machine.
(10) 1 Power hacksaw, motorized.
(11) 1 Double, high-speed, heavy-duty grinding machine, approximately 14-in. wheels.
(12) 1 Small shot-blast, or vapour-blast, unit.
(13) 1 Simpson-type sand-mill, approximately ½ cub. ft. capacity.
(14) 1 Small mixer for oil-sands.
(15) 1 No. 1 Royer.
(16) 1 Small gas-fired core-stove.
(17) 4 Steel sand bins (each approximately 4 ft. by 2 ft. 6 in. by 2 ft. 6 in. high).
(18) 1 Steel rack for metal storage (approximately 8 ft. by 2 ft by 5 ft.).
(19) 1 Platform-type weighing machine, self-indicating, 7½-cwt. capacity.
(20) 1 Set of scales up to 14 lb
(21) 1 Disappearing-filament pyrometer, 1,100 to 1,700 deg. C.
(22) 1 Tinsley molten-metal temperature measuring and recording equipment.
(23) 4 Heavy-duty vices.
(24) Plate patterns and sets of coreboxes for the moulding machines and core-blowing machines.
(25) 3 Slip flasks, or snap flasks, approximately 18 in. by 15 in. by 3½ in. each part.
(26) 8 Sets of three-part moulding boxes, complete with pins, clamps, etc., approximately 9 in. by 9 in. by 4 in. each part.
(27) 12 sets of three-part moulding boxes complete, approximately 12 in. by 12 in. by 4 in. each part.
(28) 36 sets of two-part moulding boxes (9 sets to suit each of the four power-operated moulding machines).
(29) Various sets of two-part moulding boxes, miscellaneous sizes and shapes.
(30) 1 Set-up for vertical-spindle strickle moulding.
(31) 1 Set-up for strickling barrel cores.
(32) 1 Pneumatic sand rammer.
(33) 1 Bench-type pneumatic sand rammer.
(34) 2 Pneumatic chipping hammers.
(35) 1 Hand pneumatic rotary grinder.
(36) Lengths of hose for the above tools.
(37) Various lengths of portable roller conveyor.
(38) 1 Small and simple die-casting machine.
(39) Various weights for flaskless moulds.
(40) Various weights for holding down moulding boxes.
(41) 1 Mobile hand-crane to lift approximately 2 tons.
(42) 1 Geared Durville table.
(43) Various dry brushes, camel-hair brushes and mops.
(44) Various moulders' tools (trowels, gate-knives, boss tools, cleaners, smoothers, etc.).
(45) Various fettlers' tools (hammers, files, chisels, brushes, etc.).
(46) Various moulders' and coremakers' requisites (shovels, hand-ladles and shanks, lift-out and carrying tongs, riddles, bellows, etc.).
(47) Various quantities of metals and alloys (pig-iron, steel, ferro-alloys, etc.; copper, zinc, tin, aluminium, nickel, brass, etc.).
(48) Various degassing agents and fluxes.

Machinery for China

Mr. J. Rankin (Tradeston, Glasgow, Lab. and Co-op.) asked the President of the Board of Trade what types of machinery were included in the list which the China National Import-Export Board intended to purchase in this country and which was submitted to the Board of Trade on October 2, 1952.

The main items in the list submitted were given by Mr. H. Strauss, Parliamentary Secretary, as follow:—

Textile machinery and equipment; office machinery; pumps; air compressors; engineers' tools; generating sets; cement guns and pumps; Diesel engines; transmission chain; hydraulic presses; high-pressure steam valves; electrodes for arc furnaces; sand blast sets with compressors, etc.; chloride liquification plant; mine hoist machines; steam hammers; drop-forging machines; electric-tube welding machines; electric deep hole drills; electric coal drills; electric dynamometer; mercury rectifier; magnetic separators; various items of electric power station equipment; relays of various types; metal spraying equipment; refrigerators; hydraulic jacks; metallurgical specimen preparing equipment; spares for 11,000 k.w. turbines; industrial equipment, *e.g.*, manila rope, insulating material, basic coal mine lamps; and needles for sewing machines.

A start is to be made on Osmaston Park industrial estate, Ashbourne (Derby), which will cost £2,500,000. Factories are to be built there and leased to firms. The Town Council has agreed to make an allocation of £69,000 to the estates committee to begin development of the estate during 1953-54.

Raw-material Problems at Colvilles

The most important problem facing Colvilles, Limited, Glasgow, a firm responsible for about 80 per cent. of the Scottish output of steel and 70 per cent. of the pig-iron produced, was the supply of raw materials, said Sir John Craig, chairman of the company, in his annual review of the affairs of the group. Changes had taken place in the availability of scrap since the war, and the company must therefore produce more pig-iron. Increased pig-iron production required increased coke supplies, and meanwhile they were using all the coking coal that could be provided in Scotland for their use.

Increased Pig-iron Production

They had recently been informed of the probable date when an increase in coking coal supplies could be expected, and on that basis the directors had decided on the next stage of their expansion in pig-iron production. Details were being worked out by the technical staff and it was hoped that an announcement on the extensions required could be made soon. Iron-ore supplies would continue to be imported as there were no longer any economic sources of iron ore in Scotland.

Production of steel ingots and castings by the company during 1952 amounted to 1,678,241 tons (1,664,922 tons in 1951) while the output of pig-iron reached 606,477 tons (546,335 tons)—a record which did much to offset the shortage of scrap for steelmaking. The dominating feature of operations during the year was the problem of obtaining adequate supplies of raw materials to maintain full output. It was therefore gratifying, said Sir John, to report that there were signs that the necessary materials were becoming available in greater quantities.

Steel Production in France and the Saar

Pig-iron production in France totalled 843,000 metric tons in November, against 872,000 metric tons in the previous month. Saar output of pig-iron was 217,000 metric tons, compared with 229,000 metric tons in October. French crude steel output amounted to 922,000 metric tons, against 1,000,000 metric tons in October, while production of crude steel in the Saar totalled 236,000 metric tons, compared with 261,000 metric tons in the previous month.

Rolled products output in France in November totalled 647,000 metric tons, against 734,000 metric tons in October. Saar rolled products output was 166,000 metric tons, compared with 178,000 metric tons in the previous month.

Appleby-Frodingham Blast Furnaces

Owing to the progress with two new blast furnaces, stated to be the biggest in Britain, Appleby-Frodingham Steel Company, Limited, Scunthorpe, are to scrap two of their old furnaces towards the end of the year. No. 4 furnace is to be taken off early in the autumn, and No. 7 shortly after. The sites are to be used for extensions. When the new furnaces are in commission the company expect to increase their output by 4,000 tons a week. Rear-Admiral C. W. Lambert, general works manager, said that the changes would not cause any redundancy of employees.

FULL DETAILS of the offers by Guest, Keen & Nettlefolds, Limited, to acquire the shares of the Scottish Stamping & Engineering Company, Limited, have now been sent to shareholders with forms of acceptance.

New Steel Output Record

A new production record was created in the steel industry in January when the annual rate rose to 18,009,000 tons compared with a rate of 15,234,000 tons in January, 1952, and with the November record of 17,952,000 tons.

A new record was also reached in pig-iron production, which attained an annual rate of 11,121,000 tons. This compares with 10,281,000 tons a year ago, and was well above the previous peak rate of 10,845,000 tons reached in September last. The annual rate in December was 447,000 tons higher over the year. In January, the lead was lengthened to 802,000 tons.

