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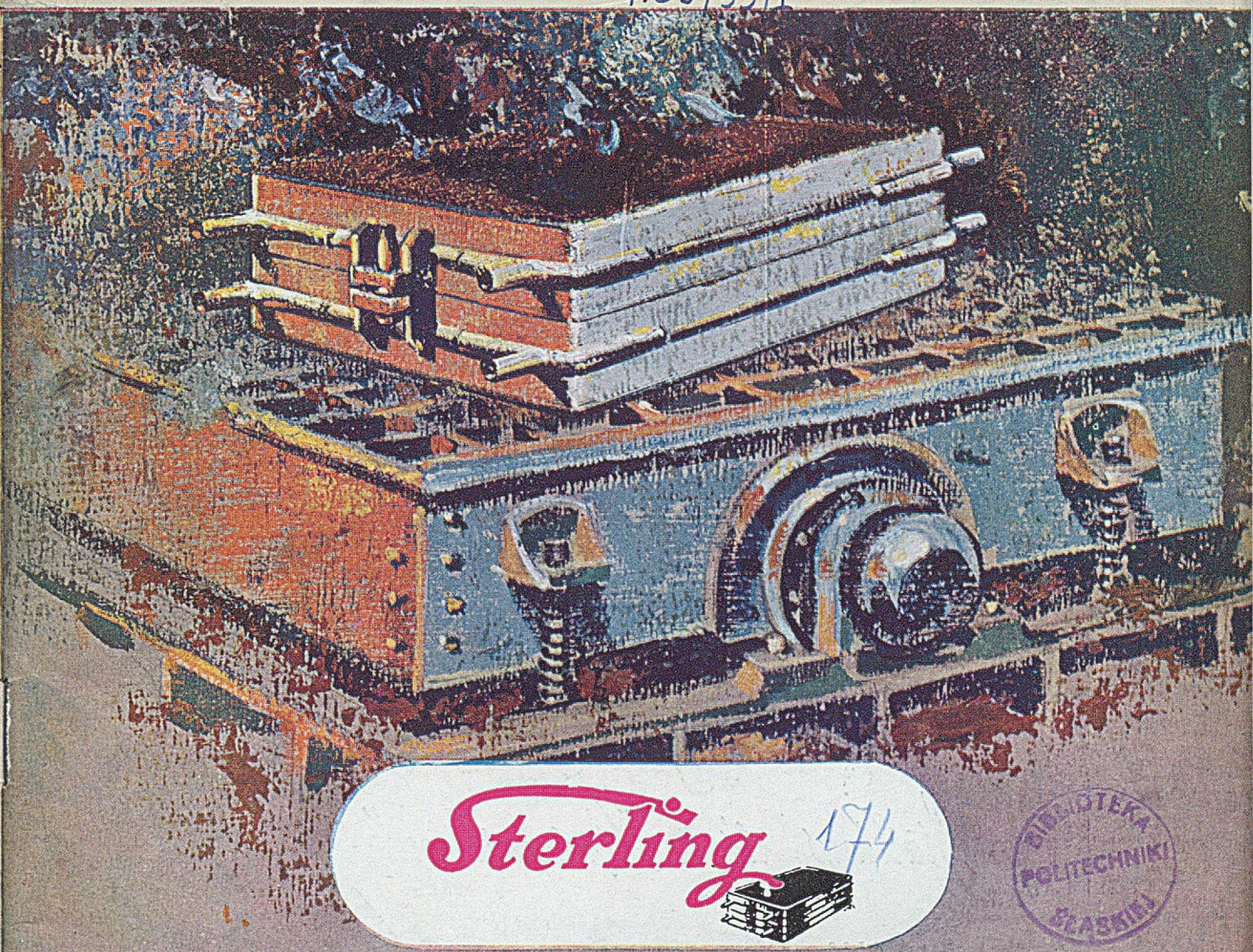
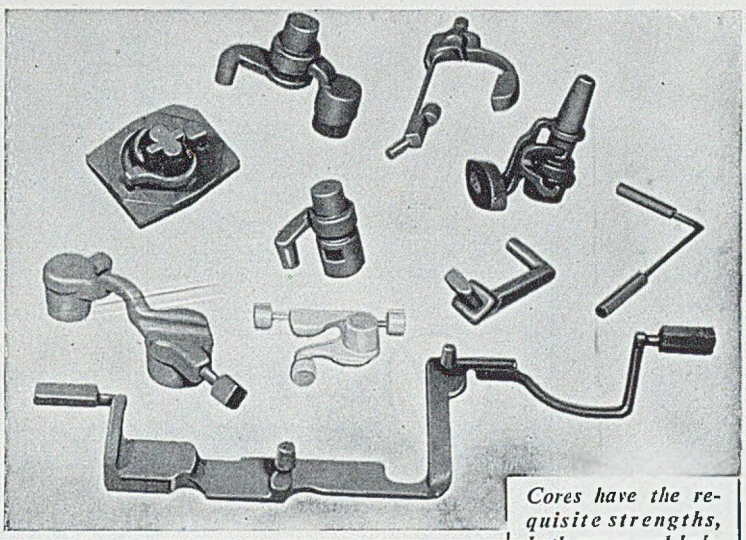


THE CORE-MIX IS AS GOOD AS ITS BOND



(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.

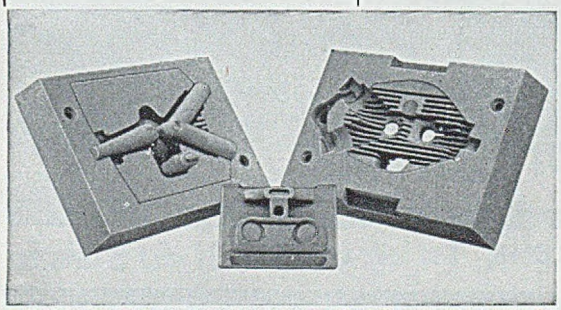
Semi-Solid Compounds give a high green bond covering a wide range of sand characteristics.

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

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.

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



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

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 BINDERS

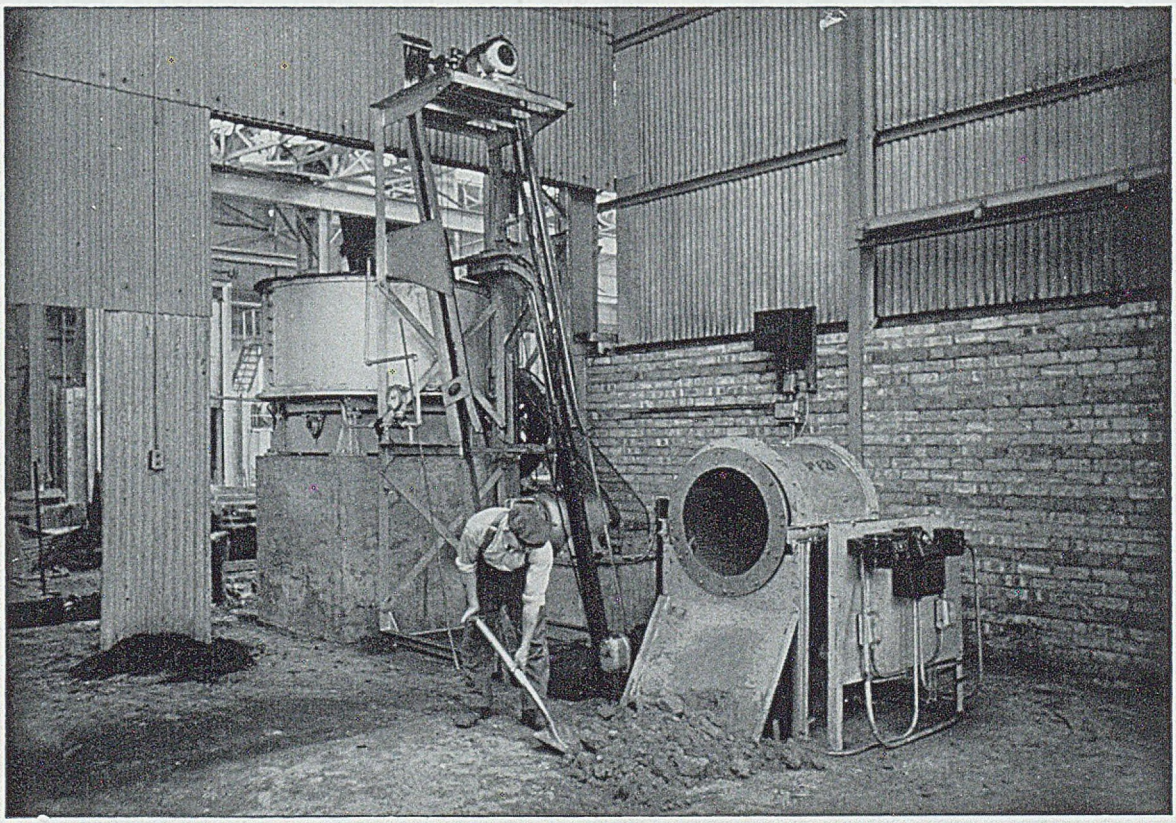
Full details obtainable from,

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

PHONE: *West Bromwich 0549, 0540, 1693*
GRAMS: *Metallical, West Bromwich*

PNEULEC *facing sand plant unit*

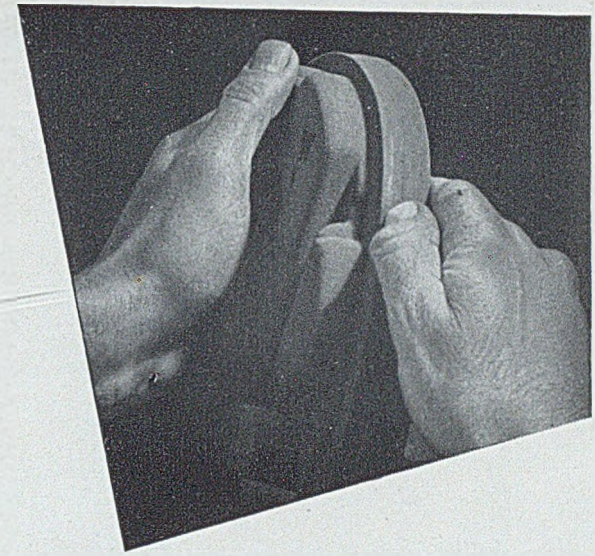
The illustration shows our facing sand plant unit which includes shovel fed rotary screen, collecting belt conveyor, magnetic pulley, loader and 6ft. 0in. diameter mill with disintegrator. The recommended batch capacity of the plant for facing is 6 cwts. and the normal batch cycle 6 minutes. This is a standard layout and there are many successful installations operating in all parts of the world. Further information will be gladly supplied on request.



Built in England by

PNEULEC LIMITED. SMETHWICK, Nr. BIRMINGHAM

It felt good... it looked good... it definitely is good!



Core sand made with THOR feels good and looks good . . . . . and baked cores, you'll find, maintain the same high quality.

You'll find, indeed, that THOR foundry resins meet *all* normal coremaking requirements, and give in addition many new advantages. They cut baking time, in ordinary ovens often by as much as 50% (90% or more in high frequency ovens) and gas content, particularly with THOR P/F resins, is outstandingly low. Hard, strong cores minimise breakages; knock-out after castings especially with THOR U/F resins, could hardly be easier and casting finish is considerably improved. All-round advantages, in fact, that mean lower all round costs.

THOR Technical Representatives can give you practical and convincing demonstrations (without any interference with normal production) and the THOR Sand Laboratory can assist, if necessary, in developing resin-sand mixes most suited to your needs. The service is free and available to all.

Below are Nos. 11 & 12 in the series of typical resin-sand mixes being given in these advertisements.

MIX No. 11

Southport Silica Sand	100	lbs.
Cereal Powder	1.5	,,
Water	2.0	,,
Liquid U/F resin (THOR SB-14)	1.0	,,
Green Bond	1.0	p.s.i.
Dry Tensile	260	p.s.i.

MIX No. 12

Skegness Silica Sand	80	lbs.
Ryarsh Fine Sand	10	,,
Mansfield Clay Sand	10	,,
Cereal Powder	2.0	,,
Water	3.0	,,
Liquid P/F (THOR SB-109)	1.5	,,
Final Moisture Content	3.5 %	
Green Bond	1.95	p.s.i.
Dry Tensile	225	p.s.i.

Full details on the complete range of THOR U/F and P/F foundry resins (including Shell Moulding resins) are available on request.

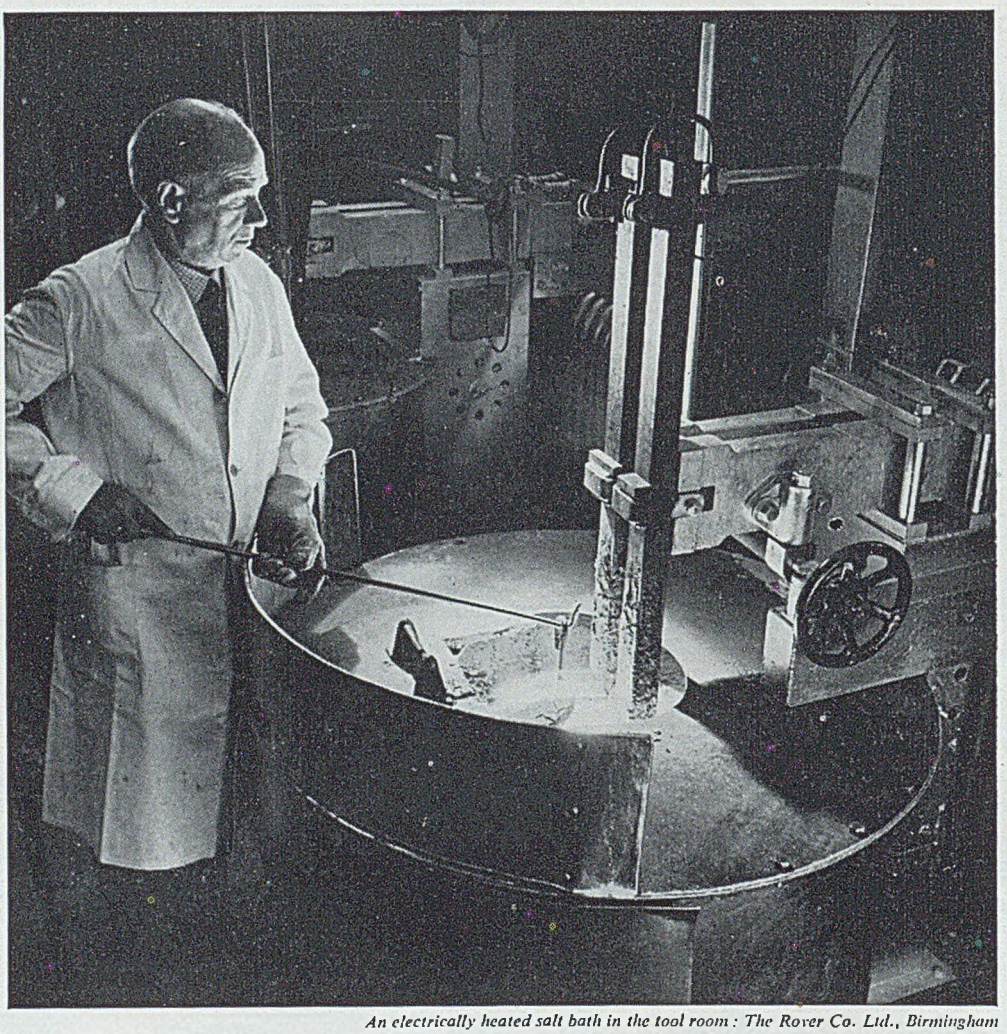
THOR

FOUNDRY RESINS

THOR FOUNDRY RESINS ARE MANUFACTURED BY

LEICESTER, LOVELL & CO. LTD.

NORTH BADDESLEY, SOUTHAMPTON. TELEPHONE: ROWNHAMS 363



An electrically heated salt bath in the tool room : The Rover Co. Ltd., Birmingham

Tools, dies and gauges

HEAT TREATMENT IN A SALT BATH IS RAPID, it gives uniform results, and it protects the metal from oxidation — considerations particularly important for tools, dies, gauges, and all fine-tolerance work. An electrically heated salt bath will bring your tool room up to date, and will also give you the advantages of cleanliness, convenience, and accurate temperature control.

HOW TO GET MORE INFORMATION

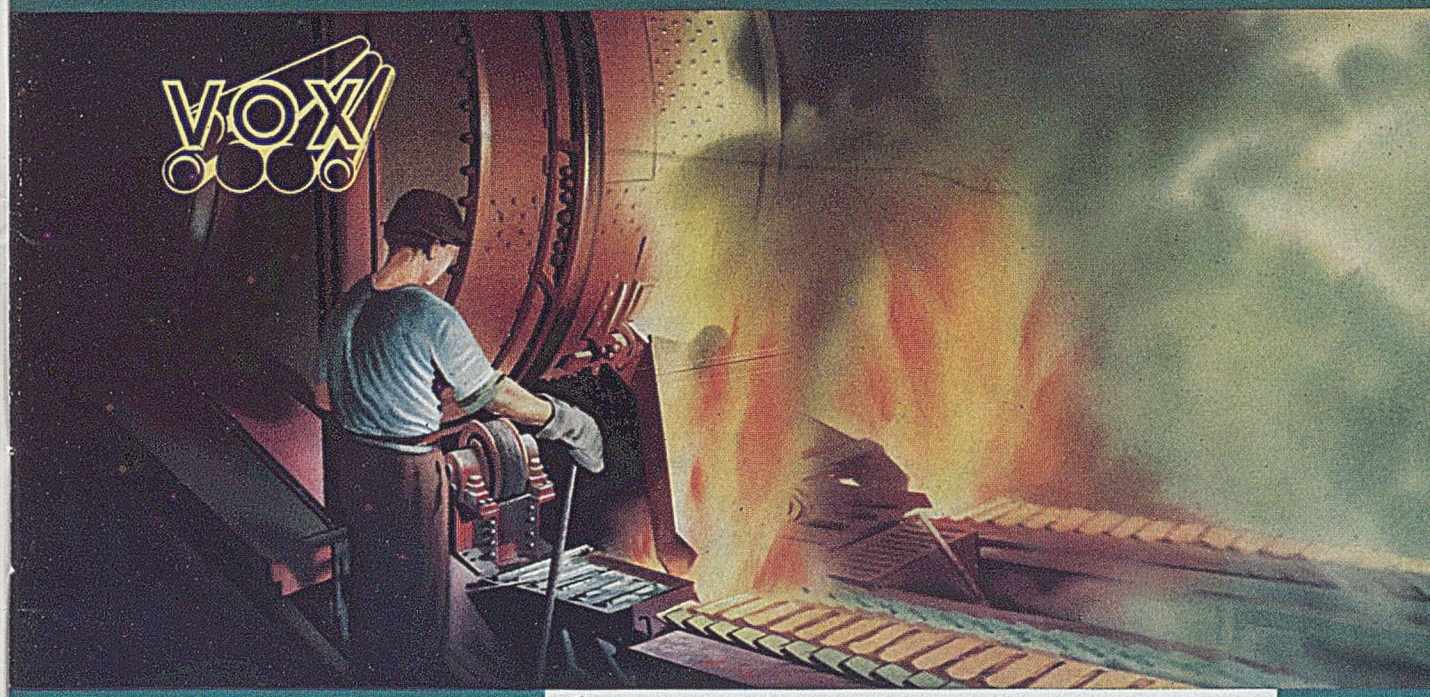
Your Electricity Board will be glad to advise you on how to use electricity to greater advantage — to save time, money and materials.

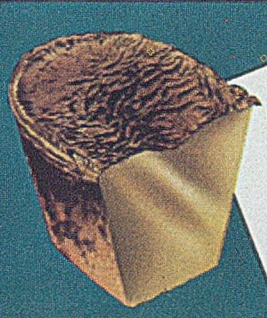
The new Electricity and Productivity series of books includes one on heating—"Electric Resistance Heating". Copies can be obtained, price 9/- post free, from E.D.A., 2 Savoy Hill, London, W.C.2, or from your Area Electricity Board.

Electricity for PRODUCTIVITY

Issued by the British Electrical Development Association

INGOTS · BILLETS · ROLLING STRIPS · CHILL CAST BARS





BRASS

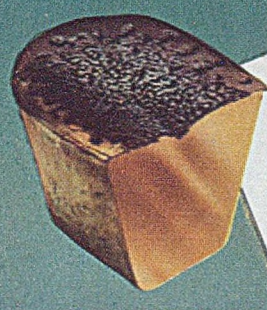
SPECIFICATION

BSS 1400	B1-1
BSS 1400	B2-1
BSS 1400	B3-1
BSS 1400	B4-1
BSS 1400	B5-1

ALUMINIUM BRONZE

SPECIFICATION

BSS 1400	AB1-1
or DTD	174A
BSS 1400	AB2-1
or DTD	412



PHOSPHOR BRONZE

SPECIFICATION

2B8 or BSS 1400	PB1-1
BSS 1400	PB2-1
BSS 1400	LB2-1
BSS 1400	LPB1-1

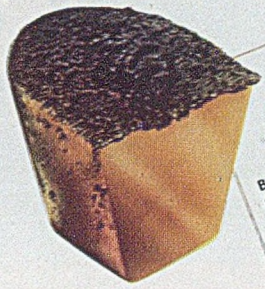
Our products are used as a foundation material upon which is built the most exacting of foundry and engineering productions. Experienced technical staff and modern laboratory facilities are always at your disposal. We ask you to avail yourselves of our wide experience to provide you with the economic solution of your metal problems.

ESTABLISHED 1854

H.B. BARNARD & SONS LTD

DUDLEY PORT · TIPTON · STAFFS

Manufacturers of Copper-Base Alloys



GUNMETAL

SPECIFICATION

BSS 1400	LG2-1
BSS 1400	LG3-1
BSS 1400	G2-1
BSS 1400	G1-1

LONDON
GLYN ST., VAUXHALL, S.E.11
Reliance 5151
Telegrams and Cables:
"Mercantile, Telex, London."

MIDLANDS
(Offices, Foundry and Laboratories):
DUDLEY PORT, TIPTON,
STAFFS. Tipton 2114 (5 lines)

SCOTLAND
GRANGE DOCK,
GRANGEMOUTH,
SCOTLAND
Grangemouth 213

MANCHESTER
5 GREENWOOD STREET,
CORPORATION STREET,
MANCHESTER 4
Deansgate 8223

This crane we want!!

" It must stand up to hard work under severe conditions. We can't afford breakdowns so it must be reliable, and also easy for our own people to maintain, and, of course, the price must be right. Now then, is there such a crane?

" Yes, we would be on a safe wicket with Clayton—their range of overhead cranes goes up to ten tons, and that Micro-Speed Unit of theirs is the very thing for our foundry. As a matter of fact I know of one concern which has over 200 of their cranes and hoists in daily use on most punishing work. I will write for a copy of their crane catalogue and ask them to send their local man round."

Going up everywhere!

CLAYTON

ALL BRITISH HOISTING & HANDLING EQUIPMENT OF ENDURING QUALITY

CLAYTON TRADE MARK

THE CLAYTON CRANE & HOIST CO. LTD

IRWELL CHAMBERS EAST : UNION STREET : LIVERPOOL 3

Telephone: CENtral 1141 (4 lines) *Telegrams: Claymag, Liverpool*

Represented in all principal countries

Foseco News Letter

Published by FOUNDRY SERVICES LTD., Long Acre, Nechells, B'ham. 7.

LATEST ADVANCE IN CUPOLA PRACTICE

Carbon pick-up increased

Of great interest particularly to foundries using a high proportion of steel scrap in their cupola charges is the introduction of CARBRIX. These briquettes are added with the charge, and practical tests show that as well as increasing the carbon content by as much as 0·2 per cent., there is an increase in silicon content and a reduction in sulphur pick-up.

The fluxing ingredients of CARBRIX flush away the ash from the coke and ensure a more intimate contact between it and the iron.

(1)

REMOVAL OF SILICON FROM GUN-METALS

The harmful effects of silicon in gunmetal castings is well-known. An easy and efficient method of removal is by the use of ELIMINAL No. 8. A recent test showed that a total addition of 2 per cent. of ELIMINAL removed 0·45 per cent. silicon from a contaminated gunmetal melt.

(2)

Hot-Topping Compound for Aluminium Alloys

Recent tests have shown that there is a considerable use for FEEDEX as a hot-topping compound in casting aluminium. For instance, for a certain casting, the weight of metal poured was reduced from 157 lbs. to 120 lbs. by the use of FEEDEX placed on the surface of the still liquid metal in the feeding heads. After taking into consideration the cost of FEEDEX this showed a nett saving of 10s. 7d.

(3)

STOPS BLOWING FROM CHILLS

Apart from its wide use a mould dressing in casting iron, MOLDCOTE No. 21 is proving most useful as a dressing for metal chills. It obviates blowing and ensures an excellent strip without in any way affecting the depth of chill.

(4)

Special Foundry Gun

Not for shooting the foreman but for making the moulder's work easier! The FOSECO Triple Action Gun can be used as an air gun for blowing out moulds, etc., as a spray gun for applying liquid dressings, and as an agitator for keeping the dressing well-suspended. It is light, and being shaped to the hand is non-tiring in use. It is fool-proof in use and is very inexpensive.

(5)

MOULDERS ACCLAIM NEW LIQUID PARTING

Free from sediment

Moulders were quick to realise the many advantages offered by SEPAROL Liquid Parting. They preferred it to dusty parting powders and appreciated the ease of use and the large number of clean, non-clagging strips given with only one application.

The original formula has now been modified and a greatly improved material — SEPAROL 'III'—is now available. It gives a still greater number of lifts from one application, is non-staining to hands, has no unpleasant smell and leaves no sediment. And, the price is still the same!

(6)

FREE OFFER

Helpful Leaflets available

Just mark on this coupon the number corresponding to the paragraph about which you wish further information. It will be sent to you by return, free of charge.

Please send information of the subjects ringed to :

Name .....

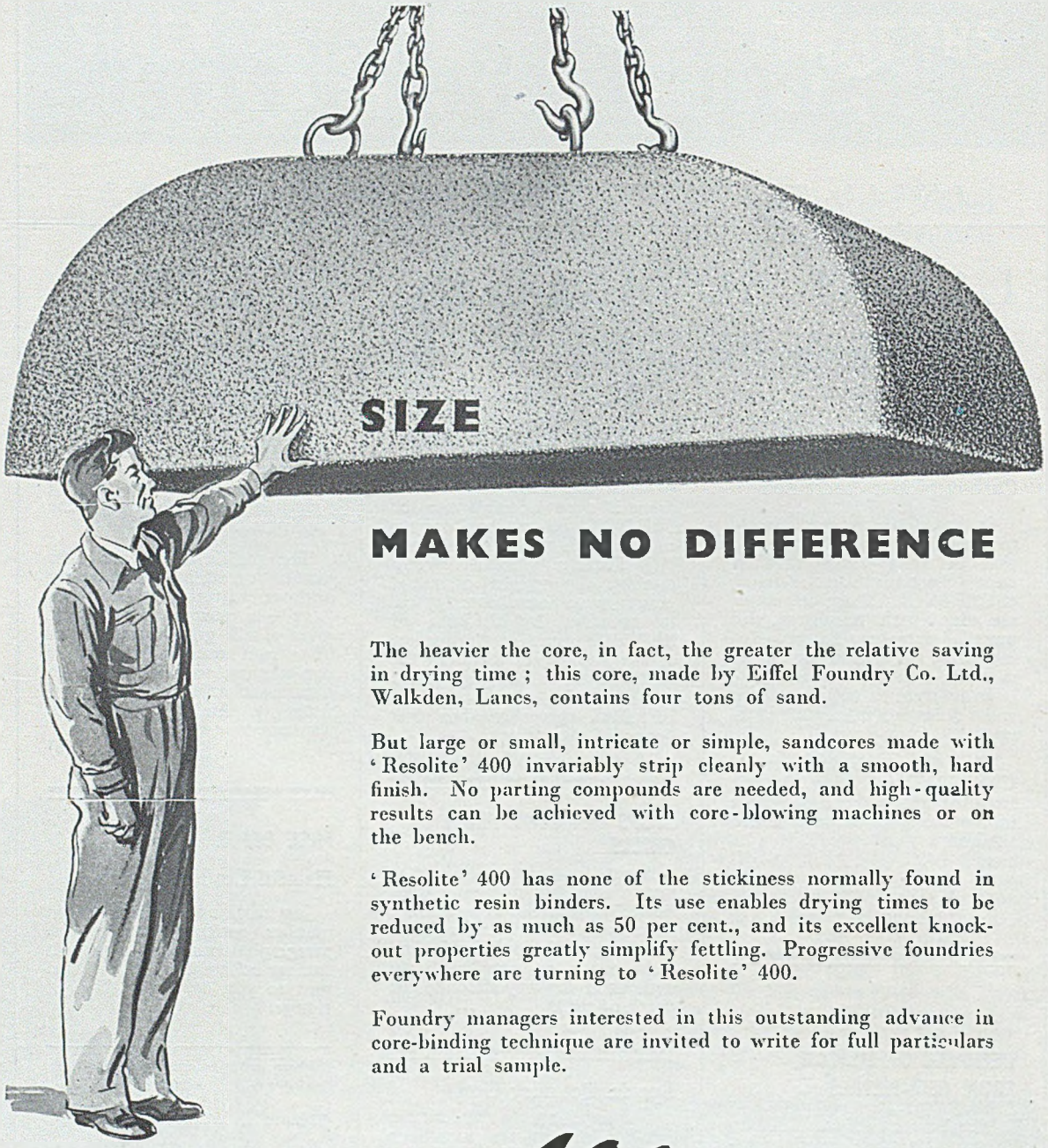
Address .....

.....

.....

or attach to your letterheading and post to :

FOUNDRY SERVICES LTD
Long Acre, Nechells,
No. 3 Birmingham 7



MAKES NO DIFFERENCE

The heavier the core, in fact, the greater the relative saving in drying time ; this core, made by Eiffel Foundry Co. Ltd., Walkden, Lancs, contains four tons of sand.

But large or small, intricate or simple, sandcores made with 'Resolite' 400 invariably strip cleanly with a smooth, hard finish. No parting compounds are needed, and high-quality results can be achieved with core-blowing machines or on the bench.

'Resolite' 400 has none of the stickiness normally found in synthetic resin binders. Its use enables drying times to be reduced by as much as 50 per cent., and its excellent knock-out properties greatly simplify fettling. Progressive foundries everywhere are turning to 'Resolite' 400.

Foundry managers interested in this outstanding advance in core-binding technique are invited to write for full particulars and a trial sample.

'RESOLITE' (REGD.) 400

SYNTHETIC RESIN CORE-BINDER

(Patent applied for)

Increased output now brings you 'Resolite' at reduced prices

AERO RESEARCH LIMITED *A CIBA COMPANY* · **DUXFORD · CAMBRIDGE · PHONE: SAWSTON 187**

Beetle in use No. 24

Since changing to Beetle W20, the knock-out time for these 4 ft. long pillars has been reduced from 5 minutes to about ¾ minute. Hammering to remove the core has been eliminated, consequently reducing from 6 per cent. to nil the number of scrap castings due to breakage during knock-out. Not an easy core to remove, but Beetle's excellent breakdown properties effect substantial economies here, as whenever any knock-out problem exists.

Write for Technical Leaflet C.B.1

B·I·P GROUP

BEETLE RESIN W20 Core-Binder

BRITISH INDUSTRIAL PLASTICS LIMITED, 1 Argyll Street, London, W.1

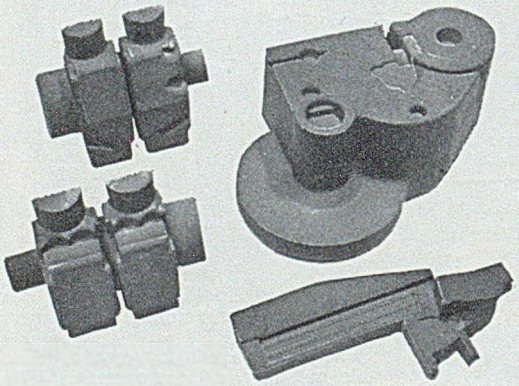
'BEETLE' is a trade mark registered in Great Britain and in most countries of the world

E

HARMARK

Core Compounds

A typical "all-core" mould assembly.



A complete range of Semi-Solids, Semi - Liquids and Creams for use with all types of Silica Sands :—

Used daily throughout Great Britain in—

STEEL
IRON
NON-FERROUS
AND
LIGHT ALLOY
FOUNDRIES

—★—

HARMARK CORE COMPOUNDS ARE GUARANTEED TO FULFIL YOUR REQUIREMENTS FOR :—

- **HIGH, MEDIUM OR LOW GREEN AND DRY STRENGTHS**
- **CONSISTENCY IN QUALITY**
- **ECONOMY**
- **LOW GAS CONTENT**
- **EASY KNOCK-OUT**
- **GOOD CASTING SKIN**

—★—

Let us help solve your core production problems—Technical advice by return—

—★—

Send for Information Leaflet No. 7
Free samples and prices on request

—★—

Also manufacturers of
CORE OILS - CEREAL
BINDERS - SYNTHETIC
RESIN BINDERS

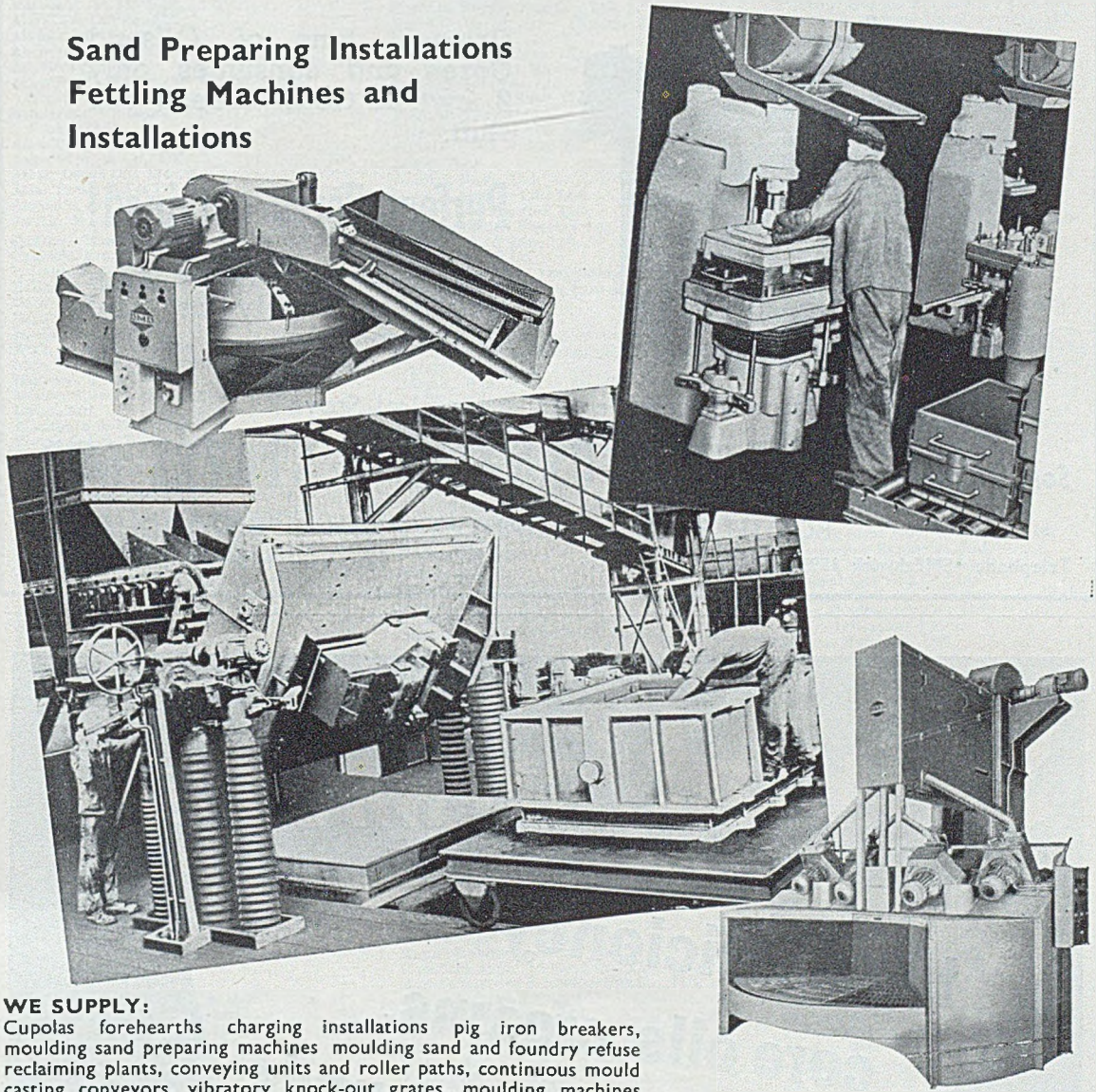
HARBOROUGH CONSTRUCTION CO. LTD

MARKET HARBOROUGH
LEICESTERSHIRE TEL : MARKET HARBOROUGH 2254-6

Sole Export Agents :—
FOUNDRY SUPPLIERS LTD., 25A COCKSPUR STREET, LONDON, S.W.1. Tel : TRAfalgar 1141-2

FOUNDRY MACHINES FOR ANY CAPACITY FULLY- AND SEMI-MECHANIZED FOUNDRY INSTALLATIONS

Sand Preparing Installations Fettling Machines and Installations



WE SUPPLY:
Cupolas forehearths charging installations pig iron breakers, moulding sand preparing machines moulding sand and foundry refuse reclaiming plants, conveying units and roller paths, continuous mould casting conveyors, vibratory knock-out grates, moulding machines (flaskless), jolt, squeeze and turnover moulding-machines, core sand mixing and preparing installations, core moulding machines, core blowing machines, tumbling barrels, centrifugal sand blast machines (air-less), sand blast apparatus, cleaning chambers, hydraulic fettling installations, git cutters, compressors and accessories, dust removal plants, and so on.

Please write for leaflets, quotations and technical advice, free of charge.

BMD

BADISCHE MASCHINENFABRIK A.-G.
Jeboldwerk
KARLSRUHE-DURLACH

Representative for England:
Ernest Fairbairn, Ltd., 9 Drapers Gardens, Throgmorton Avenue, London, E.C.2.