Latest steel and pig-iron output figures (in tons) compare as follow with earlier returns:—

	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1953—January ..	213,900	11,121,000	346,300	18,009,000
1952—January ..	198,500	10,319,000	293,000	15,234,000
November ..	206,800	10,753,000	345,200	17,952,000
December ..	206,300	10,728,000	313,700	16,314,000
1951—November ..	196,000	10,194,000	316,100	16,437,000
December ..	197,700	10,281,000	287,600	14,953,000

Imperial College Finances

In the course of its 45th annual report, for 1951-52, the governing body of the Imperial College of Science and Technology refers to the financial difficulties with which it was faced during the last half of the quinquennium 1947-1952, owing to rapidly increasing costs. Two years ago the position was obviously deteriorating, and might well have become serious if strong remedial action was not taken, and a sustained effort made to balance the budget. The result of the combined effort made by all members of the college has been that, at the cost of real sacrifices all round, it was possible to complete the quinquennium with an accumulated excess of expenditure over income of only £19,451, far less than appeared likely two years ago.

Steps are being taken to make good this loss, and with the funds placed at the disposal of the authorities for the first year of the new quinquennium it is hoped to continue the work of the college without being faced with the necessity of reducing any important part of the normal programme.

Hanover Fair

The Hanover Industries Fair this year will again be divided into two separate events. The Light Industries Fair will be held from March 1 to March 5 and the Heavy Industries Fair from April 24 to May 5. Many new exhibits will be shown at both fairs. Apart from German firms, it is claimed that exhibitors from about 60 countries have booked space. Almost one million buyers visited last year's exhibition and more are expected this year. Last year, it was reported that British manufacturers were poorly represented.

HERR F. GOETSCH, the representative of Krupps at Caracas, has stated that Krupps and certain Swiss interests are anxious to share in the development of the Venezuelan iron and steel industry, and it is hoped that they will provide 50 per cent. of the capital required. Negotiations are now taking place.

Personal

MR. ARTHUR CHAMBERLAIN, managing director of the Hercules Cycle & Motor Company, Limited, Birmingham, left Birmingham by air on February 14 on a business visit to India.

MR. W. TODD has now been appointed Midlands manager for Balbardie Limited, and will be representing the North British Steel Foundry Limited, Bonnington Castings Limited, and Shanks Ironfounders Limited.

MR. L. GORDON DARLING has been appointed a director of Australian Iron & Steel, Limited, and of its English representatives, the Broken Hill Proprietary Company, Limited, following the resignation of MR. H. B. PIPER.

MR. IVAN STEDEFORD, chairman of Tube Investments, Limited, left England by air for South Africa and Rhodesia on Tuesday for consultations with associate and subsidiary companies, and to observe general industrial trends in the Union.

MR. A. G. TELFER, until recently general manager of the Coltness Iron Company, Limited, which was taken over recently by G. & J. Weir, Limited, Cathcart, Glasgow, has been presented with gifts from the employees of his old firm.

MR. D. R. BIRKETT, a 21-year-old student at Constantine Technical College, Middlesbrough, who is employed as a draughtsman by Dorman, Long & Company, Limited, has won the Dorman Long medal for the best performance by a student at college in 1952.

Establishment of MR. HOWARD MIDDLETON as Sydney, N.S.W. representative is announced by the Nordberg Manufacturing Company, Milwaukee, Wisconsin, U.S.A. He was formerly engineer-in-chief of the Zinc Corporation, Limited, and directed several large expansion projects.

At present works manager of the Lancashire & Corby Steel Manufacturing Company, Limited, MR. J. D. DUNLOP is shortly joining the sales staff of Sir W. G. Armstrong Whitworth & Company (Ironfounders), Limited, Gateshead-on-Tyne. He will operate from the company's London office.

MR. E. H. BUCKNALL has left Birmingham for India to take up the post of director of the recently-established metallurgical laboratory at Jamshedpur, which he accepted at the invitation of the Indian Council of Scientific and Industrial Research. The laboratory is designed to play a large part in developing India's mineral resources.

During recent months W. H. Dorman & Company, Limited, engineers, etc., of Stafford, has been carrying out intensive market research in Canada with the object of appointing a chain of official distributors right across the country from Halifax in the east to Vancouver in the west. To further these investigations the company's works director, WING-COMMANDER J. H. GLADSTONE, left last week for Canada, on a visit which will last five or six weeks.

MR. S. A. DAVIS, Midland Regional Controller for the Ministry of Supply, who will be 67 on March 2, is to retire from the post at the end of March. A Birmingham man, Mr. Davis became Deputy Regional Controller of the Ministry of Aircraft Production in 1942, and Regional Controller in 1945. In 1946 he was appointed joint Regional Controller of M.A.P. and the Ministry of Supply. Before holding these official appointments, Mr. Davis was in the motor and cycle trade from 1924 to 1941.

MAJOR-GENERAL C. A. L. DUNPHIE, in addition to his existing duties as managing director of the engineering division of Vickers-Armstrongs, Limited, is to act as managing director of the aircraft division during the absence, owing to ill-health, or MAJOR SIR HEW KILNER. MR. R. P. H. YAPP, a director of the company, has been appointed assistant to the managing directors. MR. GEORGE EDWARDS, chief aircraft designer of the company since 1945, has been appointed a director. He has given up his appointment as chief designer, and now becomes general manager and engineer-in-chief of the aircraft division. MR. B. STEPHENSON has been appointed chief designer, aircraft, and MR. H. H. GARDNER, chief designer, guided missiles, at the Weybridge (Surrey) works, while MR. R. EDMONDS becomes superintendent at Weybridge. MR. T. GAMMON, a director, has been appointed deputy general manager of the aircraft division.

Obituary

MR. JOHN KING, of John King & Son (Enamellers) Limited, Chesterfield, died on February 8.

MR. ARTHUR KINGSFORD WILSON, chairman and joint managing director of Spear & Jackson, Limited, steel and tool manufacturers, Aetna Works, Sheffield, died on February 10, aged 67. He was Master Cutler in 1929-30, and president of the Sheffield Chamber of Commerce in 1935.

MR. WILLIAM FEARNEHOUGH, J.P., managing director of W. Fearnehough Limited, machine-knife manufacturers, Garden Street, Sheffield, died in hospital at Sheffield on February 14. He was a city councillor from 1932 to 1946, and was appointed a magistrate in 1942. He was also chairman of the Sheffield Wednesday Football Club.

MR. FRANK STIRLING MUIRHEAD, who died on February 7 at his home, Abbotshaugh, Falkirk, at the age of 76, was responsible for establishing two iron foundries—one in Burton-on-Trent and the other in Welwyn, Herts—shortly after the first world war. He also took an active part in the amalgamation of Allied Ironfounders, Limited, of which he was a director. He founded in Falkirk the Abbotshaugh Engineering Company, which is now in Glasgow. After the first world war he was awarded the O.B.E. for services to the Government and during the last war he made many gifts to the services and welfare associations. Mr. Muirhead was managing director of Muirhead & Sons, Limited, timber merchants, Grangemouth.