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PRINCIPAL CONTENTS

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

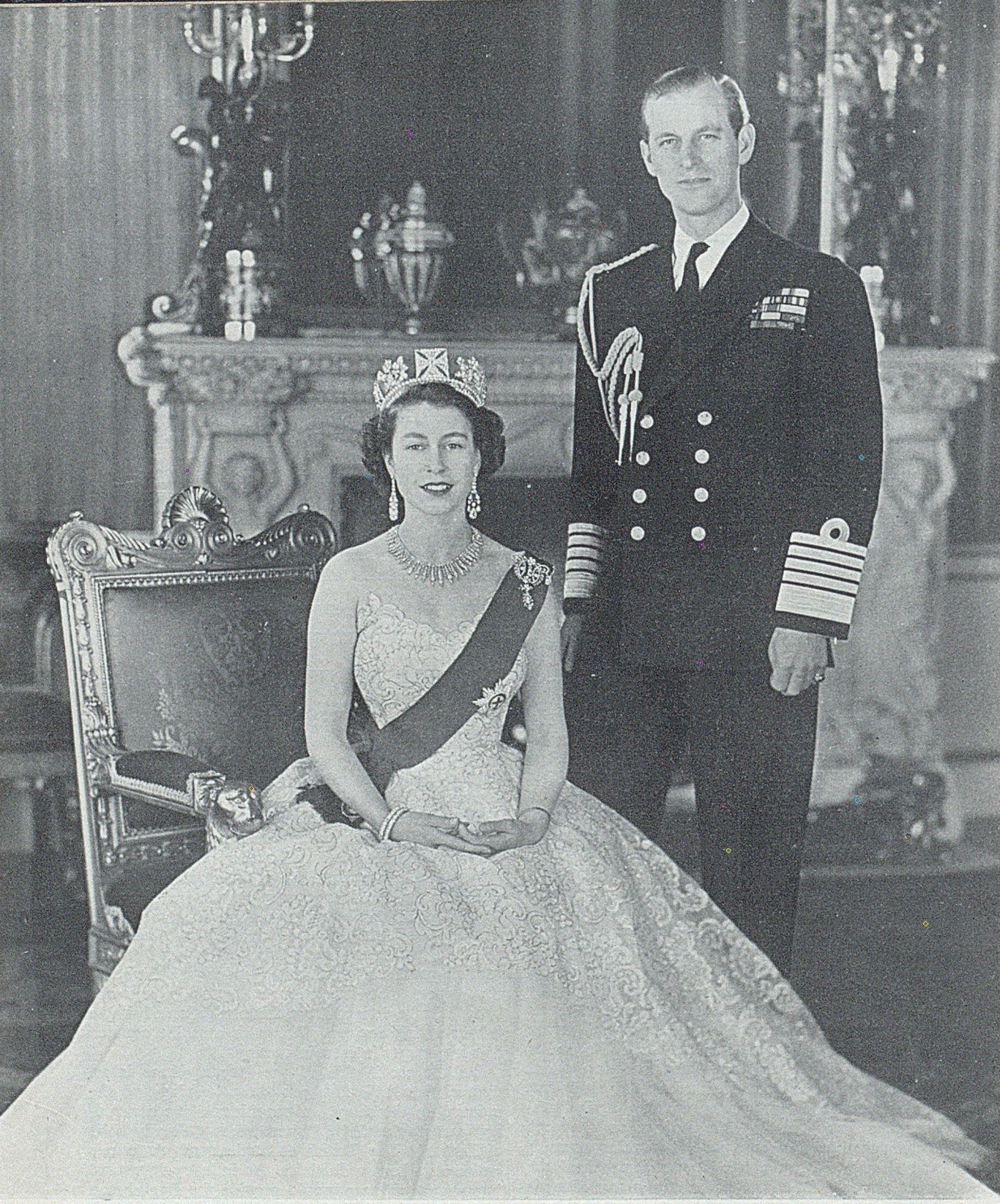
An American Viewpoint of British Industrial Efforts

A Report entitled "The British Pressed Metal Industry"* is the first account we have seen compiled by a group of American specialists dealing with manufacturing conditions in this country. As could be anticipated, it is forthright yet judicial in its findings. On the subject of safety one cannot fail to receive the impression that safety precautions on such machines as presses are overdone. Thus, to quote "where automatic 'fencing' is employed, the mechanisms which operate the guards are sometimes overlooked from the safety angle and may in themselves create a hazard. Furthermore, they definitely limit production and are likely to contribute to an apathetic attitude on the part of the operators, a condition which in itself may be highly unsafe." In other words, American opinion seems to stress that it is better to make men well aware of the dangers incidental to industrial life rather than try to design and construct fool-proof plant and machinery. Personal experience of conditions in the industries of predominantly agricultural countries has given us the impression that the British workman is born with a "factory sense" and thereby is less prone to accidents than the great majority of those to whom manufacturing is still a novelty. Yet we have noted that accidents we witnessed abroad, thought to be impossible here, have occurred—for instance, imprisonment in a mould-drying oven. A final comment was that the team only too often saw flexible pipe and wires to portable machines creating an unnecessary danger hazard.

On general matters, the Report comments on the high rate of taxation in this country and concludes that better allowances are needed for corporative expenditure on replacement of fixed assets and that reduced taxation is necessary to restore incentive to the individual. A wise remark is that "Time and motion studies are made with emphasis on the time and not much attention is paid to the motion part." Herein, is the underlying theme of the Report that insufficient attention is paid the benefits to be derived from the installation of simple labour-saving devices. With this must be coupled a more intense interest in costing.

On the credit side of the Report, there is an appreciation of British good-housekeeping and the painting of the shops and machines. The concluding paragraph of the Report reads "Finally, it is difficult for the British to understand America's enthusiasm for productivity. An industry-sponsored interchange of men would provide the Englishman with a clearer insight and understanding of this enthusiasm and would impress upon the American the English pride in craftsmanship and the importance of maintaining high quality levels."

* Published by the Anglo-American Council on Productivity, 21, Tothill Street, London, S.W.1. Price 3s., post free.



Her Most Gracious Majesty Queen Elizabeth with H.R.H. the Duke of Edinburgh

Our Royal Family

IT is with dutiful respect, pride and pleasure, that in her Coronation year we include a picture of Her Most Gracious Majesty, Queen Elizabeth. We share with our readers both at home and overseas the wish that her reign may be a long and happy one. Already, the Queen has shown her desire to serve, and so emulate the example set by her illustrious father. Her work will be shared by H.R.H. the Duke of Edinburgh. This vital task involves the strengthening of the ties between peoples scattered all over the world, of differing colour and creed, yet the Queen will face all difficulties with courage and fortitude, aided by the devotion of her subjects.

The interest which the Queen and the Duke of Edinburgh have taken in industry, and those engaged in it, is both keen and genuine, and the striving to re-establish a sound economy after six years of war has received real encouragement from her. Such interest can only result in increased effort and, it may be hoped, in the reduction of industrial unrest and strife to a minimum.

The Coronation has directed thoughts also to Queen Elizabeth the Queen Mother, and to the other members of the Royal Family, all of whom have faithfully done everything they have been called upon to do to enhance the reputation they have inherited for service to the public, whilst maintaining the dignity and prestige of their high calling.

Morgan's Refractories' Works

After world war II, Morgan Crucible Company, Limited, found that their Battersea, London, site was becoming too congested, and severely restricted any expansion programme. The company consequently sought a further site for new works and this was found at Liverpool Road, Neston, in Cheshire, the project being handled by a new wholly-owned subsidiary, Morgan Refractories, Limited, which was formed in 1948.

In developing the new site, Morgan Refractories, Limited, had four main objects in view:—(*a*) To re-house the Battersea refractory department in more modern buildings, with up-to-date equipment; (*b*) to provide buildings and plant for the bulk production of improved and stabilized aluminous refractories from 43 per cent. alumina upwards, and also a range of low-heat-capacity or hot-face insulating refractories; (*c*) to make available the new cements, "castables" and "mouldables"; (*d*) to furnish the new units with the necessary ancillaries.

The new site covers 43 acres. The Midland Region main line with over half a mile sidings forms its western boundary and the Liverpool Road its southern boundary. At present only the western third of the site (alongside the railway) is developed.

As projected, the refractories now being manufactured can be divided into four broad groups:—(i) the MR Series—a range of aluminous refractories; (ii) the M.I. Series; (iii) refractories previously made at Battersea for furnace shapes, bricks, tubing, crucibles, muffles, scorifiers and cupels, etc., in clay bodies, sillimanite, bauxite, fused alumina, silicon carbide, magnesite, pure oxides, and (iv) a range of refractory concretes, insulating concretes, mouldable refractories and refractory cements.

Production Methods

Selected raw materials go into the works for the most part by rail, and are discharged from the trucks directly into bins on the level of the works roadway. These bins are grouped adjacent to the milling and grinding plant feeding the main M.R. and Battersea production units. A large proportion of the materials used are calcined in a rotary kiln before being further processed. Alternatively, they may be passed just through crushing and processing machinery, and then elevated into storage bins inside the building.

The building for M.R. and Battersea products consists of five bays, covering an area of 125,000 sq. ft. immediately to the south of the materials-preparation plant. for the most part, it is a single storey building, but at the end where the materials from the mill are delivered, it is raised to two storeys to provide the gravity feed to the mixers.

(*a*) *M.R. Refractories.*—The weighed and blended material delivered from the mill is held in stainless-steel-lined surge bins. From here it passes into the mixers. Water is added and after pressing, the bricks are passed through a continuous drier and finally fired in an oil-fired tunnel kiln up to 1,650 deg. C. Thermocouples and radiation pyrometers in the kiln are connected to recorders on a central control panel.

(*b*) *Battersea Refractories.*—The weighed materials received from the mill are fed into mixers, water is added and the batch prepared to a suitable consistency according to the method of manufacture being used. The mixed material is dropped into aluminium containers which are held in storage racks. This storage unit was designed so that the many and varied batches can be identified easily and the containers picked up by a fork-lift truck, and delivered direct to the individual maker.

M.I. Bricks.—The M.I. range of bricks are made in a separate self-contained unit. This range of low heat-storage insulating refractories will embrace a number of different hot-face insulating bricks for service at a range of temperatures up to 1,650 deg. C. The M.I. production line occupies bays some 60,000 sq. ft. in area. The raw materials from the mill are automatically weighed and conveyed to a mixer and then to automatic presses. The pressed bricks are then dried in a continuous drier and are finally fired in an oil-fired tunnel kiln. The final operation is the grinding of the brick on all faces to accurate dimensions.

Refractory Cements and Concretes.—One new unit exists for this work and, additionally, another separate manufacturing unit (first temporarily housed in the original brickworks building, adjacent to the calcination plant) is also being modernized. These largely self-contained units produced the wide range of refractory concretes, cements, mouldables, settings and mortars already mentioned.

New Catalogues

Calipers and Gauge Blanks. Two leaflets have recently been issued by the Manchester Metal Works Limited, 368-376 Bury New Road, Salford 7, which cover the "Manchester" line of made-to-order calipers and gap-gauge blanks ranging from zero to ¼ in. up to 8 to 9 in.

Positioning Jacks. A leaflet issued by Tangyes, Limited, of Cornwall Works, Birmingham, describes and illustrates a hydraulic jack carrying a central chamber from which there are attached by flexible piping (in this case) six jacking units. Any foundry which has to line up heavy machinery should write to Birmingham for a copy of this leaflet.

Models. An interesting leaflet has been received from Hunting Aerosurvey, Limited, 6. Elstree Way, Boreham Wood, Herts. It illustrates models made in various media for exhibition work, but a covering letter tells of the making of accurate three-dimensional models of structures and the like for helping boards and committees to visualize the matter under discussion and thereby save much time poring over blueprints.

Steel Moulding Boxes. Sterling Foundry Specialties, Limited, Sterling Works, Bedford, have just produced what surely must be one of the finest catalogues ever issued to the foundry industry. In its 80-odd pages there is combined, high-grade salesmanship, with a wealth of useful technical data and above all a dignified and artistic presentation. It is spirally bound in green "leatherette." Much interest is added to the brochure by pictures of foundries located in all parts of the world. There is only one thing missing, and that is a few pictures of their own works—a feature which the reviewer believes always adds interest. It can be assumed that it is available to responsible readers who write to Bedford.

Forty Years Ago

In our issue of June, 1913, one of the editorials deals with productivity (not production) and incentives, the other being on steel additions to the cupola—then a very controversial question. There is a Table quoting many leading authorities showing the great benefits to be obtained by the addition of titanium to cast iron—a 43 per cent. increase in strength is cited. What surely must be one of the earliest strictly technical papers on the testing of moulding sands, written by the late Mr. John Shaw, is printed. Amongst new companies registered was that of Augusts Muffle Furnaces, Limited.

I.B.F. Conference Works Visits

Each year, in conjunction with the annual meeting of the Institute of British Foundrymen, a number of works' visits are arranged for members participating. With this year's conference to be held in Blackpool (June 16 to 19) and arrangements being in the hands of the Lancashire branch of the Institute, the excursions will be made to foundries and engineering works within those areas. For readers who are unable to join the parties and to "whet the appetites" of those who can, brief particulars of the establishments to be visited are printed here. All the visits will take place on Friday, June 19. Detailed arrangements have already been circulated to members.

VICKERS-ARMSTRONGS, LIMITED

The naval construction works of Vickers-Armstrongs Limited were commenced in April, 1870, when the setting out and construction of the shipbuilding yard on Old Barrow island began. The works were then called the Barrow-in-Furness Iron Shipbuilding Company. Shipbuilding flourished and the works quickly expanded and some of the largest vessels of their time, both warships and merchantmen, were built and engined there. Later, the Naval Construction and Armaments Company, Limited, took over the works and it was during this period that the Barrow works pioneered the evolution of the submarine. The first vessel of this type, the Nordenfeldt, being built in 1886. As time went on, the name changed to Vickers Sons & Maxim Limited, Vickers Limited, and later still, in 1928, to Vickers-Armstrongs Limited.

The works now occupy well over 150 acres on Barrow Island and, in addition to shipbuilding, the manufacture of all classes of marine, armament and general engineering plant is carried out. There are three large foundries for making iron, steel and non-ferrous castings. The iron foundry, which consists of four bays covering a floor area of 55,000 sq. ft., is equipped with three cupolas and is capable of producing castings up to 50 tons in weight. In the steel foundry comprising three bays, with a total floor area of 31,000 sq. ft., is a Siemens open-hearth furnace of 20 tons capacity, and two side-blown Tropenas converters of two tons capacity each. The non-ferrous foundry also has three bays (total floor area of 53,000 sq. ft.) and the melting equipment here consists of two reverberatory furnaces of three tons each capacity, and a battery of 42 natural-draught furnaces, each capable of accommodating crucibles of up to 400 lb. capacity. There are no fully-mechanized sections in the foundries as the work is not of a repetition character.

FIG. 1.—*No. 2 Bay of the New Dressing Shops at Vickers-Armstrongs, Limited. This Bay is concerned with the Lighter Type of Castings.*

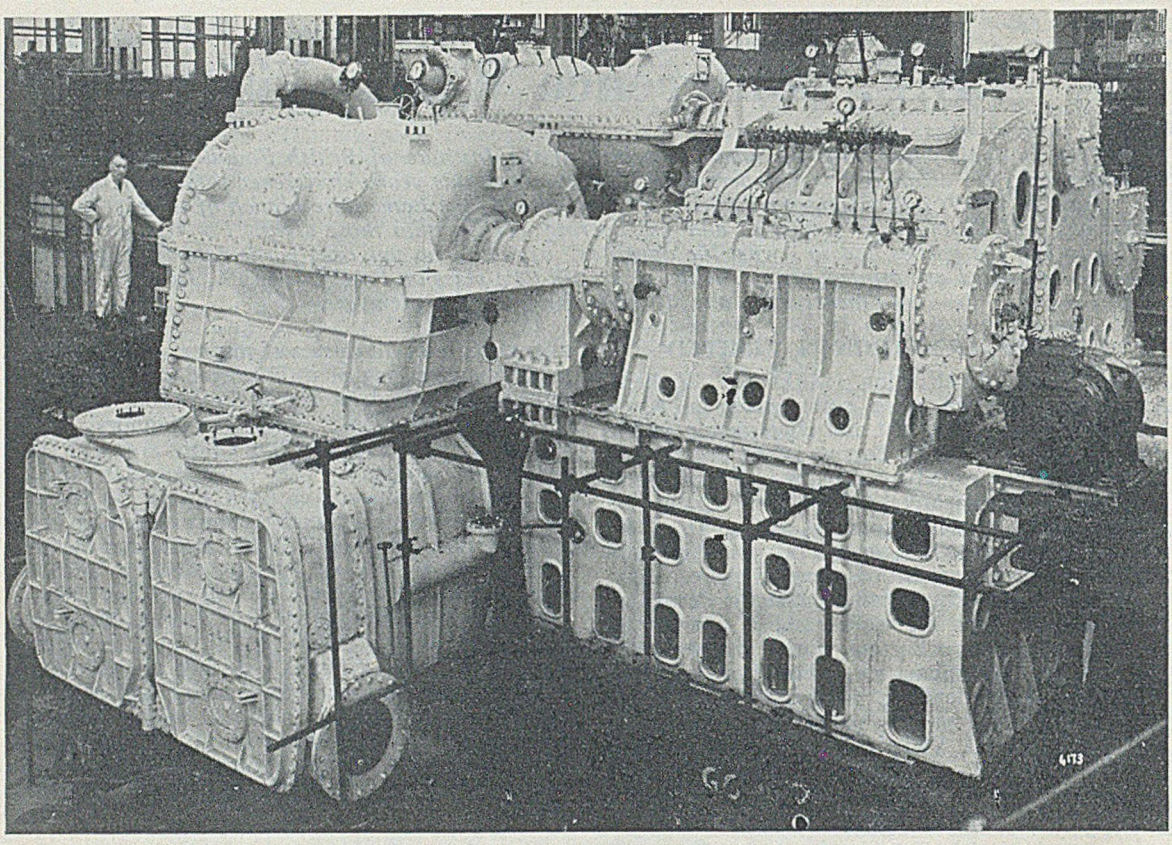


FIG. 2.—*Set of Turbine Machinery made by Vickers-Armstrongs, Limited, for the s.s. Oronsay developing 21,250 shaft h.p. All the Castings were made in Vickers Foundries, the largest weighing 25 tons.*

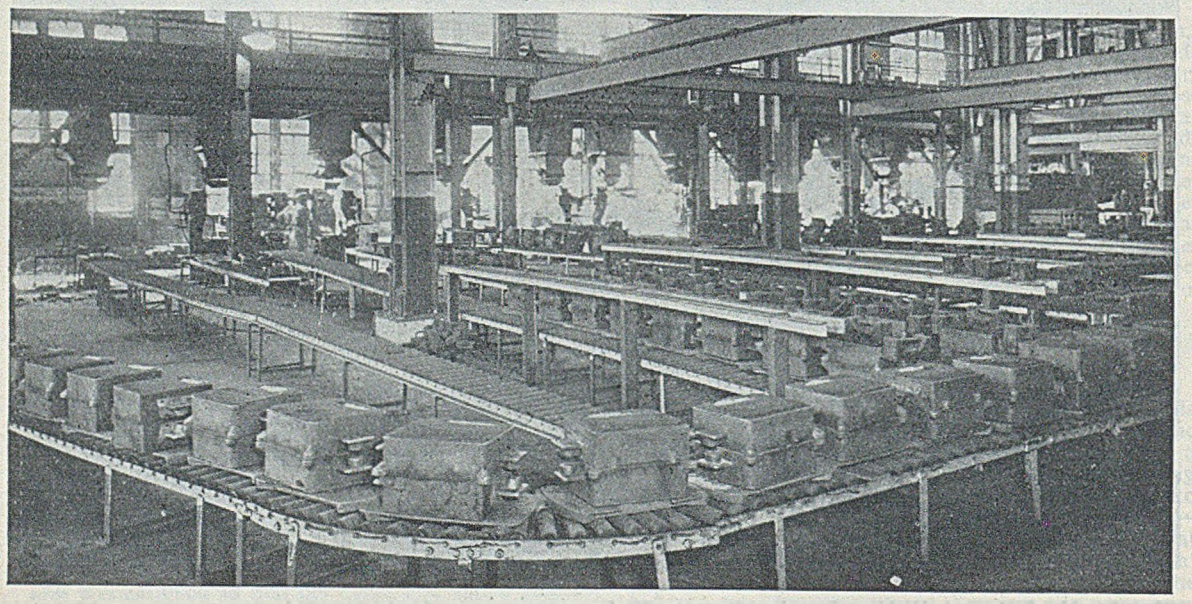


FIG. 3.—*Mechanized Section of the Metrovick Foundry producing Light Iron Castings with Female Labour.*

New Dressing Shop

The dressing of iron and steel castings is carried out in a new Portal-frame building comprising two bays 280 ft. long by 64 ft. wide with an intervening dwarf bay 36 ft. wide extending about half the length (Fig. 1). This part houses a shot-blast plant and two modern oil-fired annealing furnaces, the temperatures of which are accurately controlled. A feature of this building is the elimination of ledges and structural members on which dust could deposit. The shop is completely lined with insulation material, and is heated by a high-pressure hot-water radiant-panel system. Running along both bays is a glass, V-shaped jack roof with opening windows on either side for natural ventilation. On the side walls, a number of reversible propeller-type fans are fitted so as to cater for varying atmospheric conditions. There is one 50-ton crane, one of 40 tons, and four of 5 tons capacity. A large, modern Hydroblast plant is installed for the removal of all loose sand from the castings before fettling.