THE DEATH OF MR. WILLIAM GRAY at Coatbridge, on February 11, ended a lifelong service in the iron and steel industry. He was in his 81st year. After serving as an indentured apprentice patternmaker with the well-known Vulcan Works, he joined the firm of R. B. Tennent, Limited, Whifflet Foundry, in 1893. He soon became foreman, and in 1917 was appointed foundry manager, retaining this position until 1950 when he decided to retire, but was retained by the firm in a consultative capacity. During those 59 years' long and loyal service he saw many changes in the growth of the firm from a comparatively small works to its present leading position in the roll trade. He played an important part in the development of special equipment and the necessary roll-casting technique, and his advice on foundry problems associated with the art of roll manufacture, was held in the highest esteem by the firm's American and Continental associates.

News in Brief

ABOUT 750 people attended the annual ball of Herbert Morris, Limited, Loughborough, which was held in the Town Hall.

THE REMAINING RESTRICTIONS on the production and use of linseed oil have been removed as from February 15. In particular, licences to crush linseed will no longer be needed.

CHESTERFIELD town planning and plans sub-committee has approved a plan for a patternshop extension to an iron foundry at Station Road, Whittington Moor, for A. Green, Limited.

SOLUS-SCHALL, LIMITED, has set up in a former flour mill at Matlock, a non-destructive testing station for metals which undertakes the examination of all foundry and engineering products by X-ray, gamma ray, magnetic and ultra-sonic methods.

POWER-GAS CORPORATION, LIMITED, licensees for the Pease Anthony Scrubbers, now have pilot plant unit available for experimental purposes on a variety of applications. The unit, which is mobile, can handle 500 cub. ft. of gas per min. and is capable of dealing with micron and sub-micron size dusts and fumes.

GOOD RECOVERY is being made at the flooded Thamesside factory of British Insulated Callender's Cables, Limited, at Erith, Kent. Remarkable efforts have been made by the whole of the Erith employees in sealing the breaches in the river embankment under the control and guidance of the authorities and thereafter in cleaning up the factory.

THE BRITISH STANDARDS INSTITUTION has just issued two specifications for copper-alloy rods and sections, viz.: B.S.1949—60/40 brass rods, sections and forgings, and B.S.1948—copper/silicon alloy rods, sections and forgings (both for general engineering purposes). Copies can be obtained from the Institution's sales branch at 24, Victoria Street, London, S.W.1 (price 3/- each).

THE FIRST SHIPMENT of almost £100,000 worth of mechanical handling equipment left Birkenhead for China on February 3 under arrangements recently completed. More equipment is to follow, it is stated by I.T.D. Limited (Industrial Truck Development), a technical sales organization owned jointly by the Austin Motor Company and Crompton Parkinson, Limited.

AT A LUNCHEON in the canteen of the Renishaw Iron Company, Limited, Chesterfield, last week, given to celebrate the birthday and retirement of Mr. George Clixby, commercial manager of Appleby & Company, Renishaw's foundry branch, he received a cheque from Miss Margaret Needham on behalf of the staff. Mr. Clixby was given a cheque last year to mark his 50 years' service to the company.

THE TWENTY-SECOND biennial dinner of the Sheffield Society of Engineers and Metallurgists will be held at the Royal Victoria Station Hotel, on Friday April 10, at 6.45 p.m. for 7.15 p.m. The chief guests will include Sir William Larke, K.B.E., D.SC., F.INST.F., M.I.MECH.E.; the Lord Mayor of Sheffield, the Master Cutler and the president of the Sheffield Chamber of Commerce. The price is 21/- each ticket.

THE BUTTERLEY COMPANY, LIMITED, announce the following appointments to their newly-formed oxygen-generator division:—MR. H. W. BARNETT will combine managership of the new division with the post he now holds as London manager; MR. A. A. C. ROBERTSON will be chief engineer; while DR. G. G. HASELDEN has been appointed consultant. The headquarters of the division are at 20, Ashley Place, London, S.W.1 (Tel. VICtoria 8023).

BAKELITE LIMITED announce that the Company's travelling exhibition of plastics will be on view in Portsmouth (Chamber of Commerce Hall, Swan Street), March 3 to 7, and in Bristol (Royal Hotel), March 17 to 21. It is designed to show manufacturers and the public the wide range of uses for their products, and exhibits include both industrial and domestic applications. Amongst many interesting items will be "shell" moulds for foundry castings.

MR. JOHN FALLON, chairman and managing director of Incandescent Heat Company, Limited, Smethwick, speaking at the luncheon meeting of the Midland Region Engineering Industries Association in Birmingham on February 12, said that Britain could become the research centre of the Empire and perhaps of the world. "To help research and to improve our economic position 'self-defeating' restrictions on effort and reward should be removed from employers and employees alike."

WITH A VIEW TO FUTURE EXPANSION, Cramond & Company, Limited, iron and steel merchants, have acquired buildings and ground adjoining their premises at Graham Square, Dundee. They have become the proprietors of the whole of Douglas Foundry and its environs. Thomas Russell & Son, engineers, and Parkins & Himsworth, motor engineers, are remaining in their present premises as tenants. The foundry is a landmark in the north end of the city, being built in 1890, and Cramond & Company have occupied part of the building since 1921.

LAST SATURDAY, on the occasion of tapping a new cupola at the Charlton Brook Works, of Charlton Ironworks, Limited, Savile Street East, Sheffield, Mr. Thomas Oxley, the managing director, carried out the time-honoured custom of broaching a barrel of ale. Previously, Mrs. Oxley had "launched" the furnace with a bottle of champagne, and named it "Coronation Cupola." The cupola was designed and built by the firm's engineering staff, and is part of a £15,000 plant installation scheme. After the day's cast, workpeople were presented with Coronation tankards, silver sugar-spoons, and a half-pound of sweets.

THE "INVISIBLE-RAY" type of intruder alarm has for long been an efficient method of giving warning of intruders entering a protected area. This simple and reliable system consists of projecting beams of invisible infra-red light across suitable positions. Should the beam be interrupted by an intruder, equipment actuated by a photo-electric cell is brought into operation to sound an alarm, and, if required, to switch on flood lighting. Radiovisor Parent Limited, of 1, Stanhope Street, London, N.W.1, announce a new development of this equipment whereby the warning device can now be arranged to contact the police immediately the beam is interrupted.

MR. F. N. LLOYD, of F. H. Lloyd & Company, Limited, Darlaston, has presented to the Ministry of Labour for sending abroad, copies of "Lloyds Nowadays," the film of the activities at the James Bridge steelworks, claimed to be the most highly mechanized steel foundry in Europe. Mr. Lloyd made the gesture as practical help in fostering British prestige overseas. The film is to be shown by the Swedish labour organization to some 3,000 joint committees in industry and 10 copies have been asked for from Rome with explanatory comment in Italian, which is being planned. Further copies are being prepared in various languages for Uruguay, Paraguay, Chile and Argentina. The film is also being sent to Denmark to fulfil a request of the Danish trade unions for films of productivity in England. Prints are also to be made with commentaries in Hindustani and Japanese.


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"

Raw Material Markets

Iron and Steel

The blast furnaces are working under the strongest incentives to expand production, and upon their success in this direction the further increase in the output of steel very largely depends. It is hoped that the new furnace at Shotton will be in operation before the end of this month, and the construction of other new units is being hurried forward.