The chemical and metallurgical laboratories at the works are new, and form a modern building, the equipment of which includes spectrographic, absorptiometric, physical-testing and heat-treatment apparatus of the most advanced type. In association with this department is a well-equipped radiographic section employing both X- and gamma-ray methods. Full collaboration with the foundries department ensures the production and treatment of metals as required by the various purchasing and inspection authorities.

The foundries are chiefly engaged on the production of castings for shipbuilding, turbine and oil-engine machinery, axial-flow pumps, condensing plant, winding, soap and cement machinery, etc. In addition, castings are made for outside manufacturers. Fig. 2 shows a set of turbine machinery made by Vickers-Armstrongs for the s.s. Oronsay.

METROPOLITAN-VICKERS ELECTRICAL COMPANY, LIMITED

Iron and Non-ferrous Foundries

Metropolitan-Vickers Electrical Company, Limited, which was founded in 1899 as the British Westinghouse Electric and Manufacturing Company, has its main factory in Trafford Park, Manchester, where production commenced in 1902. In the years which followed, the company expanded and made many notable contributions to progress in the design and development of its wide range of electrical and mechanical products, which set new standards of efficiency, and won it a leading place in the industry. To-day, staffed with some 20,000 out of a total of over 22,000 employees, the Metrovick factories in Trafford Park cover more than 160 acres. Whilst production is primarily concerned with the manufacture of plant for the generation and application of electrical power, the company's products cover

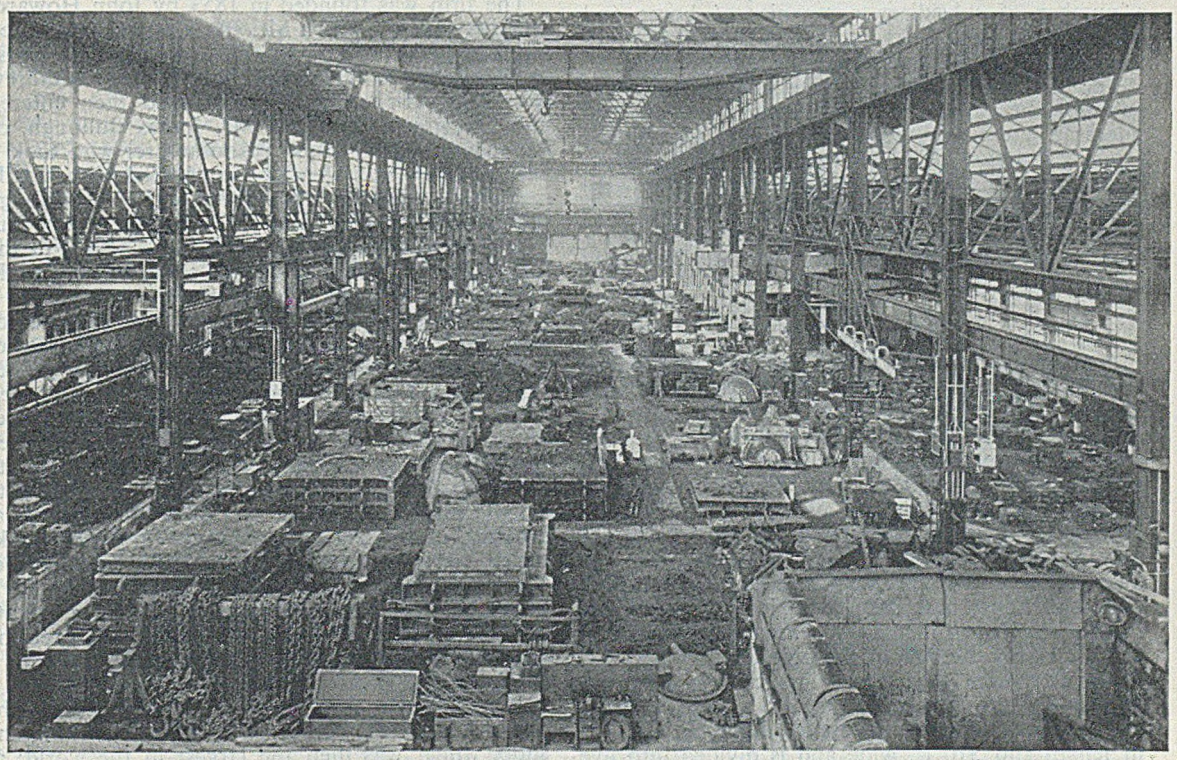


FIG. 4.—*Main Bay, 770 ft. long by 80 ft. wide, of the Metropolitan-Vickers Iron Foundry where Large Castings (up to 64 tons) are made.*

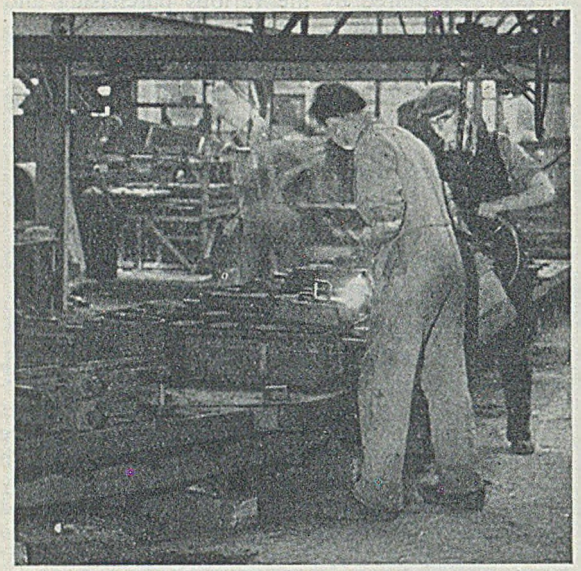


FIG. 5.—*Pouring Station on the Mechanized Plant for producing Intermediate Framing Castings at the Foundry of Howard & Bullough, Limited.*

an ever-widening field, ranging from electron microscopes to complete electric locomotives. The M-V factories in other parts of the country, together with a number of subsidiary companies at home and overseas, combine to maintain a world-wide reputation of which the company is justifiably proud.

The firm's foundries and patternshops, which are amongst the biggest in the country, are of considerable interest to those concerned with modern foundry practice. Though they have not been enlarged since 1920 and in general remain as they were originally built early in the century, they have during the past 50 yrs. expanded their range of manufacture and output far beyond what was originally intended.

Present Layout

A comprehensive scheme of reorganization began in 1947 and led to the present improved conditions of working which are accepted by factory inspectors and trade union officials as complying in practice with the recently-publicized foundry health and safety regulations. The manufacture of castings, ranging from less than one ounce to over 60 tons in weight, is greatly facilitated by a considerable degree of mechanization (Fig. 3), and with the installation of an increasing number of mechanical aids it is hoped not only to maintain the present output but also to increase it where necessary without increasing the size of the buildings.

The foundries produce castings both in iron and in non-ferrous metals and cover a total area of 212,913 sq. ft. The main foundry building is 576 ft. in length and 310 ft. wide and is divided into five bays, two of which were lengthened to 770 ft. in 1920. The centre bay (Fig. 4) is 80 ft. wide by 55 ft. high to the crane track. The foundry for non-ferrous casting is a separate section in the north-west corner of the main building.

HOWARD & BULLOUGH, LIMITED

Howard & Bullough, Limited, are members of the Textile Machinery Makers Group of Companies formed in 1931, which also includes Platt Bros. & Company, Limited, Hartford and Barton works, Dobson & Barlow, Limited and Brooks & Doxey, Limited. A sales organization, Platt Bros. (Sales), Limited, from their Hartford Works, Oldham, governs the sale of machinery for all operating companies. Each firm manufactures specialized groups of machinery. In the case of Howard & Bullough, Limited, this consists of ring spinning frames, sizing machines and shirley analyzers. Ninety-eight per cent. of the manufacture is for ring frames for which there is a capacity of 30 to 40 frames per week. With the exception of the motors and a few specialities, all the parts for the machines are manufactured at the works and include such items as spindles, rings, and fluted rollers. The older works (Globe works), manufactures all the main parts of the frames, *e.g.*, gearing ends, off ends, roller beams, ring rails, rings, rollers, etc., and Stevenson Street and Charter Street works manufacture exclusively spindles and solid-top rollers.

Historical

The firm was founded in 1853 by John Howard, a native of Bury, and a Mr. Bleakley, who provided the necessary capital. In 1856, a difference arose in regard to the capital and Mr. Bleakley withdrew from the partnership. Mr. Howard then entered into an agreement with a Mr. James Bullough, of Baxenden, a local cotton manufacturer who took a keen interest in inventions connected with textile machinery. Under this agreement Mr. Bullough provided the capital and his son, Mr. John Bullough, became a partner in Globe Works and the title of the firm was changed to Howard & Bullough, with an employment strength of 40.

The firm specialized in the manufacture of machinery for the preparation and spinning of cotton and experiments were tried for the manufacture of looms for cotton manufacturing processes. The first works were adjacent to the present offices in Fountain Street, but as the business expanded the works were extended from Fountain Street to Ormerod Street, in the late 'sixties. The Rabbeth spindle introduced in the late 1870's brought great changes, and increased the output of Globe works which were enlarged and practically transformed. After the death of Mr. John Bullough in 1891, Howard & Bullough's was converted into a private limited company and in 1894, owing to increasing growth, was turned into a public company with a capital of £750,000.

In 1920 the firm purchased land where the Stevenson Street works were built as a moulding shop, which was then the largest in the world; at the same time, Globe Works were also extended. During the trade recession in the late 1920's, the firm, together with competitors in the textile

machinery trade, went through a trying period and in 1931 merged with the five main companies into Textile Machinery Makers, Limited.

Foundries

The general iron casting work needed in the production of ring frames are manufactured in the No. 1, No. 2 and No. 3 foundries and visits of I.B.F. members will be paid to No. 1 and No. 3. In the No. 1 foundry, there are sections on hand-moulding from loose patterns, floor/plate moulding, plate-moulding and hand-moulding machines, a completely mechanized pallet-conveyor plant (Fig. 5), and an impellor-type ramming plant for the larger castings on gravity roller conveyors. Melting is carried out in cupolas of orthodox design, augmented with a Birlec electric furnace for special metals and particularly for cast-iron borings (Fig. 6). No. 3 foundry is designed for the mechanized production of spindle and roller castings, and here there is a complete mechanized system with two units fed by cupolas of the Pari-blast type. In addition, this foundry has a small plate-moulding floor section and a small non-ferrous foundry, where the melting is accomplished by oil-fired tilting crucible furnaces. The dressing shop in this foundry is equipped with continuous ovens for the annealing of spindle-part castings to enable high machining speeds to be obtained.

Personnel and Amenities

At present approximately 3,000 people are employed in the works (practically all males), with an additional 550 staff members. Recruitment, welfare, etc., are under the direction of the personnel officer. Employees work 44 hrs. per week (39½ hrs. for office staff, including draughtsmen, etc.). In 1947, in conjunction with the Lancashire Education Authorities, a works school was opened at Stevenson Street works and Mr. W. Mercer, B.SC., was appointed headmaster with one full-time instructor and additional part-time staff. The curriculum includes literary subjects (including English, civics, history and geography), physical training, mathematics, practical science, practical drawing and mechanical engineering and general workshop practice. Boys between the ages of 15 and 18 are released for one whole day per week, for which they receive pay at time rates. Recently, assistance has been given to the education authorities by allowing boys from other local engineering establishments to attend the school.

A comprehensive apprentice training scheme is operated and at the present time there are rather more than 200 apprentices in training for such trades at fitter, turner, millwright, mechanic, electrician, joiner and motor mechanic. In 1945, the directors endowed the scheme by which awards of a number of valuable scholarships and research fellowships tenable in the Faculty of Technology at the University of Manchester or at other universities were made. Other welfare and social activities include the organization and running of a sports and recreation club in the centre of the town with a separate part run entirely for the youth section; a surgery, canteens and an accident-prevention department.

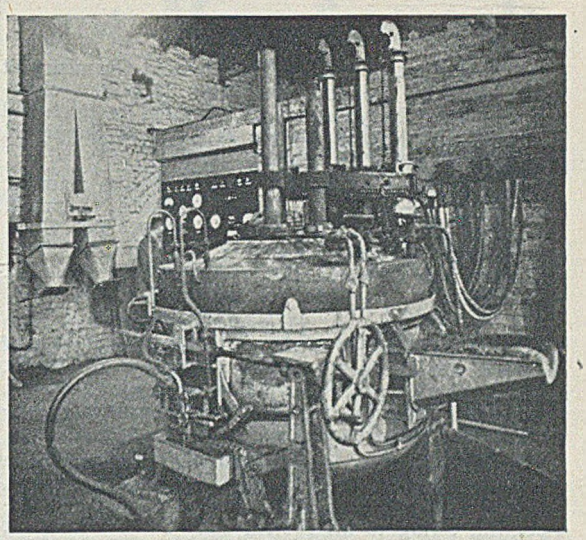


FIG. 6.—*Direct-arc Electric Furnace for Melting Swarf at Howard & Bullough, Limited.*

(To be continued)

Long-service Recognized

Lt.-Colonel H. B. Riggall last week presented to MR. H. M. REES, the 400th 50-yrs'-service gold medal awarded by Ruston and Hornsby, Limited. The first was given in 1906. A total of 20,000 years' service in spells of 50 yrs. is indeed a wonderful record and may even be unique.

Employees with 25 years' service and over are being entertained by the directors at a dinner party at the Botanical Gardens, Edgbaston, Birmingham, on June 26 as part of the commemorative programme arranged by the Birmingham Aluminium Casting (1903) Company, Limited, in honour of its 50th anniversary.

At the brass foundry of Alfred Shirley, Limited, Birmingham, Mr. R. A. Woodward, governing director, presented special Coronation gifts to long-serving employees on May 29. Established in 1898, by the late Mr. Alfred Shirley, the firm has entered the dollar market recently for the first time and is winning substantial orders from America and Canada. As a result, discarded and almost forgotten patterns, some of them over a 100 yrs. old, are being brought into use again. American buyers turned out to be enthusiastic about brass dolphins, galleons, candlesticks, ornate coat hooks and other cast brassware for which there is a vogue in U.S.A., and the firm has the necessary patterns available. They have also supplied candlesticks to Worcester, Liverpool and other cathedrals, and recently an order for 1,000 pairs of candlesticks was received from Canada. During the war, the firm made over 73,000,000 brass trouser buttons for the armed forces.

Latest Foundry Statistics.—According to the British Bureau of Non-ferrous Metal Statistics, the output of copper-base castings during April was 3,334 tons. During the first four months of this year, the production was 16,059 tons as against 24,117 tons during the same period of 1952.

Personal

SIR ERIC RIDEAL, Professor of Physical Chemistry at King's College, London, has been appointed chairman of the Advisory Council on Scientific Research and Technical Development to the Ministry of Supply in succession to SIR JOHN LENNARD-JONES.

MR. J. T. RITCHIE has been appointed sales manager and local director of Aveling-Barford, Limited, Grantham, in succession to his father, Mr. C. J. Ritchie, who is retiring. Mr. N. C. Earll is to be works manager. Mr. E. R. Howlett is also retiring from his directorship.

MR. R. T. JENKINS, planning engineer, has been appointed manager of the central engineering shop of the steel division of the Steel Company of Wales, Limited, at Margam (Glam), in succession to MR. ANDREW HENDERSON, who has been appointed superintendent of maintenance shops.

MR. C. W. MOSS, deputy general manager of the Barrow works and shipyard of Vickers-Armstrongs, Limited, who retires on October 31 after 40 years' service will, owing to his present state of health and at his own request, be relieved of active duties as from July 1. He will remain on the Board of the company, however, until his retirement.

LORD ABERCONWAY has been appointed chairman of John Brown & Company, Limited, in place of the late Lord Aberconway, and Mr. S. W. Rawson has been appointed vice-chairman. The Board of John Brown & Company (Clydebank), Limited, have also appointed Lord Aberconway chairman of the company, with Dr. James M. McNeill as deputy-chairman and managing director.

MR. WILLIAM ERNEST SIMPSON, of Smethwick, is the first student to win the Institute of Production Engineers' higher national certificate since the award was offered last year. Trained under the Birmid apprenticeship scheme, Mr. Simpson is now on National Service, but he will receive the certificate, plus a prize of books, at a ceremony in the Guildhall, London, on October 9.

MR. CHARLES ROBSON, a director and secretary of Ashmore, Benson, Pease & Company, Limited, blast-furnace plant manufacturers, etc., of Stockton-on-Tees, has been appointed chairman of the Tees-side Productivity Committee, and MR. H. NICHOLSON, secretary of the Tees committee of the Confederation of Shipbuilding and Engineering Unions, has been appointed secretary.

THE RESIGNATION from the board of Allen West & Company, Limited, the Brighton electrical control and switchgear manufacturers, of MR. ALLEN WEST, "to make way for a younger man," is a generous gesture. Mr. West was the founder of the company in 1910. One of the first things designed was a finger contact for drum controllers, which was adopted by the Admiralty as its standard, thus starting the company's connection with the Admiralty which has grown in various directions ever since.