The insatiable demand for steelmaking iron is not matched by prevailing conditions in the foundry trade. Makers of light castings have recently been disposing of orders in hand more rapidly than fresh business has accrued. Export demands on the foundries show no improvement, and home buyers are indenting for immediate requirements only, so that forward bookings are small. The foundries which have suffered most from the decline in export trade are unable to obtain sufficient business from home buyers to keep their plants fully operative, resulting in either a suspension of labour or a reduced working week. Many of the engineering and speciality foundries are included in this class, particularly those connected with the motor, tractor, and allied trades, and those providing castings for agricultural implements and the textile industries. Many of the light and jobbing foundries are also short of work, owing to the scarcity of orders from oversea markets, and there is a marked decline in orders from home buyers. The foundries providing castings for steelworks and collieries are busy, as well as those catering for the machine-tool trades.

Pig-iron supplies are generally adequate for most foundries, and, apart from hematite iron, the furnaces have little difficulty in meeting the demands made upon them. Some foundries are not taking up their full allocations.

Foundry coke supplies are adequate, but some complaints are received of the quality and size of recent deliveries. Ganister, limestone, firebricks, and ferro-alloys are received to requirements.

Deliveries of home-produced steel semis are not nearly sufficient to cover the full requirements of the sheet and re-rolling mills, and to make good the deficiency in home supplies substantial tonnages of imported material are still required. This is a matter which engages the constant attention of the British Iron and Steel Corporation, whose purchases of foreign material will ensure the maintenance of imports on a substantial scale during the next few months, or at least until stocks have been replenished. Some of the mills at present have very slender reserves of small billets, while supplies of slabs are by no means abundant.

All the heavy rolling mills are employed to the limit of their capacity. Pressure for prompt deliveries is intense, and the heavy commitments of shipbuilders, marine and constructional engineers, and power plant producers extend over periods of three, four, or more years ahead. Nor is the policy of greater concentration of capital development confined to this country. Big business contracts are in hand or in sight, and confidence in the outlook has been fortified by the announcement that a British group of engineering companies has booked a £6,000,000 contract for a new iron and steel plant in northern Spain. A similar inquiry from India is also under consideration, while a £4,500,000-bridge job in New Zealand is approaching final ratification. Meanwhile, the plate, section, and sheet mills have all the work they can cope with and are clearing outputs as rapidly as they become available for distribution.

Non-ferrous Metals

A further list of the Republican Administration's decontrolled commodities was issued in Washington last Friday, and among them were lead, zinc, and tin. All scrap and secondary metals were also included, and among these copper scrap, of which it is believed something like 150,000 tons has been held off the market pending this release on the price. In some quarters there is a feeling that the current quotation for copper scrap may go as high as 30 cents. Although virgin copper has not been included in this list, it is hard to believe that lifting of price control on this metal can be long delayed. for the position is becoming difficult. The improving supply situation in copper has been emphasized by the announcement from Washington that the International Materials Conference has decided to discontinue allocation of copper from February 15. So the first-quarter allocation has been stopped half way through the period, and it will be remembered that there was a suggestion it would be reconsidered at the end of January.

It is understood that a further statement will be made in March, but in the meanwhile the action that has been taken is another and important step in the direction of freeing the copper market in this country about which much has been heard of late. Opinion now is generally agreed that trading in copper futures on the Metal Exchange will begin again later this year, and it would not be surprising if notice were given by the Ministry of Materials any time now.

All three metals lost ground on the Metal Exchange last week, tin particularly showing weakness. Metal Exchange stocks of tin are still low, but there are some grounds for thinking that before many months have gone by a change will have occurred. In zinc the market was fairly active. Demand for this metal both in the U.K. and in the U.S.A. is poor. Lead lost ground, too.

Official prices of refined pig-lead:—

February—February 12, £94 7s. 6d. to £94 12s. 6d.; February 13, £94 15s. to £95 5s.; February 16, £93 7s. 6d. to £93 12s. 6d.; February 17, £92 10s. to £92 15s.; February 18, £93 5s. to £93 10s.

May—February 12, £92 12s. 6d. to £92 15s.; February 13, £93 to £93 5s.; February 16, £91 15s. to £91 17s. 6d.; February 17, £91 5s. to £91 10s.; February 18, £92 5s. to £92 10s.

Zinc official quotations:—

February—February 12, £81 10s. to £81 15s.; February 13, £81 15s. to £81 17s. 6d.; February 16, £81 to £81 5s.; February 17, £80 2s. 6d. to £80 5s.; February 18, £81 10s. to £81 15s.

May—February 12, £81 12s. 6d. to £81 15s.; February 13, £81 15s. to £81 17s. 6d.; February 16, £81 5s. to £81 10s.; February 17, £80 10s. to £80 15s.; February 18, £81 15s. to £82.

The following official tin prices were recorded:—

Cash—February 12, £969 to £971; February 13, £964 to £965; February 16, £952 to £956, February 17, £953 to £957; February 18, £960 to £962 10s.

Three Months—February 12, £940 to £942; February 13, £942 to £943; February 16, £938 to £939; February 17, £940 to £942; February 18, £944 to £946.

As PART of its centenary celebrations, the Royal Photographic Society is organizing, from February 16 to March 28, an exhibition of photographs from the Society's permanent collection and of photographic apparatus collected by the Society and the Science Museum, at the Science Museum, Exhibition Road, S.W.7.


NON-FERROUS INGOTS
UNDER CONTROL
Only a balanced combination of skill and science can produce Ingots which are consistent with the specification
ON A.I.D APPROVED LIST
LEOPOLD LAZARUS LTD
CREECHURCH HOUSE
CREECHURCH LANE
LONDON E.C.3.
Tel. AVENUE 5341
WORKS:—
ST. STEPHENS STREET
ASTON
BIRMINGHAM 6
Tel. ASTON CROSS 3115
CHRONICLE BUILDINGS
CORPORATION STREET
MANCHESTER 4
Tel. BLACKFRIARS 3741
PEMBROKE BUILDINGS
PIER STREET
SWANSEA
Tel. SWANSEA 4035

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

(Delivered unless otherwise stated)

February 18, 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, £960 to £962 10s.; three months, £940 to £946; settlement, £961 10s.

Zinc.—February, £81 10s. to £81 15s.; May, £81 15s. to £82.

Refined Pig-lead—February, £93 5s. to £93 10s.; May, £92 5s. to £92 10s.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £108 10s.; rolled zinc (boiler plates), all English destinations, £106 10s.; zinc oxide (Red Seal), d/d buyers' premises, £115.

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, 34⅛d.; sheets to 10 w.g., 281s. per cwt.; wire, 32d.; rolled metal, 267s. 9d. per cwt.

Copper Tubes, etc.—Solid-drawn tubes, 32⅜d. 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), £204 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, 49⅝d. 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. 8¾d. per lb. (7 per cent.) to 3s. 11d. (30 per cent.); rolled metal, 3 in. to 9 in. wide × .056, 3s. 2¾d. (7 per cent.) to 4s. 5d. (30 per cent.); to 12 in. wide × .056, 3s. 3d. to 4s. 5¼d.; to 25 in. wide × .056, 3s. 5d. to 4s. 7¼d. Spoon and fork metal, unsheared, 2s. 11¾d. to 4s. 2d. Wire, 10 g., in coils, 3s. 9¼d. (10 per cent.) to 4s. 11d. (30 per cent.). Special quality turning rod, 10 per cent., 3s. 8¼d.; 15 per cent., 4s. 1¾d.; 18 per cent., 4s. 6½d. All prices are net.