THE TWIN BROTHERS who were the joint designers and builders in 1895 of what they believe was the first internal combustion motor-car engine in this country celebrated their 80th birthday last week, although they were not together. They are SIR ERNEST PETTER, who resides in British Columbia, but who is coming back to this country next month, and MR. P. W. PETTER, who lives at Bournemouth. Both were founder members of Petters, Limited, engineers and oil-engine builders, of Loughborough and Staines, which is now controlled by the Brush Electrical Engineering Company, Limited.

Australian Foundrymen Join I.B.F.

About 18 months ago the Institute of British Foundrymen received a suggestion from the Institute of Australian Foundrymen, Victorian division, for closer co-operation, even to the extent of possible amalgamation, a number of members in this country and in Australia being already members of both organizations. It was with very great pleasure that the Council of the Institute, at its meeting held at York in April of this year, received a letter from Australia intimating that a ballot had been taken of the members of the Victorian division and that it was unanimously decided to amalgamate with the I.B.F. on the basis agreed upon in previous correspondence. The Institute of Australian Foundrymen, Victorian division, now becomes, therefore, the Australian branch (Victoria) of the Institute of British Foundrymen, and the members of the Victorian division become members of the I.B.F. In this country it is felt that this valuable accession to the ranks of membership will be of benefit to the Institute as a whole.

Early Liaison

The successful outcome of these negotiations is the best tribute which could be paid to the spirit which has animated those who have conducted them. In particular, tribute should be paid to the president of the Victorian division, Mr. Silvester, and to its most energetic and enterprising secretary, Mr. G. D. Thompson.

A number of members of the Victorian division have visited this country during the past two years and contacts with them have been most helpful both to the Australians and to British founders.

The Annual Convention of the Australian branch (Victoria) will be held in November. Members from this country will be most welcome and any member of the Institute likely to visit Australia during that period is requested to be good enough to communicate with the secretary at Manchester.

Harland's 50 Years of Engineering

A booklet issued by the Harland Engineering Company, Limited, to commemorate the fiftieth anniversary of its foundation, and which also incorporates the annual report of the company, recalls some of the conditions which prevailed in 1903 and draws comparisons with the world of to-day. Fifty years ago the British Empire was at the peak of its power, and the general atmosphere was one of peace and prosperity. It was in this spirit of quiet confidence and security that two young engineers, Mr. F. Carleton Anderson and Mr. C. A. Atchley, joined in partnership with the late Mr. G. Harland Bowden, and started a contracting business. At the same time the late Mr. J. G. Stewart, of Stewarts and Lloyds, Limited, launched a company making electric motors in the town of Alloa to provide work for men where the predominating employment was for women in the woollen industry. From these two events the present Harland company has emerged.

To-day Harland plant is found in many parts of the world in such important industries as oil producing and refining, plastics, chemicals, fertilizer production, irrigation, transport, docks, railways, power production, and public utilities. In addition to offices in the main industrial centres of Britain, the company is now represented in 17 countries abroad.

MR. ERNEST ALLEN has retired after 52 years' service in the drawing office of the light-castings department of Newton Chambers and Company, Limited.

Non-ferrous Alloy Ingot Manufacture*

By W. G. Mochrie

Review of the preparation of ingots to specification for the founder. The refiners' raw materials, his methods of treating them, as well as the plant at his disposal are dealt with in turn. The check methods employed to guarantee uniformity of product and notes on the limitations of the processes are included.

The term "ingot" in this context implies a block of metal of shape and size suitable for the crucible or foundry furnace; of a composition known both chemically and physically to the manufacturer, if not always to the foundryman; of reasonable consistency within the limits of the specifications to which it is produced, free from slag and detrimental inclusions.

Its simple shape belies its processing. The manufacture of an ingot can be a relatively straightforward operation, as in the alloying of virgin metal, or a highly-complicated series of operations, when the so-called "lowest grade" of raw materials is employed. To describe the many processes contained between these two extremes would be quite impossible in one short Paper, but it is proposed to give you a very brief outline of the many direct processes and as much of the ancillary processes as may interest foundrymen.

PREPARATION OF MATERIAL FOR THE FURNACE

Flow Sheet

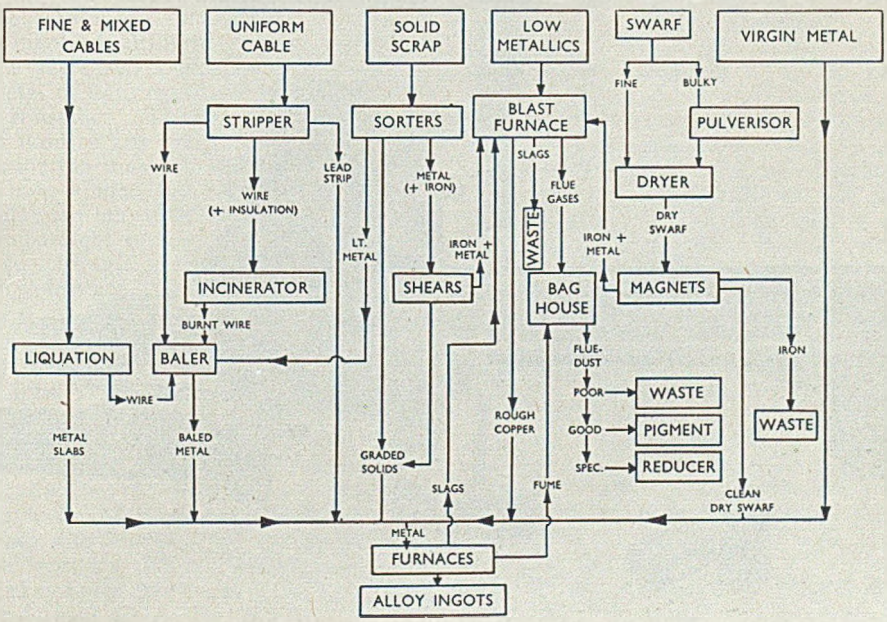
The routing of metal from various sources is shown in Table I. This has been drawn up under some difficulty, imposed by the restrictions on space and does not, therefore, read progressively from the important sources on say any one side. However, following the Table, and reading from the left, the various types of cable are followed by solid scrap, low-metallic material, swarf, and finally virgin metal. These constitute the most important sources of supply for the ingot manufacturer, accounting for about 90,000 tons of non-ferrous ingots during 1951. Of these, in terms of tonnage, by far the most important is solid scrap, indeed it is the practice of some manufacturers to concentrate only on this type of material. As well as this, some of the ancillary plant may, or may not, include cable-stripping machinery, but invariably swarf-treating apparatus is available on the ingot manufacturers' premises. Again, so far as is known, there is no ingot manufacturer concentrating on "low metallics" as his main source of metal supply. It is the plant utilized for this type of material, however, that is the best standby for the reclamation of his own by-products.

Cable

Although lead-covered cable, as such, does not constitute an essential source of metal supply to the ingot manufacturer, its copper content does. There are many types of cable, from the bare, stranded copper wire to the steel-armoured, includ-

* Paper presented to the Slough section of the London branch of the Institute of British Foundrymen, Dr. E. Scheuer, presiding. The Author is London manager of Tyseley Metal Works, Limited.

TABLE I.—*Sources and Routes of Metal Reaching the Refining Furnaces.*



Non-ferrous Alloy Ingot Manufacture

ing hessian-covered, lead-sheathed, pitched and paper-cum-rubber insulated copper wire. This lead is melted and falls to a sloping hearth or receiver from whence it is ladled or run into ingot moulds. All the steel armour remains on top, together with the copper wire. Both are withdrawn from the furnace after the insulation has been completely burnt and the lead removed. It is an easy matter for the steel to be separated from the copper. This copper may have been originally tinned or bare and, obviously, whenever possible the tinned variety is kept apart from the bare material.

Similarly, fine and mixed lead-covered copper cables are treated in this liquating type of furnace. The resultant wire is invariably mixed, tinned and untinned, and in any event contaminated with lead. In both types of cables, the ultimate copper content rarely exceeds 98 per cent. purity, the average being much less. Moreover, the operation does not, as a rule, continue to finality, and adhering particles of unburnt impurities remaining on the wire can lead to aggravated melting losses later. For these reasons, it is better to employ a treatment other than firing to free the lead from copper wherever practicable. Such material as lends itself to mechanical treatment, for instance uniform cable in sufficiently large quantities, is treated by a special stripping machine. This is an arrangement whereby the cable, on being introduced between two rolls, engages a knife edge, which pierces the end and upper side of the lead sheathing and cuts along the length of the cable as the latter progresses through the rolls. As it is withdrawn the lead is taken to one side and the copper coiled on the other. Paper- or rubber-insulated copper is subsequently burnt.

Most copper wires and certainly all fine wires, are baled before charging to the furnace. They are still kept separate, the tinned from the untinned, the burnt usually from the unburnt. The size of the baling machine usually determines the size of the bale, depending on the use to which the bale is to be put; for instance, for crucible charging (Fig. 1) a rather small bale is necessary, but for use in a large furnace a much larger type of bale is suitable (Fig. 2). The object in baling is twofold:—(1) it puts the material into manageable proportions, and (2) it minimizes subsequent melting losses. The lead strip from such cables requires handling only to bring it into suitable form for furnace charging.

Solid Scrap

As previously mentioned, solid scrap constitutes the most important source of supply to the ingot manufacturer. It arises from "*process*" *material* of uniform shape and composition, *e.g.*, rejected machined parts or, for instance, spent cartridge cases, and "*collected*" *material, e.g.*, that accumulated through merchants' yards where the initial hand-sorting operations start. It is in the sorting of this material that care must be taken initially to ensure a minimum cost in the eventual ingot. It cannot be emphasized too strongly that contamination of one undesirable element in any combination of elements means a cost or loss out of all proportion to its percentage content. Sorting is largely a matter of experience by the individual. There are no text-books on the subject and rarely does one sorter's verbal description of any one set of circumstances agree with that of his colleague. One can, therefore, well understand the dearth of literature on this subject.

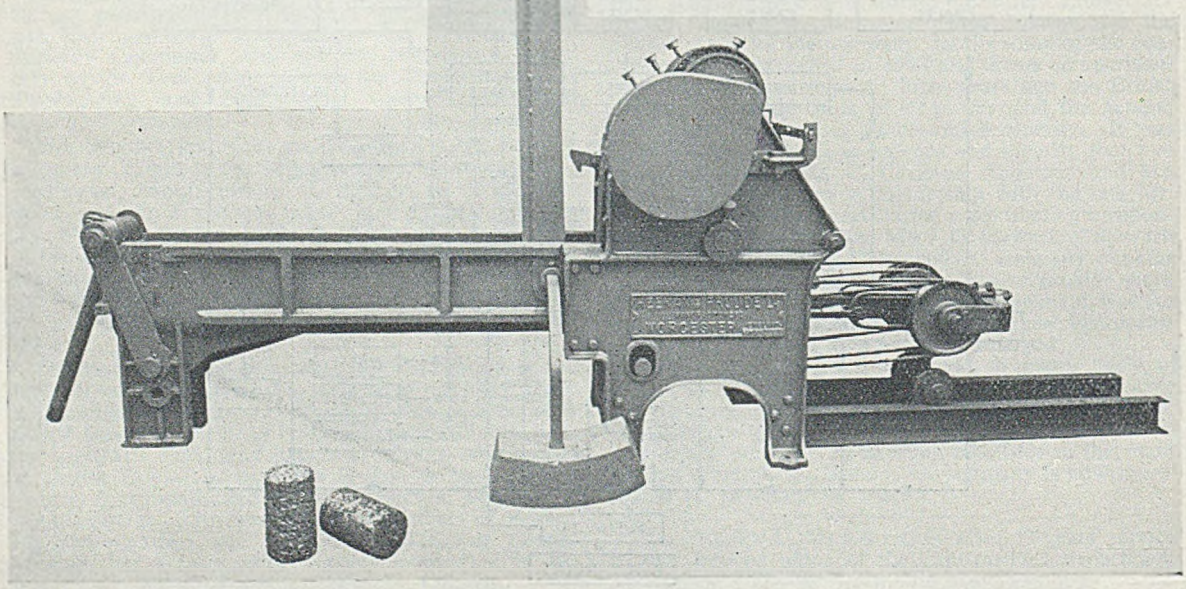


FIG. 1.—*Heenan & Froude Baling Press which produces a Compact (see Foreground) suitable for charging into a Crucible Furnace.*

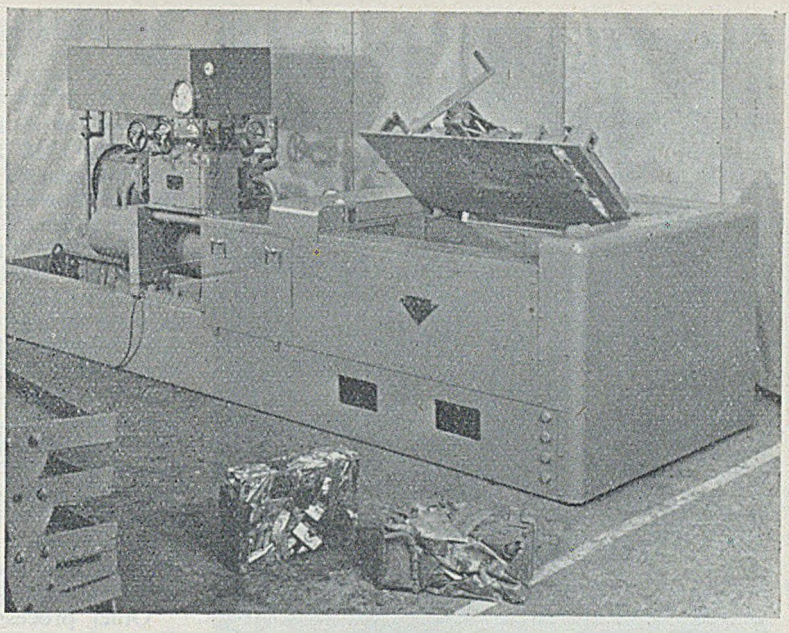


FIG. 2.—*Larger Baling Press of the Double-ram Type, shown with the Lid Open. This Model produces Compacts (see Foreground) suitable for the Larger Melting Units.*

The first clues to identify are shape and colour. Coupled with these, the ability to tell the method of production of the particular piece, *i.e.*, extruded, hot-stamped, chill- or sand-cast, is extremely useful in determining the alloy or group into which it should be put. The experienced use of a file will determine a certain degree of hardness, or resistance to the movement, and reveal the sub-surface colour of the article. A cold fracture will narrow down the possibilities to close limits, if indeed it does not supply the last shred of evidence necessary to classify the piece. Fracturing, probably the most accurate indication of identity, is the most laborious and is used only as a rule when all other tests have failed. A rough bend-test serves as a good indication of category when similar shapes are known to be of different composition, and a hammer will help to determine brittleness.

The magnet is the sorter's constant companion and, until the introduction of stainless steels, it was infallible in rejecting ferrous materials from copper-base scrap. Powerful bench-type permanent magnets are used extensively in the detection of concealed iron or steel inserts. However, where pieces are sufficiently uniform and plentiful, and when other means fail, spot-testing, involving the use of acids, may be employed. Of course, where large castings are involved, drillings can be taken for assay. A few years ago a machine was produced to identify metal of uniform shape by measurement of electrical resistance. This, so far as is known, has not been used to any great extent. Such processes of elimination may strike founders as being arduous and long-winded, but, in practice, they are not so, for one man may sort up to a ton of mixed heavy brass into eight or nine different categories in a day, suggesting perhaps that experience becomes almost instinct.

Solid scrap is, of course, not always entirely free from non-metallic attachments, and there may be contaminated metals one with another, as in the case of composite assemblies, switchgear, etc. Where possible, these are treated before introducing to the furnace. For large material, there are several mechanical arrangements in use, for instance, the guillotines or "shears" as they are named, in Table I, and these are shown in Fig. 3. These machines may or may not completely free the non-metal from the metal or isolate one metal from the other. Large pieces of iron with small pieces of non-ferrous metal still attached will find their way to the blast furnace for further "detachment." One metal still adhering to another may be treated in normal furnace refining, but according to circumstances blast-furnace treatment may have to be employed.

The appreciation of this section would not be complete without mentioning the use of special machines capable of handling very substantial tonnages of uniform shapes and ridding them of iron rivets, screws and the like. It is always desirable thus to rid metal from contamination by mechanical or manual means rather than by furnace refining, which involves metal loss and costly (furnace) holding time.

"Low Metallics"

The metal contained in the "low metallics" incorporates, in addition to all the non-metals, all the non-ferrous and very often ferrous materials; it is, however, assessed in terms of its copper content. It arises from the iron-containing metals previously described, as well as reverberatory slags, casters' ashes, and possibly outside sources. The principle adopted in dealing with it is to concentrate as much of the copper content together, when so desired, with as much of the other metal constituents as possible *in the form of metal at the furnace spout.* There are other ways of reclaiming metal from the blast furnace, but these are wasteful. Nevertheless, blast-furnace practice is, or can be, extremely wasteful in many respects, for, owing to the unstable nature of so many of the elements contained in the charge and the reversible reactions in the furnace, the composition of metal tapped can vary appreciably. Precautions are therefore taken both in the initial charge (which incidentally incorporates slagging materials as well as fuel) and in the collection of the oxides in the flue gases. No blast furnace is complete without the inevitable "baghouse," in which the flue gases are screened.

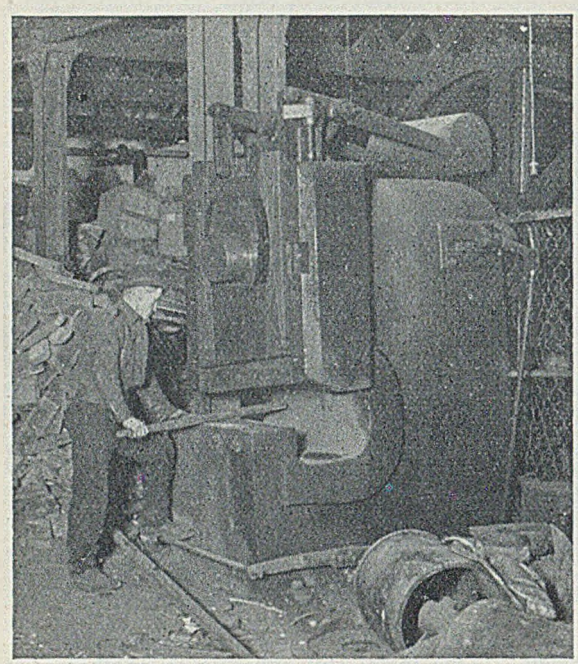


FIG. 3.—*Heavy, Power-driven Shears in the Metal Sorter's Works for cutting Scrap into Pieces of Convenient Size.*

There they pass through a series of bags which trap the volatile material, allowing the gas itself to escape. This collected flue-dust, depending on the initial blast-furnace charge and the desired metal combination tapped, may be of very poor quality, that is to say, of low metallic content, in which case it goes to waste; or it may be of sufficient purity and colour to be suitable for pigment manufacture. Under special circumstances, however, this flue-dust may be suitable for further treatment, but this, generally, is beyond the interest of the ingot manufacturer and comes within the sphere of the lead or tin refiner. Analysis of a normal flue-dust shows:—

	Per cent.		Per cent.
Zn	50.0 to 60.0	Al	trace
Cu	Abt. 1.0	Mn	under 0.1
Ni	trace	Si	up to 1.0
Sn	up to 1.5	S	abt. 2.0
Pb	abt. 10.0	Cl	abt. 2.0
Fe	less than 0.5	O_2 (by diff.)	10.0 to 25.0

The slag from the blast furnace is of no real commercial value and goes to waste. This contains approximately:—

	Per cent.			Per cent.
Cu	1.0	The bulk is:—	Si	30.0
Sn	up to 2.0		FeO	abt. 15.0
Zn	5.0–15.0		Fe_3O_4	abt. 4.0
			MnO	4.0
			Al_2O_3	abt. 25.0
			Cu_2O	1.5
			CaO	2.5
			NaCl	10.0–11.0

The copper tapped may vary from 80 to 95 per cent. Cu content depending again on the initial charge, the other metals being zinc, tin, nickel and lead, which can produce a base for many of the non-ferrous casting alloys after suitable treatment.