Forthcoming Events

FEBRUARY 23

Institution of Works Managers

Northampton branch:—" Office Administration," 7.30 p.m., at the Franklins Garden Hotel.

Purchasing Officers' Association

Enfield group:—Film evening, 7.30 p.m., at the Demonstration Theatre, Eastern Gas Board, Sidney Street.

FEBRUARY 24

Sheffield Metallurgical Association

" Applications of Monoliths," by A. L. Bradley, 7 p.m., in the Grand Hotel.

Institution of Production Engineers

Lincoln section:—Film evening, 7.30 p.m., at the Technical College, Gainsborough.

FEBRUARY 25

Institute of British Foundrymen

Birmingham branch:—" Operation of the Water-cooled Cupola," by J. W. Dews, 7.15 p.m., at James Watt Memorial Institute.

London branch:—" Operating Experiences with Hot-blast Cupolas in Great Britain," by F. C. Evans, 7.30 p.m., at the Waldorf Hotel, Aldwych, W.C.2.

Institute of Vitreous Enamellers

Southern section:—Works visit to Rockware Glass, Limited, Rockware Avenue, Greenford, Middx. Members should assemble at Greenford Station (Central line) at 2.15 p.m.

Liverpool Metallurgical Society

Visit to British Aluminium Company, Limited, Warrington.

FEBRUARY 26

Institute of Vitreous Enamellers

Midland section:—" Defects," 7.15 p.m., at the Imperial Hotel, Birmingham.

Institution of Production Engineers

Coventry graduate section:—" Management Forum," 7.30 p.m., at the Technical College (Room A5).

South Wales and Monmouthshire branch:—" How Production Engineers can be helped by the Metallurgist," by Dr. J. D. Jevons, 6.45 p.m., at the South Wales Institute of Engineers, Park Place, Cardiff.

Western graduate section:—" Layout for Batch Production," by B. C. Harrison, 7.30 p.m., at the Grand Hotel, Broad Street, Bristol.

Purchasing Officers' Association

West of England branch:—" Purchasing and Production," by H. H. C. Wood, 7.15 p.m., at Carwardines, Limited, Baldwin Street, Bristol.

Yorkshire branch:—" Purchasing in Industry," by F. J. White, 7 p.m., in the Great Northern Hotel, Leeds.

FEBRUARY 27

Institution of Mechanical Engineers

" Steel Castings in the Heavy Power Plant Industry," by F. Buckley, 5.30 p.m., at Storey's Gate, St. James's Park, London, S.W.1.

Institute of British Foundrymen

Falkirk section:—" Light Castings Defects: Source and Cure," by A. N. Sumner, 7.30 p.m., at the Temperance Café, Lint Riggs.

Institute of Metals

Birmingham section:—" Making the Best of Metals," all-day symposium, opening address by R. Lewis Stubbs, 10.15 a.m., at the Birmingham College of Technology.

North-east Metallurgical Society

" Steelfoundry Radiographic Practice," by G. M. Michie, 7.15 p.m., at the Cleveland Scientific and Technical Institution, Middlesbrough.

Incorporated Plant Engineers

Birmingham branch:—" Development of Mechanical Excavators," by L. V. Nelson; " Modern Crawler Tractors," by G. H. Shaw, 7.30 p.m., at the Imperial Hotel.

FEBRUARY 27 to MARCH 1

Institute of Industrial Supervisors

" Industrial Relations and Industrial Law." Week-end Residential Course for Foremen and Supervisors, at Ashorne Hill, Leamington Spa.

FEBRUARY 28

Institute of British Foundrymen

Wales and Monmouth branch:—" Gas Removal from Molten Aluminium Alloys," by A. W. Brace, 6 p.m., at the Engineers' Institute, Cardiff.

West Riding of Yorkshire branch:—Works visit to John Haig & Sons, Limited, Huddersfield, meeting at 2 p.m. at the works.

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

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.

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.

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

FULLY experienced FOUNDRY FOREMAN/MANAGER (age 44), M.I.B.F., expert repetition, loose, oddside, plate, and general up to 8 tons, able set piece work prices, incentive bonus, etc., with commercial and sales, and excellent connections in trade, metallist, technically trained, wide knowledge of casting uses and modern processes, wishes contact foundry (small Midlands preferred) where full control is given and responsibility expected. Work on results/salary basis. Past proved results and excellent references.—Box 3278, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN (45), M.I.B.F., accustomed full charge, technically trained, metallurgist, and fully practical, life experience trade, grey, high duty, malleable and non-ferrous, rigid control, experienced sales, commercial, desires change to small foundry (Midlands preferred), requiring organisation and increased economic production. Salary/results basis. Available short notice.—Box 3279, 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.

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.

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.

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.

ENAMELLING SUPERINTENDENT required for large Australian Cooker and Holloware manufacturers. First-class passages for applicant and family. Salary in accordance with experience.—Apply Box 3268, FOUNDRY TRADE JOURNAL.

METALLURGIST required. Must be energetic and able to take charge of laboratory, technical control of high duty irons, sand and cupolas. Position is progressive, with ample scope for suitable applicant, with opportunities of joining Staff Pension Scheme.—Complete details to SYKES & HARRISON, LTD., Port Penrhyn, Bangor, North Wales.

MANAGER — METALLURGIST with specialised experience in magnesium and capable of pioneering expansion from premises to finished casting including pressure die casting, modern mass production methods throughout. Exceptional appointment with established and successful group of Companies offering progressive income to capable and energetic man.—State full details of experience, technical education, age and salary level to, Chief Engineer, Box 3208, FOUNDRY TRADE JOURNAL.

ESTABLISHED Aluminium Die and Sand Foundry in Midlands with first class facilities and room for expansion wishes to increase turnover and desires to contact Agents or Representatives who can introduce business on a commission or salary and commission basis. The Company is in a strong position and can amply support any worthwhile proposition.—Full details in first instance in confidence to Box 3245, FOUNDRY TRADE JOURNAL.

A CHIEF METALLURGIST IS REQUIRED BY A YORKSHIRE STEELFOUNDRY PRODUCING APPROXIMATELY 6,000 TONS PER ANNUM OF CARBON AND ALLOY CASTINGS. THIS IS A PROGRESSIVE POSITION WITH A COMPANY WHICH IS EXPANDING OUTPUT AND UNDERGOING A COMPLETE REORGANISATION OF PLANT AND BUILDINGS. A SOUND KNOWLEDGE OF GENERAL FOUNDRY PRACTICE IS DESIRED COUPLED WITH A WIDE EXPERIENCE OF ARC FURNACE PRACTICE. COMPREHENSIVE DETAILS OF EXPERIENCE TO DATE TOGETHER WITH AGE SHOULD BE GIVEN. HOUSING ACCOMMODATION WILL BE PROVIDED TOGETHER WITH A SALARY OF £1,500 PER ANNUM. THE APPLICANT SHOULD WRITE IN FULL CONFIDENCE TO BOX 3237, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

METALLURGIST for Ironfoundry in Lanarkshire. Age 25/35 years. Experience cupola operation. Good salary and prospects to suitable man.—Full particulars to Box 3247, FOUNDRY TRADE JOURNAL.

REPRESENTATIVE required by Midlands Foundry to cover all areas north of Birmingham. Experience with grey iron castings essential. Resident in Manchester an advantage.—Write, giving full particulars, to Box 3276, FOUNDRY TRADE JOURNAL.

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.

CATTON & COMPANY, LIMITED, Steelfounders, have a vacancy for a Metallurgical or Science Graduate. The position is one which holds considerable prospects for the type of person who is prepared to develop a career in the steel-foundry industry.—Complete details to CATTON & COMPANY, LIMITED, Steelfounders, Hunslet, Leeds, 10.

FOUNDRY ENGINEER, Pattern Maker, or Metallurgist, not above 35 years of age, with drive and initiative required to form part of an administrative team, organising and running small Mechanised Foundry in Midlands. Applications treated in strict confidence.—Box 3240, FOUNDRY TRADE JOURNAL.

METALLURGIST required for mechanised and semi-mechanised Whiteheart Malleable Foundry in Midlands. Must have extensive experience of metal control, annealing, etc., and must be able to produce own pig iron.—Box 3241, 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.

FOUNDRY MANAGER required for small jobbing iron foundry in East Midlands. Excellent opportunity for man with sound experience, possessing drive and initiative. Please send full details of qualifications and experience along with salary required.—Box 3243, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

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.

FOREMAN required for steelfoundry to control the output of loose pattern moulding. The applicant should state previous experience together with age and other relevant details. A house will be provided and the salary will be £700 per annum.—Box 3238, FOUNDRY TRADE JOURNAL.

ASSISTANT TO MELTING SHOP SUPERINTENDENT required with experience in Converter practice essential, and knowledge of iron production desirable, for a modern Foundry in South Yorkshire. Applicant should be under 30 and have completed his National Service. Apply in confidence.—Box 3254, FOUNDRY TRADE JOURNAL.

DIE FITTER required for Aluminium Foundry in the East of Scotland. Experience of die work and able to do maintenance repairs to keep dies in production. Good position for versatile man. State full particulars.—Write 0725, WM. PORTEOUS & Co., Glasgow.

FOREMAN required for Die Casting Department of Aluminium Foundry in the East of Scotland, familiar with blue prints and with knowledge of die design. State full particulars.—Write 0726, WM. PORTEOUS & Co., Glasgow.

WANTED.—Experienced PATTERN SHOP FOREMAN, in medium size pattern shop engaged on jobbing pattern work, loam and pipe work.—Apply in writing in first instance, stating full details, to A. BARTON (ENGINEERS), LTD., St. Helens Junction, Lancashire.

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.

MAN in the thirties for modern Steel and Non-ferrous Foundries to be mainly concerned with PROCESS DEVELOPMENT. Machine and floor moulding experience essential, together with engineering and/or metallurgical training. Special experience in methods of technical controls an asset. A man of broad vision and vigour is required, and the post will be progressive in status and remuneration. Pension and bonus schemes in operation. If resident in London area housing can be arranged.—Apply in confidence, giving personal details, with history of training, experience, qualifications and salary required, to FOUNDRY MANAGER, A.P.V.-Paramount, Ltd., Crawley, Sussex.

SITUATIONS VACANT—*Contd.*

LARGE Iron Foundry, West Birmingham, requires an ASSISTANT CHEMIST. Knowledge of sand control and cast iron analysis preferred, but not essential.—Please state experience and salary expected to Box 3270, FOUNDRY TRADE JOURNAL.

WEST YORKSHIRE FOUNDRIES, LTD., Sayner Lane, Leeds, 10, require ASSISTANT CHIEF METALLURGIST for technical control in their Grey Iron, Aluminium and High Frequency Steel Foundries. Qualification to A.I.M. standard or equivalent. Salary according to age, qualification and experience.—Apply in writing to CHIEF METALLURGIST.

PAKISTAN ORDNANCE FACTORIES.

THE Government of Pakistan invites applications for the post of WORKS MANAGER (Ferrous Group), to take charge of an Iron and Steel Foundry employed in the production of Iron and Steel Castings for armament production in Pakistan.

Qualifications: Candidates should be Engineers with qualifications equivalent to a Technical Degree of recognised University, or have at least Associate Membership of a recognised Professional Institution.

Must have served recognised apprenticeship or at least undergone a post graduate course in a works of repute.

At least 15 years' subsequent experience, 5 of which must have been in a managerial capacity.

The applicant must have worked in a modern Iron and Steel Foundry, including High Frequency, Electric Arc Furnaces, etc.

Rates of pay: Rupees 850×100—1,550 per month, and from date of arrival in Pakistan an addition of £30 (sterling) per month Overseas Pay, plus a Technical Staff Allowance as authorised.

Forms of Application may be obtained upon application, in writing, to PAKISTAN ARMY TECHNICAL LIAISON OFFICER, No. 2, Palace Gate, London, W.8. Closing date for applications: 7th March, 1953.

AGENCIES

AGENTS required. Able to obtain orders for Brass, Bronze Monel and Aluminium Castings, and machine parts of light and medium weight.—Box 3222, FOUNDRY TRADE JOURNAL.

LONG established German manufacturer of Foundry Machinery seeks Representation by well introduced firm supplying Foundry Equipment.—Box 3264, FOUNDRY TRADE JOURNAL.

ALUMINIUM Die Casters in gravity and sand require SALES AGENTS for all areas, excluding South-East Counties and London.—Apply Box 3226, 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.

PATENT

THE proprietor of British Patent No. 597530, entitled "Methods of and apparatus for direct reduction of iron ores," offers same for licence or otherwise to ensure practical working in Great Britain.—Inquiries to SINGER, STERN & CARLBERG, 14 East Jackson Boulevard, Chicago 4, Illinois, U.S.A.

MACHINERY WANTED

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

CORE BLOWER wanted, with approximately 10 lbs. cartridge capacity.—Particulars and price to RICHARD MORRIS & SONS, LTD., Bradley, Bilston.

B.M.M. TYPE H.P.L.1 MOULDING MACHINE required. Write stating price, etc., Box 3261, FOUNDRY TRADE JOURNAL.

1 (One) Secondhand Alpha Transverse Testing Machine, or equivalent. The machine is required to take a 3 ft. 4 in. long test bar supported at 3 ft. centres. Stroke of piston up to 1 in., and deflection to be registered on an inch scale.—Box 3263, FOUNDRY TRADE JOURNAL.

WANTED: Coke fired portable mould drier to suit 240 v., 3 phase, a.c. Would exchange Modern Furnaces gas fired portable mould drier in new condition.—ERIFO, LTD., Manor Road, Erith.

MACHINERY FOR SALE

FOR SALE.

LANCASHIRE BOILER FLUES, suitable for Cupolas; can be inspected at our works; cheap.

MARKLAND SCOWCROFT, LTD.,
Cox Green Works, Bromley Cross, near Bolton.
Tel. No. Eagley 600/1/2

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.

MACHINERY FOR SALE—*Contd.*

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

FOUNDRY PLANT & EQUIPMENT.

FURNACES—IMMEDIATE DELIVERY:

TYPE K2 COKE LIFT OUT CRUCIBLE FURNACE. With Heat Resisting Cast Iron Dome; quick action drop bottom; arranged with special air distributing belt, also acting as a preheater for air; M.D. Blowing Fan, 400/3/50. CAPACITY 120-200 lbs.