"Low Metallics"—Wet Processes

In the flow sheet, Table I, none of the other methods used for metal concentration could be accommodated. Mention must be made, even in passing, however, of one or two methods alternative to blast-furnace practice. Usually on a very much smaller scale, they can be more conveniently fitted in to the smaller ingot-manufacturing concern. The most important treatment is the Wiffley process, involving ball-milling or grinding of metalliferous materials, the object of which is to free as much of the metal from the burden as possible. This is subsequently washed over a sloping table fitted with suitably arranged ridges, permitting, as the charge is washed along its length, the heavy larger metal to fall first, then the middlings, containing a certain amount of non-metals, and finally the tailings—with a very small percentage of metal—which invariably go to waste. The metal concentrates are subsequently dried and can be used as a mixed-metal base for furnace treatment.

Other processes do not use water, for instance that of "balling" and subsequent screening. Again, of course, the metal concentrates are mixed, depending on the material used, and have to be fire-refined in subsequent furnace treatment.

Swarf

Swarf as collected from the machine-shop may be mixed or uniform, very fine or very bulky. This

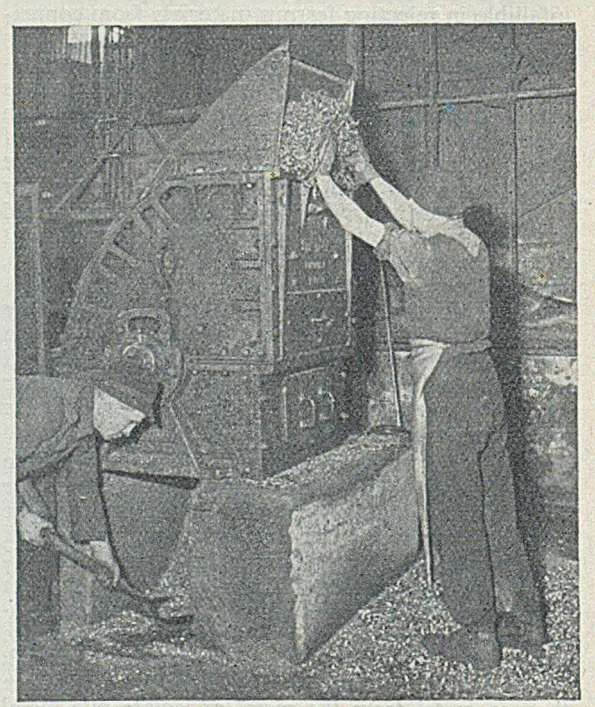


FIG. 4.—*Machine for Pulverizing Non-ferrous Swarf, prior to Drying and Iron Separation.*

latter in its original form, quite apart from handling difficulties, has a relatively large surface area which, when exposed to furnace atmospheres, involves high melting losses. It is therefore subjected to a pulverizing treatment, which is a treatment (Fig. 4) far from being the simple operation it sounds. All swarf in its original state is contaminated with iron, but before this is removed by magnets the bulk must be thoroughly dried. Typical magnetic separators suitable for swarf treatment are shown in Fig. 5 (*a*) and (*b*).

The clean dry swarf from the magnets may be charged to a special furnace, or introduced with other suitable material into the reverberatory furnace. The iron from the magnets may reasonably be expected to be nothing more than iron, but in spite of the excellent qualities of most machines, through the vagaries of the accompanying metal, there is usually valuable non-ferrous metal contained with the iron tailings. Such material finds its way into the blast-furnace charge. In the best-equipped factories, the processing of swarf is completely mechanized, from the drying cylinders through the magnets to the furnace-loading hopper.

Virgin Metal

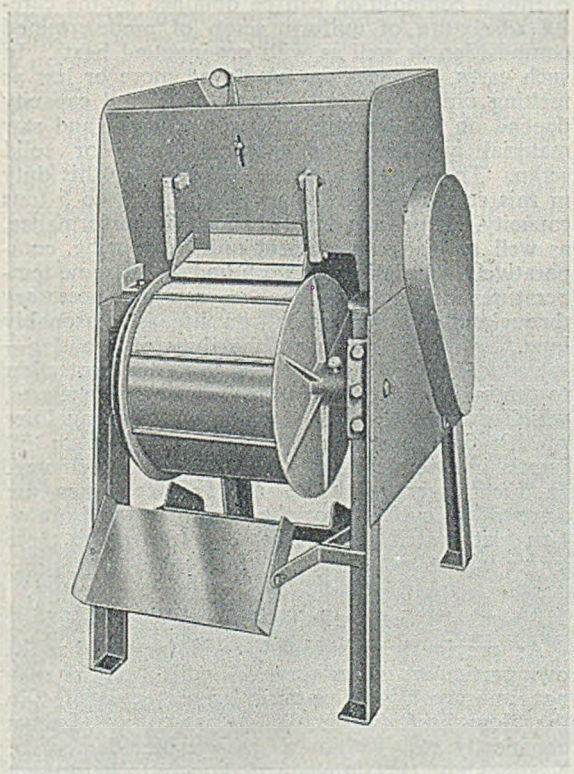
Lastly, in Table I, there is virgin metal. This may be used on its own, but the greatest use to which this is put is collectively in the compounding of special alloys, hardeners, and in the balancing of charges.

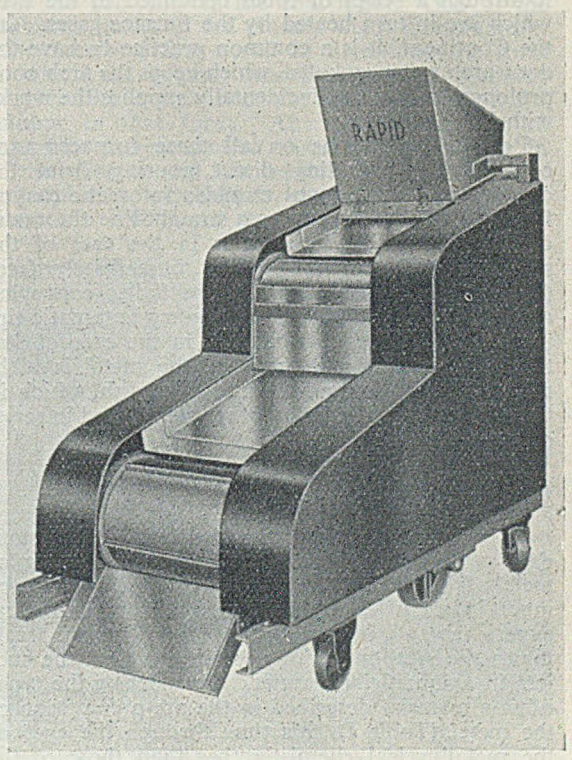
As a result of the processes already described, there are available: lead, copper wire (both clean and burnt), burnt wire but contaminated with lead, also tinned wire contaminated with lead, and lead strip. Then there is solid scrap graded, for instance, into the following categories: low-tin, leaded gunmetal, high-tin gunmetal, phosphor-bronze, possibly, leaded phosphor-bronze, aluminium-bronze, manganese-bronze, extruded brass, hot- and/or cold-rolled brass, heavy brass, lead-bronze, clean copper, braziery copper, tinned copper, Tombac, gilding metal, soldered brass, and so on; also rough copper or metal concentrates, clean dry swarf, *i.e.*, of uniform composition as well as mixed, for instance, mixed gunmetal or mixed brass.

FURNACES

Types and Capacities

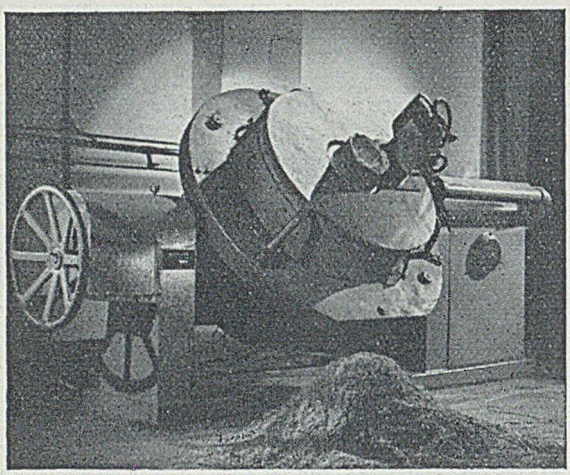
Before describing furnace treatments, a short reference must be made to the furnaces themselves. Ingot manufacture involves the use of most, if not all, types of furnaces, *e.g.*, the humble crucible (Fig. 6), tilting and stationary, the reverberatory rotary (Fig. 7), and semi-rotary of 2 to 5 tons capacity, and the larger stationary reverberatory of 10 tons capacity upwards. For certain special treatments, muffle furnaces are also employed. Continuous open-hearth types and furnaces with specially-adapted loading arrangements are in use. Electric furnaces have not come into general use for ingot manufacture, but all other





[*Courtesy Rapid Magnetic Machine Company, Limited*

FIGS. 5 (*a*) *and* (*b*).—*Two Types of Magnetic Separator, for removing Iron from Non-ferrous Swarf.*



[*Courtesy Morgan Crucible Company, Limited*

FIG. 6.—*Crucible Melting Furnace of the Type Used for Metal Refining.*

firing means are employed, for instance, coke, oil, powdered and solid fuel and even town's gas. Foundrymen are quite familiar with all these types of furnaces, with the possible exception of the stationary reverberatory model. For the larger "refining" tonnages, this is the most economic one for the job. Fired by producer-gas prepared from solid fuel, the secondary air is pre-heated by passing it through a series of tubes contained in the flues which are in turn heated by the furnace gases. On the Continent, it is a common practice to have the door arch water-jacketed, which keeps the arch cool, prolongs its life, and incidentally supplies the works with hot water.

Pouring operations on all these furnaces vary considerably, including direct pouring from the crucible into static ingot moulds; automatic casting from the tilted rotary on to a straight-line automatic conveyor (Fig. 8); into ladles in the case of the smaller rotary furnace (which immediately frees the furnace for re-charging), the ladles conveying the metal to a straight-line stationary automatic tip-up mould assembly. Again, as in the case of stationary reverberatory furnaces, the metal is withdrawn through a tap-hole into a tundish, which in turn feeds one or more ingot moulds placed in series on a conveyor.

FURNACE TREATMENTS

Raw-material Composition

In alloy refining, procedures do not follow standard text-book practices used for the refining of metals from ores. The treatments employed in the ingot industry have been built up from individual experience and, in dealing with these furnace treatments the Author has of necessity to treat the subject in a superficial manner. Considering the types of raw material described in the pre-preparation of the metal (Table I), this time through the eyes of the metallurgical chemist rather than those of the metal sorter, the black copper, ingot lead and copper wire have already been touched upon chemically; the various brasses are now identified basically as, say, 60/40 copper/zinc, 63/37 and 70/30, each with or without lead and/or tin in bulk. The heavy brass becomes (doubtfully) 60 to 70 per cent. copper, anything up to 3 per cent. lead, with maybe 1.5 per cent. tin and remainder zinc, with possibly a trace of aluminium and iron. Soldered brass may, in the aggregate, be 63/37 copper/zinc basically, with a decimal fraction or so of tin and lead and so on. Similarly, gunmetal is reckoned in terms of chemical compositions. How simple and relatively worry-free would the ingot manufacturer's life become if he could be assured of the correct and constant composition of the sorter's "given" categories. Raw material is never supplied to the furnace absolutely guaranteed with regard to chemical composition, unless in certain circumstances, which are extremely rare, the material has been purchased and checked against chemical composition. Certain types, however, if carefully segregated at the source, will provide a uniform composition as, for instance, the process scrap from, say, rolled brass.

Melting and Admixture

From even the abbreviated list of material prepared for the furnace it will be apparent that there is included a fair range of uniform materials. The only furnace treatment necessary for these is one of melting, with adjustment for melting loss, or at most melting and admixture. An ingot of close chemical composition can be obtained by the careful admixture of uniform scrap of predetermined composition as well as with pre-ingotted heats. In such cases, furnaces are employed more or less as melting units only and furnace type and capacity depend on the tonnage of ingot required and raw material available—for example, swarf or solid scrap. The most economical furnace for this duty in this country is the rotary model of 2 to 5 tons capacity. It permits a speedy melting performance, as well as being an efficient unit in pouring, comparatively simple in operation and, as extreme temperatures and sudden changes are not necessary throughout the operation, its life is reasonably long. In such treatment, the duty of the slag—introduced with the charge—is to afford protection to the molten metal from the furnace atmospheres, which are mostly highly oxidizing. The qualities of this slag must be: (1) low melting point; (2) inertia in several respects; and (3) ease of removal. In the larger factories, all furnace times are arranged in cycles. For the straightforward operation just described it is possible to arrange these cycles within a normal day-shift.

Semi-refining Processes

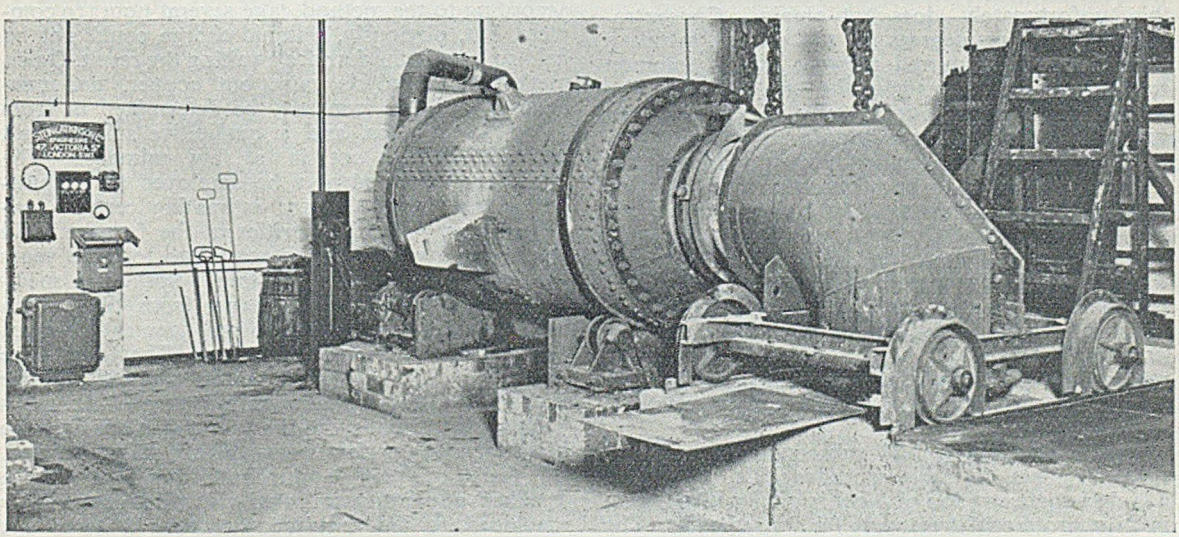
As previously mentioned, each factory has its own particular *modus operandi*, which may or may not embrace all the various processes entailed in the flow-sheet (Table I). Charges are known chemically to within a reasonable degree of accuracy and certain elements known to be present in the charge are given whatever treatment experience has prescribed, for instance, where small-scale

semi-fire-refining is part of the cycle of operation a certain continuity is desirable, if not actually necessary. As an example of this type of treatment can be cited the solute iron and free aluminium in brass. It is desired to reduce the iron to well below the maximum allowed for whatever specification the ingot is to be produced and to remove completely the aluminium. Both these elements respond favourably to oxidation and although there are certain fluxes which carry out this work quite efficiently, the methods with which the Author is personally familiar involve the use mostly of pre-heated air. With, say, a given 65/35 base, it is known just how long it will take to remove a given percentage of aluminium and/or iron. It will be appreciated that a certain amount of the zinc will be oxidized in the meantime and a certain smaller percentage of copper. The zinc will be volatilized and the copper, possibly, removed to the slag. These affinities for oxygen possessed by iron and aluminium vary, of course, with other elements present, and although the affinity tables are very well established, they are apt to turn topsy-turvy when other combinations of metallic elements are present. In passing, it might be interesting to note that with oxidation as a means of removal, from two to ten times as much zinc as iron will be removed from the bath, and probably two to five times as much copper, all depending on furnace conditions. Obviously, due regard must be made to offsetting the zinc loss, and allowance must be made for this adjustment in the initial furnace charge. The most convenient furnace for this type of work, whether by fluxing or by the use of air, is the rotary type with an open flame firing.

These processes involve longer holding time in the furnaces and account for a more extended time cycle for operations than the straightforward melting types. These time cycles are important to the ingot manufacturer, as an hour *saved* in the operation does not always reflect a proportionate overall saving.

Complex Refining

In copper-base-alloy refining, the time cycle is from 12 to 24 or more hours and the operation is as continuous as the furnace permits. The furnaces used are usually of 10-tons capacity upwards, of the stationary reverberatory type and all air is pre-heated. Again, charges are known to be those designed to give a fairly regular composition and subsequent furnace treatment. Oxidation again plays a large part in the operation, but this can be coupled with reduction, concentration and, of course, slagging, which may be progressing simultaneously. The effects of these conditions vary according to composition of the metal, the nature of the charge and temperature. The actions and reactions are complex, and to prepare a scale of elimination rules for each and every alloy condition would be a job for the mathematician as well as the metallurgist. Taking as an example sulphur elimination, and discounting the possibility of its presence as an element either in solution (which varies according to copper content, as a rule), or as a mechanical admixture, it can be in the bath as a dioxide (which may be transposing from the bath to the atmosphere and back), or as a sulphate or sulphide formed with one or other of the constituent metals in the charge. At the elevated temperatures present in the furnace, these compounds may be complex, mechanically mixed, or have varying degrees of solubility in the parent metal or constituent metals in the alloy. This solubility, of course, need have no relationship whatsoever with the solubility in the cold ingot. One of the problems besetting the pioneer ingot manufacturer was, therefore, first of all to determine the form in which the sulphur was present, and secondly to prescribe a treatment for the removal of the sulphur in that form. Alternatively he had to determine a treatment to eliminate the sulphur in all these forms, and this, incidentally, he eventually accomplished. Unhappily, the matter did not rest there. It was found that the reaction that took



[Courtesy Stein & Atkinson, Limited

FIG. 7.—*Reverberatory Furnace and (left) its Control Panel.*

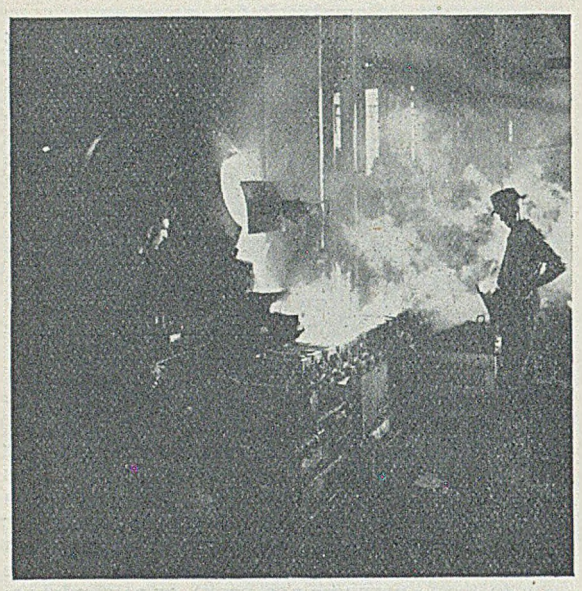


FIG. 8.—*Pouring of Non-ferrous Ingot Metal on a Straight-line Automatic Conveyor.*

place to eliminate the sulphur was reversible and no sooner had the refiner got rid of this undesirable element than it found its way back into the metal again. To-day, however, the complete, or at any rate to all practical purposes complete, elimination of sulphur is a matter of routine.