TYPE F1a ALUMINIUM BALE OUT AND HOLDING FURNACE. Fabricated of heavy steel plate; Heat Resisting Cast Iron Top; lined with alumina firebricks and well insulated; M.D. Blowing Fan, 400/3/50. CAPACITY 150-200 lbs.

TYPE P.1a HALF TON CENTRAL AXIS TILTING FURNACE—OIL FIRED: but can be converted to GAS quite easily. Tilting Gear, consisting of worm, main wheel and bevels; drop bottom; M.D. Blowing Fan, 400/3/50.

RUMBLING BARRELS (IMMEDIATE DELIVERY):

"FORWARD" MOTOR DRIVEN RUMBLING BARREL, Model 23J. Approx. ½-ton capacity; length 4 ft. 7½ in., width A./F. 1 ft. 10½ in.; speed of barrel, 36 r.p.m.; 3 h.p. S.C. Motor, 400/3/50. TOTALLY ENCLOSED trunnion mounted, driven through Totally Enclosed Worm Gear Reduction Unit.

MOTOR DRIVEN HEXAGONAL RUMBLING BARREL. 36 in. long by 18 in. across flats; 12 in. plate; driven by 3 h.p. Motor, and complete with Starter, 400/3/50.

BELT DRIVEN—ditto. Size 36 in. long by 30 in. across flats; driven through fast and loose pulleys, with belt striking gear.

THOS W. WARD LTD.

ALBION WORKS : SHEFFIELD

Phone 26311 'Grams: "Forward."

Remember . . Wards might have it!

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.*

"WADKIN" motorised Ball-bearing Woodworking Machines:—18 in. "PKA" Canting Spindle Dimension Saw, 30 in. "JV" Double Disc Sander (both practically new); 30 in. "DNA" Bandsaw; 6 in. centre "RTA" Lathe; 18 in. "AZA" Rising Table Sawbench.—DALTON'S, Canal Street, Nottingham.

---

48 ft. 14-in. by 3-in. Gravity Roller Conveyor. Four 90 deg. bends; 15 portable adjustable trestles. All above unused.—Box 3273, FOUNDRY TRADE JOURNAL.

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.

---

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.

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.

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.

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

MACHINERY FOR SALE—*Contd.*

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. £35.

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.

CAPACITY WANTED

CONSULTANTS wish contact maker Iron or Steel Piping (Flg. S. & S.). B.S.S. Details.—Box 3251, FOUNDRY TRADE JOURNAL.

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.

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.*

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.

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.

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—*Contd.*

TRIPLEX FOUNDRY, LTD., have capacity for high class light grey iron repetition castings in medium and large quantities. Also vitreous enamelling including lustre finishes.—TRIPLEX FOUNDRY LTD., Great Bridge, Staffs.

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.

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

NO MORE GUESSING GAMES IN THE FOUNDRY.—Use "SPEEDY" MOISTURE TESTER and reduce your rejects by ACCURATE determination of water-content in foundry sand, refractories, etc. Exact percentage of moisture determined in 2/3 mins. Portable; non-electric; simple for use by unskilled labour. Over 6,500 in use in Foundries and many other industries.—Write for Illustrated Brochure to THOS. ASHWORTH & CO., LTD. (Dept. F.T.J.), Burnley, Lancs.

MISCELLANEOUS—*Contd.*

REFRACTORY Repairs and Renewals to Annealing Muffle, Refinery, and Reverberatory Furnaces, and Furnaces of all types.—B. RICHARDSON, 49, Milton Avenue, East Ham, E.6. Tel. No.: Grangewood 0619.

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.

PATTERN Equipments, Machined Plates, Castings, Components, Assemblies, Jigs, Fixtures, Corebox Air Vents and Dowels. Developing firm requests enquiries. Keen personal attention.—BOOTH BROS. ENGINEERING, Baggrave Street, Leicester.

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.

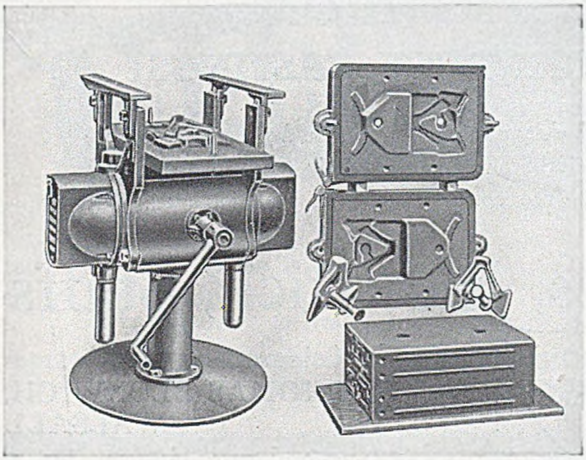
PATTERNMAKER

PATTERNMAKING
CAPACITY AVAILABLE
FOR ALL BRANCHES OF THE TRADE
ELLIOTT MUSGRAVE LTD.,
30 LONGSIDE LANE, BRADFORD, YORKS. Tel. Bfd. 24464

PATTERNMAKERS' *Section*

PATTERNMAKERS' *Section*

An Adaptable Plan for Increased Production



ADAPTABLE "STANDARD" MOULDING MACHINE

The "Standard" machine is adaptable for pattern plate widths between 12″ and 20″ and is built to such fine limits that pattern withdrawal is perfect, with a tolerance of only 0.001″ in 6″ draw.

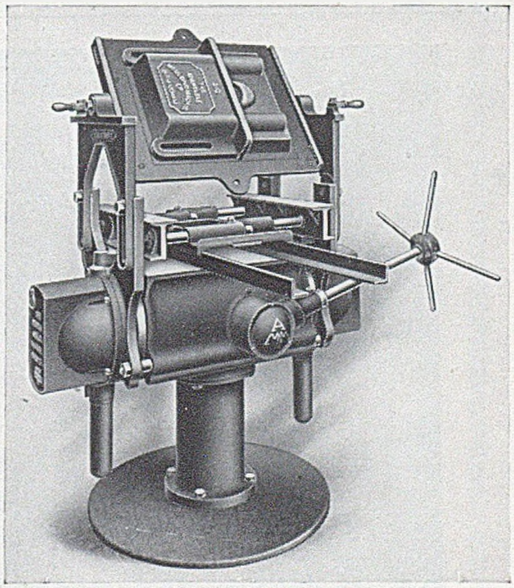
Illustration shows use of snap flasks with "Transfer" or "Reversible" pattern plate, giving two castings off plate, each run by independent gate.

ADAPTABLE "LARGE" MOULDING MACHINE

Similar to the machine illustrated above but capable of accommodating plates from 18″ to 26″ in width.

A Turn Over Attachment as shown can be fitted to either machine for use with double sided plates or for patterns with deep cores.

Star wheel shown can be supplied as an alternative to draw handle where required.

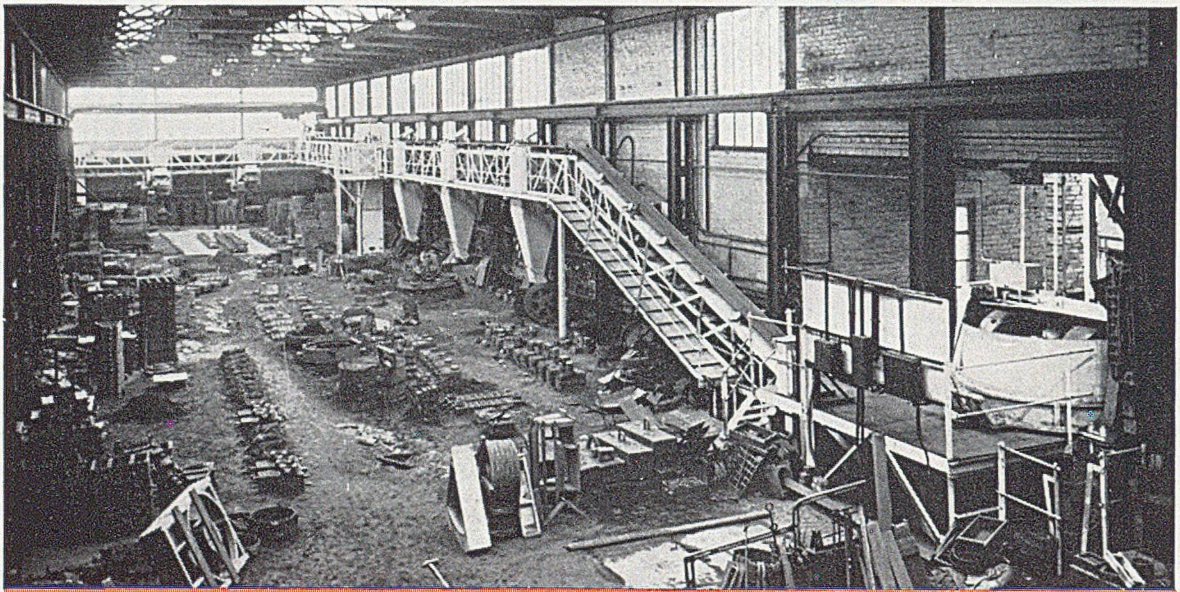


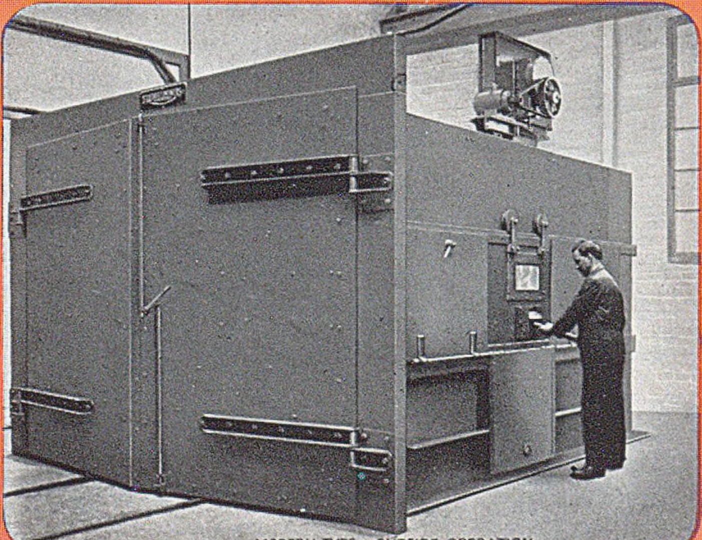
THE ADAPTABLE MOULDING MACHINE COMPANY LIMITED

CHARLES HENRY STREET, BIRMINGHAM, 12 Phone: MIDland 6911

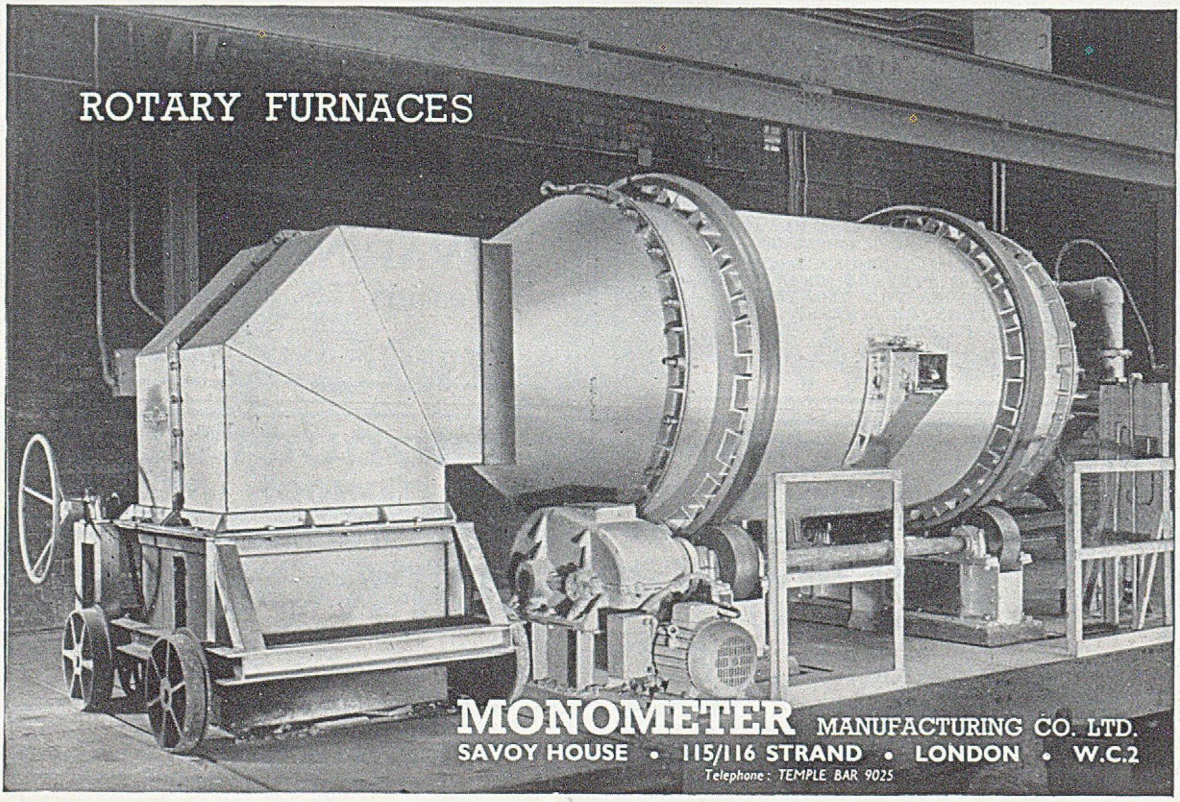
London Office: **47 WHITEHALL, S.W.1** Phone: **WHITEHALL 7740**

Other Products include VIBRATORY KNOCK OUTS (Suspension type), PORTABLE RIDDLES (Hand or Electric), RUNNER BUSH MACHINES, CORE MACHINES, SNAP FLASKS, BOXES, PATTERN DUPLICATORS, SQUEEZE MACHINES, DUPLEX ROLLOVER MACHINES.





MODERN TYPE — OUTSIDE OPERATION



ROTARY FURNACES
MONOMETER MANUFACTURING CO. LTD.
SAVOY HOUSE • 115/116 STRAND • LONDON • W.C.2
Telephone: TEMPLE BAR 9025

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 TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. 94
No. 1903
Registered at the G.P.O. as a Newspaper

FEBRUARY 19, 1953
Offices: 49, Wellington Street, Strand, London, W.C.2

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