Other Difficulties

A well-established table of oxide-forming propensities of the known metallic elements has been mentioned. It is quite an orderly table, from which one may gather that zinc will oxidize before copper, lead before tin and so on. This might be quite workable if all had an equal chance to combine with the oxygen, even given unlimited supplies, but this, unfortunately, does not obtain. Concentrations of varying degrees in the molten metal, a furnace temperature and pressure that is common to all and unfair to some, the waywardness of a recalcitrant element (for example the sulphur just mentioned) that prefers to form a compound either in the presence of oxygen or without, with another element, only then to be taken into liquid solution with a bulkier companion to oxide (the oxygen having a catalytic influence) regardless of the gassing, slagging or liquefying that may result, all tend to make the whole process subject to "interesting" possibilities. So that, while lead, for instance, has relatively high oxide-forming properties, and in consequence should be a comparatively-easily-removed element from the copper-base metal bath, it is in practice one of the most difficult elements to remove.

Again, oxidization and subsequent removal of some elements, desirable or undesirable, may mean a higher concentration of other impurity, which may involve protracted treatment for its removal. The latter is always wasteful of the main constituents in the charge. Various methods are employed to minimize furnace time, for example, reducing agents may be charged with the metal to form a slag, temporarily shielding the metal from the oxidizing furnace atmosphere. Rising temperature and time tend to dispose of impurity types which go into the slag and the slag is removed and another substituted before or during oxidization. Indiscriminate rabbling can undo much of the good work that may have taken hours to accomplish.

An endeavour has been made to outline the complexity of the refining-furnace operation but, unfortunately, full detail is impossible, partly because of the space limits imposed. Unfortunately the impression may have been given that matters are too complicated for solution, but, actually, in practice, with a given charge and a given set of imposed conditions (atmosphere and/or slag), it is known that certain elements will be eliminated, up to a point. If that point is insufficient for the purpose, a different set of conditions is imposed. Temperature plays a large part in these treatments, and as work proceeds 24 hrs daily, automatic temperature control is desirable. Slagging too, as will be appreciated, has assumed a much more scientific aspect than the ingot manufacturer of even 25 yrs. ago ever envisaged. Among the slagging and fluxing materials on hand are borax, sand, phosphor-copper, copper oxides, manganese ore, charcoal, fluorspar, sodium carbonate, iron, magnesium and—strangely enough—aluminium.

TESTING

In conclusion, the part the chemist plays in all these operations must be acknowledged. He is largely responsible for the charge as it reaches the furnace; for the material while it is in the furnace; and the ingot as poured. While the methods of analysis of the ingot are of a standard pattern, interim checks on the molten metal must be taken by much more rapid determination. A standard determination of tin in gunmetals, for instance, may, according to the method, take several hours to complete, but, obviously, a liquid charge could not be held so long in the furnace awaiting the result. Quick methods of analysis vary, but copper, tin, manganese, lead and iron may be determined in from 15 to 25 minutes, and a qualitative sulphur test can be carried out in a few minutes. The "Spekker" method may be employed for impurities in the ingot and for estimating certain constituents as well as impurities in the furnace. An interesting "gadget" seen some two to three years ago was used to take a dozen "Spekker" specimens at a time, true to shape, from the molten bath. It was quite a simple arrangement of silica tubes connected to an air pump. The tubes were inserted in the bath, the metal allowed to rise within the tubes, the air was cut off and the tubes containing the rods withdrawn. After cooling, the silica tube was broken away and the rods extracted. Of these, one set in duplicate was sent to the Spekker apparatus for analysis, when they were machined to the required diameter if necessary; one set was sent to the chemical laboratory, and the third set to the Tensometer testing machine.

Other Quality Checking

In the larger furnace, first and last ingots may vary—even slightly—according to the time taken to discharge the furnace. It is customary to take drillings or millings from first and last and, in particularly large heats, compare these with the middle ingots poured. Chemical analysis is insufficient in certain cases and mechanical tests are necessary. Certain specifications, also, call for micro-constituent examination and for these the operation follows standard metallurgical technique. The sample is cut, milled, polished, etched, and examined under a microscope and camera, and constituents are measured.

Under the category of testing must be mentioned a more casual or visual inspection, namely, fracture tests. These are indicative of certain furnace conditions and also of homogeneity or otherwise of the finished ingot. The rough-top ingot, generally favoured by foundrymen 25 yrs. ago, as against the smooth-top variety which would appear to be coming more into favour now, gave a good indication of general quality. Certain elements tend to reveal themselves either on, or through lack of, this roughened oxide skin.

The non-ferrous ingot industry has undoubtedly progressed much during the last decade, but the book of knowledge must never be closed, neither must it ever be finished, particularly so in an industry where labour costs, " overheads " and reserves combined form only a fraction of the sales price, which in turn is usually considerably less than mixture values. With this background, there must be a never-ending search for quicker performances all round, speedier or alternative treatments, fuel and furnace performances and testing methods —all forming the basis of research as a matter of necessity to the very existence of the individual ingot manufacturer.

Ingot practice in this country, which compares with Continental practice, has been referred to particularly. In view of the larger tonnages involved, methods in the United States employ more elaborate pouring and charging devices, although practice is basically similar to that in this country. In conclusion, appreciation and acknowledgments are due to the directors of Tyseley Metal Works, Limited, for permission to give this Paper and to various friends from whom illustrations have been secured.

DISCUSSION

MR. BLANDY inquired what phosphorus addition was necessary to a phosphor-bronze ingot to British Standard Specification, and what phosphorus loss would ordinarily be expected in normal foundry melting operations?

MR. MOCHRIE replied that no phosphorus addition should be necessary with a 100 per cent. charge of B.S. ingot phosphor-bronze. It was customary to include runners and risers in the charge, but normally not to exceed one-third of the weight, but, in the speaker's opinion, this was probably a low ratio. Such a proportion of foundry scrap was probably smaller than need be, but there was a safety factor involved, taking into account the multiplicity of types of furnaces and subsequent foundry losses. So far as the second question was concerned, generally speaking, it would be almost impossible in the foundry to denude phosphor-bronze of all its phosphorus content. Most specifications stipulated a minimum phosphorus content and there was ample included in the ingot to offset normal foundry losses.

MR. SURTEES inquired whether every ingot manufacturer recovered the flue-dust, and asked for further details concerning the " baghouse."

MR. MOCHRIE said, as mentioned in the text, the flow-sheet (Table I) did not detail every ingot manufacturer's operations and all did not recover flue-dust. With the help of the blackboard he then illustrated cooling and collection arrangements.

Fluxes

MR. WIZARD asked what were the functions of the fluxes used in ingot manufacture and whether it was necessary to use fluxes when using ingots in the foundry.

MR. MOCHRIE explained that " fluxes " had been used in the text in its widest possible sense. There were various kinds, including chemical reactants, to promote reducing or oxidizing conditions, or to form an inert slag to prevent reaction with the furnace gases. The need for fluxing in the foundry would depend on foundry conditions; for instance, where gas was being picked up in the crucible or furnace, due regard would have to be taken to eliminate that gas before pouring. Certain alloys particularly susceptible to furnace gases, *e.g.*, the nickel-containing alloys, would have to be treated accordingly.

MR. SYMONDS asked whether due regard was taken by ingot manufacturers generally in connection with slags. He commented on the waste in melting technique owing to the indiscriminate supply to the ingot manufacturers of non-metallic materials or oxides which were substituted for metal. He also inquired what was regarded as the lowest economical size of scrap for hand sorting. To what uses were the so-called " fines " put? He also pointed out that all curly turnings were not necessarily pulverized, as some could be made amenable to briquetting by suitable tempering treatment, minimizing the increase in surface area caused through pulverizing. He emphasized the ill-effects of indiscriminate rabbling in the furnace.

MR. MOCHRIE answered that slags were becoming extremely important with regard to analysis, particularly in semi-refining and refining; they were bringing to the notice of manufacturers important aspects not hitherto appreciated.

He agreed that some ingot manufacturers, particularly the smaller ones, were causing themselves much work and worry through the supply to their furnaces of metal not necessarily in the form generally supposed, and the acquisition of individual experience was the only solution to this problem.

With regard to the sorting size, normally the smaller pieces were sorted from a sieve, the mesh of which varied from shop to shop. He illustrated an arrangement seen in the States, whereby all scrap

Non-ferrous Alloy Ingot Manufacture

supplied to the sorter was automatically screened over a wire mesh. Everything that passed over this mesh had to be hand sorted. The metal content in the "fines" varied. The very smallest sizes were briquetted and, according to their nature, treated in the reverberatory furnace or blast furnace, which latter obviated the need for magnetting.

The lecturer agreed with Mr. Symonds that all curly turnings were not necessarily briquetted and some grades were susceptible to heat-treatment.

MR. LEUTSCHER, a visitor from Holland, endorsed the lecturer's views on the use of fluxes in the foundry, but said that his technique could utilize 100 per cent. scrap without any phosphorus addition.

MR. MOCHRIE expressed some doubt as to whether the required casting satisfied the standard composition requirements without pre-ingotting.

Ingot Characteristics

MR. ELLIOTT asked for details of mould dressings used in ingot conveyors and whether cast-iron moulds were always used.

MR. MOCHRIE said, generally speaking, oil was used as a dressing, but certain manufacturers had their own types of materials. Cast iron was the usual mould medium, but non-ferrous metal or alloy, under certain conditions, would give longer life and cleaner ingots.

MR. ISBILL asked whether the lecturer had any experience of smooth-top ingots *versus* rough-top ingots, and what was the additional foundry loss involved in the use of the latter?

Replying, MR. MOCHRIE said that while the smooth-top ingot in certain quarters was regarded as a recent innovation, it had in fact been produced during the 1914-18 war. It was not acceptable to the foundry then, as it did not reveal indications of impurities which the rough-top ingot always provided. He personally hoped that the smooth-top ingot, which was a simple matter to the manufacturer, would be universally acceptable as it did reduce melting losses. In experiments conducted before the war, he had found that a saving of as much as 2½ units per 100 lb. was made by using smooth-top ingots. This figure, of course, could not be taken universally.

In closing the meeting at this stage the president, Dr. Scheuer, proposed a hearty vote of thanks to the lecturer, which was carried with acclamation. The lecturer responded suitably.

New Electric Portable Saw

Wolf Electric Tools, Limited, Pioneer Works, Hanger Lane, Ealing, London, W.5, have designed and placed on the market a seven-inch heavy-duty, portable electric saw. It is stated that during its trials it cut 14 ft. of two inch seasoned oak per min. Its weight is 17¼ lb., even though a heavy-gauge, steel, soleplate is used instead of aluminium. The depth of cut is adjustable to a maximum vertical distance of 2 5/16 in. bevel cuts go up to an angle of 45 deg. and to a depth of 2 in. The materials which can be dealt with include timber, wall board, plywood, stone work, light sheet metal and asbestos corrugated sheet.

Modern Foundry Handling*

Modernization of a 100-years-old iron foundry is nearing completion at New Britain, Conn. The P. & F. Corbin Foundry Division, American Hardware Corp., has equipped the plant with the latest and best in materials-handling devices. The casting and shake-out departments were completed about a year ago and work has just been completed in the trimming, cleaning and inspection departments.

The foundry produces 15 tons of castings each day. Moulds are dumped on a central conveyor belt and carried to a shake-out. Castings pass over a screen, located on the floor below, down a chute and fall into buckets. These buckets are then picked up by monorail cranes and the castings are charged directly into the skip hoist of one of two Wheelabrator machines.

Previously, the castings discharged on to the floor where three or four men were kept busy loading them into tote boxes. Now, the Wheelabrator operators are able to handle both assignments without difficulty. All lifting has been eliminated in charging the castings into the blast-cleaning machines.

The old method of trimming was a slow, tedious job, which required lifting of single castings, and 100-lb. boxes of castings. To-day, all castings are discharged from Wheelabrators into an oscillating conveyor, from which they are trimmed and inspected simultaneously.

The total operation now fits in a quarter of the space previously required. It is cleaner, faster and easier. Working time required to trim and inspect the shop's daily production has been cut from 72 to 30 man/hours per day through use of these modern machines and materials handling equipment.

* Extracted from an article appearing in *Iron Age* under the title "Modern Handling Commutes Hard Labor in Small Foundry."

Atmospheric Pollution

Complaints made at a Walsall Town Council meeting of atmospheric pollution from the James Bridge Copper Works, Pleck, have been answered by Mr. T. C. James, managing director of the Wolverhampton Metal Company, Limited, owners of the works. Mr. James stated that the company is spending about £300 a week, or £15,000 a year in collecting zinc-oxide fumes. In his communication to the Town Clerk of Walsall (Mr. W. Staley Brookes) Mr. James said that, although the firm is most anxious to be good neighbours, there is a limit to which the emission of zinc oxide can be eliminated if smelting operations are to continue. The company were now the largest processers of copper-bearing residues in the country, he pointed out. Mr. James valued at £50,000 the company's collecting plant, which is extensive and incorporates 700 filter units. These units had a limited life, and when one burnt out there was a greater emission of oxide into the atmosphere until replacement was carried out. A deputation from Walsall Health Committee is to visit the works on June 8 for discussions with the management. About 250 operatives are employed at the factory.

THE BRITISH PRESSURE GAUGE MANUFACTURERS' ASSOCIATION held its second annual general meeting at Leamington Spa on May 18. Mr. A. J. Mann, of David Harcourt, Limited, was elected president for the forthcoming year, with Mr. F. H. Halestrap, of Dewrance & Company, Limited, as vice-president. Mr. John Baker White, publicity adviser to the Economic League, gave a talk on "The Export Battle."

Process Control of Cast Iron for Vitreous Enamelling*

I.V.E. Midland Section Discussion of Mr. J. Bernstein's Paper

Examination of process scrap figures for vitreous enamelling of cast iron, as revealed by replies to a questionnaire submitted to the industry, has caused searching enquiries into means of amelioration, and, in the discussion reported here, many suggestions were put forward. Inter alia, *synthetic* versus *natural moulding sand; time lag between founding and enamelling; requirements of annealing; causes of cracking and trouble with isolated defects, were examined. No hard and fast rules were found to apply, but emphasis on stricter day-to-day control and better liaisan between foundry and enamelshop were said to pay good dividends.*

MR. BALL opened the meeting by stating that a special point had been made of inviting members of the Institute of British Foundrymen to be present at this meeting and, in fact, I.B.F. members were welcome at any of their meetings and to join in discussions. Mr. Ball then asked Mr. W. Todd to take the Chair, remarking that he needed no introduction to either foundrymen or enamellers.

MR. TODD referred to the comprehensive report which had been presented to the Institute in London on the general position obtaining with regard to enamelling of cast iron, suggesting that it was hoped to ascertain at that meeting the views of members who were not able to be present in London. He particularly hoped that the meeting would produce the criticisms and views of the "jobbing enameller." Recent figures had revealed an astonishingly high number of rejects, and so much re-processing alone represented a considerable financial loss to the industry, even though it might delight frit manufacturers!

MR. BERNSTEIN then read his Paper, at the conclusion of which he stated that the subject of enamel-shop practice was far too wide to go into at that stage, and he had only mentioned essential features.

MR. PRICE, opening the discussion, said he would like to know if there were any figures available relating to defective castings where synthetic moulding sand had been used; or any to show the results when the castings were not annealed, as against when they were annealed.

MR. BERNSTEIN replied that the differences were so small as not to have any real effect. If the casting conformed to the required chemical composition, and soundness, it was possible to process the casting without annealing, whether synthetic sand was used or not. One of the things he had been unable to define, or explain, had been found on castings which were normally annealed and which suddenly gave trouble in the enamel shop. Annealing was stopped, and the trouble disappeared but later re-appeared. Thereupon annealing was re-started, and the trouble disappeared once more. No factual evidence was available to support one procedure against the other.

* Paper printed in the June 5 and July 10, 1952, issues of the JOURNAL.

Annealing Times and Temperatures

MR. BLACKBURN asked what was the critical temperature of the annealing, might it vary with the type of casting ?

MR. BERNSTEIN said it all depended on the chemical composition of the material, the thickness of the casting, and the time at which the casting was maintained at a particular temperature. Metallurgists would say that certain reactions take place, particularly at a temperature of say 780 deg. C., and more so at 800, and to an even greater extent at 850, and so on. Nevertheless, with the right conditions and temperature maintained for a sufficiently long period, the same result would be obtained. The annealing of cast iron was a subject on its own, and covered a very wide field.

MR. TODD said it was of interest to the jobbing enameller, who may not know anything about the chemical composition, but who annealed every casting which came into his shop, to learn an average time and temperature which could be suitable.

MR. BERNSTEIN added that generally speaking, the temperature should be in the region of 25 deg. C. above the temperature at which fusion of the enamel was carried out and the casting should be held for a minimum period of 15 min. at temperature.

MR. BILLINGHAM asked whether the time cycle between the foundry and the enamel shop had any bearing on the casting enamelling better, or more readily after, say, 24 or 48 hrs., or, if after that, the conditions would worsen without annealing.

MR. BERNSTEIN said it had been found in one or two foundries that they could take castings virtually straight from the knock-out without annealing and get excellent results on enamelling. In one particular foundry it was a regular practice, and as soon as they hit trouble, annealing was commenced. Research had been done under the heading of "weathering" and castings had been left without annealing up to six months, and the results in some cases had been excellent and in others very bad. It had been found that castings which had been discarded as bad castings for enamelling, had, after a period of time, through sheer necessity been brought in again and had been found quite satisfactory to enamel.

MR. BEDHAM also asked for suggestions as to temperatures for annealing.

Process Control of Cast Iron for Vitreous Enamelling—Discussion

MR. BERNSTEIN said it depended what was required. Some enamellers only wanted to remove dirt and grease. If the enameller could say what he wanted to do from the metallurgical point of view, suitable treatment could be specified. If it was intended to obtain a reduction in the amount of combined carbon, to obtain a better result on enamelling, he would say that for every ½ in. of section of a casting a minimum of 45 min. at selected temperature would be required but there were too many variables to give a precise answer.

MR. WILLIAMS asked if, for a thin casting (say ¼ in. thick), the time required would be about 20 min.

MR. BERNSTEIN confirmed that was correct.

Cracking

MR. BILLINGHAM asked if cracking of a casting during annealing was the enameller's fault.

MR. BERNSTEIN said cracking during annealing might be the foundryman's fault or that of the designer. If a designer produced a poorly designed casting, cracking could not be blamed on the founder, but it could be said that an enameller could still prevent certain castings from cracking by modifying his method of annealing. If a casting which was awkwardly shaped was plunged from room temperature into a furnace at 800 deg. C., it was very likely that a considerable number would crack, due to thermal shock and differential expansion. On the other hand, the same casting brought up slowly to temperature and cooled slowly would have a much reduced tendency to cracking. While certain castings might not always be ideal, if the enameller would apply his experience he could help himself to produce good enamelling. Particularly this applied to the jobbing enameller who had to accept castings from many suppliers. By modification of technique, more careful drying, adjustment of fusing time and temperature, etc., much could be accomplished. One of the most important pleas he could put forward was that there should be complete accord between founder and the enameller. As soon as "boiling" or "blistering" took place, an enameller should get in touch with the founder to ask if there was anything different about the batch of castings, and see what was going on in the shop. Supervision was imperative, and should be there all the time, and rigidly applied. The speaker was convinced that where supervision lapsed, quality deteriorated. Supervision in the enamel shop ranked equal in importance with control and supervision in the foundry and the human element was probably the greatest factor likely to cause trouble in the enamelling of cast iron. A good enameller could enamel poor castings satisfactorily and, conversely, perfect castings could be completely ruined by bad enamel. If both sides got together, half the troubles would disappear.

Isolated "Boils"

MR. SEMPLE said he would like some views on a type of defect not previously discussed—isolated "boils," that is one "boil" or one blister over a considerable area. His firm had tried every possible cause in the enamel shop, and they still could not get rid of the defect. Castings had been put away for six months, and when brought out again still gave bad enamelling results. He ventured to suggest that the origin of the trouble was in the foundry. He would also like to get an opinion on foundry running methods for it was believed that improved results could be obtained by altering a running system. Previously, a casting run by using one runner had apparently been improved by changing to double running.

MR. BERNSTEIN said these were very interesting points. Purely by shortening the time cycle, however, between foundry and enamelling, rejects were considerably reduced. A few people associated with many aspects of the work believed that the figure for scrap could be reduced to, say, 1.5 per cent. by altering sand, chemical composition of the iron, increasing the supervision during the time the castings were being made, etc. All these factors were contributary, but it was necessary for all to be applied simultaneously. Any one of these factors alone could completely destroy work in another direction. With incorrect sand or incorrect microstructure, for instance, by putting one right there would not necessarily be better results.

The Author said he was completely ignorant of the source of the isolated blister. It could be any number of things—a coarse flake of graphite; the biscuit ware might be touched or a drop in temperature might occur during firing, for instance. With regard to running, no one type of runner could be recommended as the best for all types of castings. The principal requirement was a system which would permit clean iron to enter the mould with a minimum of turbulence. He, personally, had not been able to ascertain whether the time of contact between the moulding sand and the hot casting made in it had any measurable influence on the results of enamelling light iron castings.

MR. CHAPMAN said that his firm also found that some castings resurrected after six months' ageing produced good results, others bad, and at the moment it was something which they did not understand, but which they hoped to have more information on in the future.

THE CHAIRMAN concluded the meeting by thanking Mr. Bernstein for his Paper which put into helpful perspective enamelling problems, which were still being encountered and which were likely to persist for some time.

ELLIOTT BROTHERS (London), Limited, announces that Mr. Charles Marcus, a vice-president of Bendix Aviation Corporation, Mr. J. G. Beevor and Mr. E. O'Hanrahan have been appointed to the Board.

THE EARL OF HALSBURY, F.R.I.C., F.INST.P., has become the chairman of the National Institute of Industrial Psychology, succeeding General Sir Ronald Adam, BT., G.C.B., D.S.O., O.B.E., who has been the Institute's chairman since 1947. Lord Halsbury is the managing director of the National Research Development Corporation. His scientific interests are very wide; he is a member of the Advisory Council on Scientific Research and chairman of the Science Museum Advisory Council.

Harper's Amenities Extended

John Harper & Company, Limited, first became interested in providing washing facilities for their foundry workers in the early 1920's, and in the "Old Works" provided a bathroom for this purpose. When the company decided to do this on a large scale in 1946, there were many gloomy forebodings that the men would not use the facilities, and it would be a waste of money. In actual practice, however, the first block of shower-baths, which were adapted from the A.R.P. decontamination block, proved exceedingly popular, and provided baths accommodation for about 100 men per day. As more bathing facilities were continually being asked for, the directors sanctioned the extension which has just been completed.

The new block for men consists of two sections, each containing a changing room and a bathing and shower room. Both changing rooms are equipped with individual lockers for clothes and will accommodate a total of 80 men at a time. The new extension also includes a section for women who work in the core-shops, painting and enamelling shops, and consists of a dressing room together with an attendant's cubicle for the issue of towels, etc., and 10 shower cubicles. Each cubicle is self-contained with seat and hangers so that the occupier may undress, and dress again in the cubicle after taking a shower. To provide showers for women in an industrial concern is still something of an innovation, but it is thought that these will be appreciated.

In construction, the new buildings are of the north-light type, with asbestos roofs insulated below. Adequate ventilators are provided, particularly over the shower sections. These sections are lined throughout in cream-coloured tiles and the changing rooms are tiled in those places where there is a likelihood of users brushing against the walls. The floors are finished with red quarries, the corners being curved to make for easy cleaning. Internally, where not tiled, the walls are flat finished in cream emulsion, with woodwork in green and black glossy paint. Externally, sand-faced bricks are used to match with the existing buildings comprising the ambulance room and other showers, the walls being pointed in cream and finished off with cream coping. Fig. 1 shows an external view.

The new buildings were opened by Miss M. Herbison, M.P., on May 25. The planning, equipment and lay-out of this new block has been very ably undertaken by the works engineer, Mr. E. Smith, and the builders were J. & F. Wootton, Limited, Bloxwich.

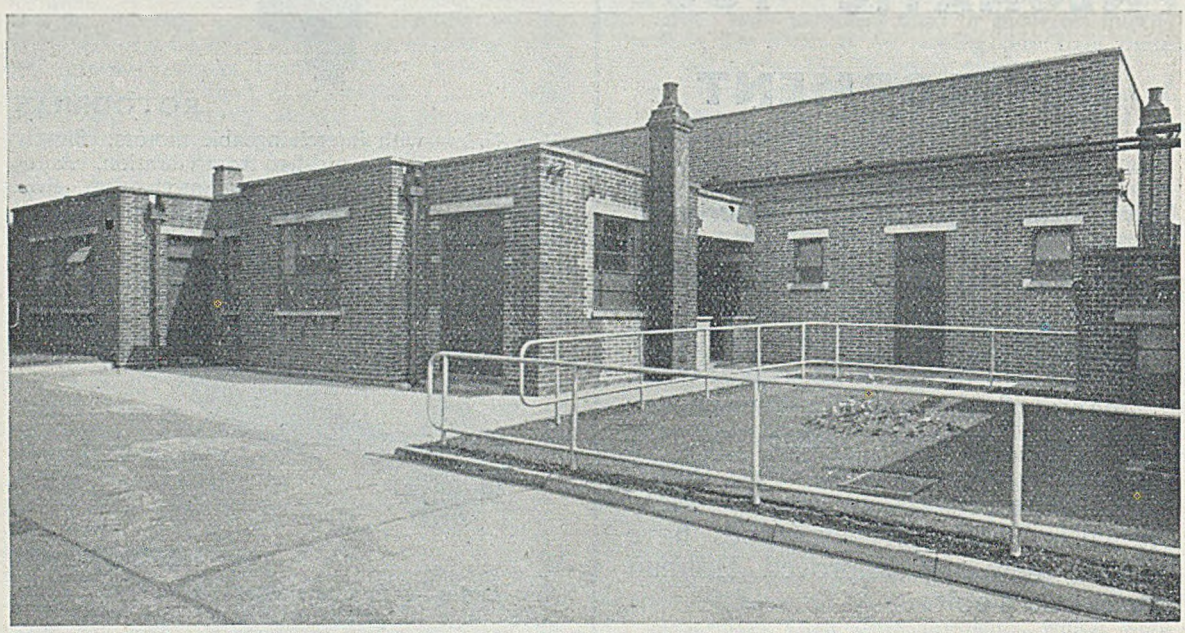


FIG. 1.—*New Amenities Block at John Harper & Company, Limited.*

AT THE INVITATION of the High Authority of the European Coal and Steel Community a conference of steel consumers will be held in Luxemburg on June 10.

THE CONSTRUCTION of a £5,000,000 combined plant to produce electricity and heavy water using geothermal steam in the Wairakei area of the North Island has been approved in principle by the New Zealand Government.

ITALY'S PRODUCTION of ingot steel rose from 3,060,000 tons in 1951 to 3,530,000 tons in 1952. During the last year before the war her steel production figures had amounted to only 2,320,000 tons. Pig-iron production during the same period rose from 860,000 (pre-war) to 950,000 (1951) and 1,100,000 tons (1952).

EXPORTS OF METALS in April were £1,000,000 below the monthly average for the first quarter of this year, but shipments of engineering products increased by £6,000,000.

A CONTROLLING INTEREST in Paterson Engineering Company, Limited, makers of plant for purifying water, of London, W.C.2, has been acquired by the paper manufacturing firm of Portals, Limited.

MORE THAN 90 PER CENT. of the shareholders of Radiant-Heating, Limited, of London, N.1, have approved the offer of George Wilson Gas Meters, Limited, Coventry, to purchase a controlling interest in the company.

Export Licensing Control Changes

Changes in export licensing control are made by a Board of Trade Order which came into force on June 1. The principal changes are as follow:—

Licences are now required for certain kinds of water lubricated bearings for all destinations other than the Commonwealth (excluding Hong Kong), the United States, and the Irish Republic.

Further specified abrasives, certain classes of iron and steel and carbon blacks may now be exported without licence to the Commonwealth (excluding Hong Kong), the U.S. and the Irish Republic.

Licences are not now required except for exports to China, Hong Kong, Macao, or Tibet, for specified silica refractories, certain classes of iron and steel and non-ferrous metals.

The general effect of the changes as they affect iron and steel is that licences are no longer required for finished forms of alloy steels other than those with a high alloy content and those with a very low alloy content which for technical reasons are treated as non-alloy steels. The export of certain finished forms of non-alloy steel is also freed from the necessity of a licence.

All forms of semi-finished steel (alloy and non-alloy), *e.g.*, ingots, billets, blooms, and slabs, remain subject to export licensing control.

Iron-ore Imports

Iron-ore imports in April and the total for the four months of the year to date, with comparative figures for 1952, are shown below.

Country of origin.	Month ended April 30.		Four months ended April 30.	
	1952.	1953.	1952.	1953.
	Tons.	Tons.	Tons.	Tons.
Sierra Leone	83,080	80,930	278,184	262,148
Canada	—	9,825	32,088	133,587
Other Commonwealth countries and the Irish Republic ..	1,249	12,541	7,369	16,254
Sweden	357,621	347,996	1,152,065	1,042,687
Netherlands	420	1,840	2,418	3,196
France	43,989	39,428	147,794	170,170
Spain	56,255	39,329	224,826	162,806
Algeria	164,727	138,307	597,534	537,651
Tunis	39,196	38,460	154,941	154,923
Spanish ports in North Africa	43,330	—	126,834	—
Brazil	9,180	9,168	28,541	68,946
Other foreign countries	75,581	153,828	102,337	425,495
TOTAL	875,528	871,652	2,944,931	2,977,863

New Norwegian Ore-handling Plant

A new plant for handling iron ore at Narvik, North Norway, is now being constructed. It will be the biggest of its kind in the world, according to Hr. Karsten Dahlum, Norwegian manager of the Swedish iron company, Luossavaara-Kiirunavaara A/B.

The all-automatic plant aims to keep moving 8,000 tons of ore an hour. Four new ore crushers are being erected within a large chamber 70 ft. under the hills, and for moving the ore, transport belts and cranes will be used, operating on a bridge 75 ft. high and nearly 3,000 ft. long. Part of the installation will be ready in 1954 and the remainder the year after.

Prospect of Raw Material Shortage

Increasing shortages of raw materials over the next 20 or 30 years, and a heavier demand for them, were forecast by Mr. E. J. Mackenzie Hay, president of the British Federation of Commodity Associations, at the International Chambers of Commerce Congress in Vienna last week.

He quoted views of an official United States Commission that the world demand for copper, lead, and zinc would double between 1950 and 1975, and that there would be an expansion of about 50 per cent. in that for iron ore and rubber. Requirements for aluminium would double.

Stressing the value of international schemes for marketing raw materials, he said that while he thought they were in the long-term interests of both producers and consumers, he saw few signs of the international co-operation needed to bring them into being.

Franco-Saar Iron and Steel Production

Production of iron and steel in France in April showed a slight general decrease compared with March and the monthly average of 1952. Pig-iron production fell from 848,000 metric tons in March to 784,000 tons in April, compared with the monthly average of 729,000 tons last year. Production of crude steel was 888,000 tons (906,000 tons), against 938,000 tons in March, while 630,000 tons (647,000 tons) of rolled steel was produced, compared with 654,000 tons in the previous month.

Saar production also showed a decline, 205,000 metric tons of pig-iron being produced, against 213,000 tons in the average month of 1952, and 222,000 tons in March, 1953. Crude steel dropped to 223,000 tons (235,000 tons) from 246,000 tons in March, and production of rolled steel was 148,000 tons (162,000 tons), compared with 168,000 tons in the previous month.

Board Changes

SMITH & MCLEAN, LIMITED—Mr. James Stewart has been appointed a director.

TEXTILE MACHINERY MAKERS, LIMITED—Mr. H. L. Rushton has retired from the board.

WARNE, WRIGHT & ROWLAND, LIMITED—Mr. A. W. French has resigned from the board.

STEEL COMPANY OF SCOTLAND, LIMITED—Mr. Ronald J. B. Colville has been appointed a director.

HORDERN, MASON & EDWARD, LIMITED—Mr. W. Griffith Edwards has retired from the board.

AUTOMATIC TELEPHONE & ELECTRIC COMPANY, LIMITED—Mr. R. H. G. Lee has been appointed a director.

POWER JETS (RESEARCH & DEVELOPMENT), LIMITED—Mr. T. G. Hicks has been appointed joint managing director.

NORTHERN ALUMINIUM COMPANY, LIMITED—Mr. B. N. H. Thorneley, chief engineer, has been elected a director.

HIGH DUTY ALLOYS, LIMITED—Mr. W. S. Warner, secretary, and Mr. G. W. Richards have been appointed to the board.

IGRANIC ELECTRIC COMPANY, LIMITED—Mr. R. K. Fleming is relinquishing his position as managing director on June 30, and has been appointed chairman of the company in succession to Mr. G. R. Thursfield.

News in Brief

HONEYWELL-BROWN, LIMITED, have established a new branch office at 20, Oak Dale Road, Nether Edge, Sheffield, 7.

WORK WILL BEGIN in July on the completion of the original plan for the Brown Street, Sheffield, research centre of the Permanent Magnet Association.

BRITISH TRANSPORT COMMISSION have given their authorization for work to begin on the modernization of Crewe North Motive Power depot. The estimated cost is nearly £1,000,000.

MR. P. T. BLISS has been appointed sales director of G. A. Harvey & Company (London), Limited. He joined the Company in 1909, and has been sales manager for a number of years.

MR. A. CODY, who for the past four years has been sales manager to Conveyancer Fork Trucks, Limited, and Electro-Hydraulics, Limited, of Warrington, Lancs., is shortly leaving for South Africa. Later, he will visit other parts of Africa.

BRITISH INDUSTRIAL PLASTICS, LIMITED, announce that Foundry & Engineering Products Company (Glasgow), Limited, of 1 to 8, Farm Road, Glasgow, S.1, have been appointed sole agents for the sale of Beetle foundry resins in Scotland and Northern Ireland.

ABOUT 1,830 YARDS of new tunnelling will be required for a £1¼ m. scheme for providing two additional tracks between Greenwood Signal Box (north of New Barnet station) and Potters Bar during the projected widening of the East Coast main railway line.

STOURBRIDGE AND WOLVERHAMPTON BRANCHES of the National Farmers' Union which last year collected more than 150 tons of scrap metal have begun a similar effort which will last until the end of June. Collecting centres are situated at Tettenhall, Wombourn, Himley, and Penkridge stations.

IN A PROGRESS REPORT of the Dominion Iron & Steel Corporation, Limited, Maritime House, Loveday Street, Johannesburg, South Africa, it is stated that a hot-air cupola furnace and recuperator which are to be installed will enable the conversion costs from "Luppen," or Krupp-Renn Iron, to pig-iron to be effected most economically.

CASTINGS of all descriptions, and a working demonstration of a Coronet-Lathe, for which all the castings were made in home foundry, are featured on the stand of Browns Foundry Company, Limited, Nottingham Road, Derby, at the Derby and County Coronation Year Exhibition, Derby, which is to remain open until June 13.

PREMISES now being erected in Scotland Street, Sheffield, will house Yorkshire Testing Works, Limited, and Beecroft & Partners (Metallurgists), Limited, subsidiaries of J. & J. Dyson, Limited, refractories manufacturers, Stannington, Sheffield. Chemical testing and analyses will be carried out on ferrous and non-ferrous metals and ceramic materials.

THE INSTITUTION OF PRODUCTION ENGINEERS is pleased to announce that the Right Hon. Viscount Swinton, G.B.E., C.H., M.C., Secretary of State for Commonwealth Relations, will be the guest of honour and principal speaker at the banquet held at the Hotel Majestic, Harrogate, on June 25, to mark the opening of the Institution's biennial conference.

THE CONTINUED growth of the Purchasing Officers' Association, which now has 40 branches and groups in most of the large centres in the U.K., and also in Australia and South Africa, has necessitated a further expansion in the head-office accommodation. From June 1 the Association took over the remainder of the first-floor offices at Wardrobe Court, and additional telephone facilities have been arranged. The Association's new telephone number is CITy 3841/2/3.

THE INDUSTRIAL WELFARE SOCIETY, 48, Bryanstone Square, London, W.1, announces that its 30th annual conference will be held at Keeble College, Oxford, from July 2 to 6. Additionally, at the same place, there are to be held in September two conferences for apprentices, the first from September 3 to 7 and the second from September 8 to 12. The fee for each of these latter events is nine guineas, or eight guineas for representatives of firms who are members.

AT THEIR ANNUAL MEETING on May 29, the Birmingham Metallurgical Society confirmed the election of the following officers for the coming year:—As *president,* Mr. G. Parkin; as *vice-presidents,* Mr. H. Evans, Mr. J. O. Hitchcock, Mr. H. H. Symonds, and Dr. C. E. Homer; as *hon. treasurer,* Mr. A. C. Craig; as *scrutineers,* Mr. W. F. Brazener and Mr. J. A. A. Fraser; and as *members of the council,* Mr. L. O. Cartwright, Mr. L. G. Beresford, Mr. E. S. Lloyd, and Mr. H. M. Bigford.

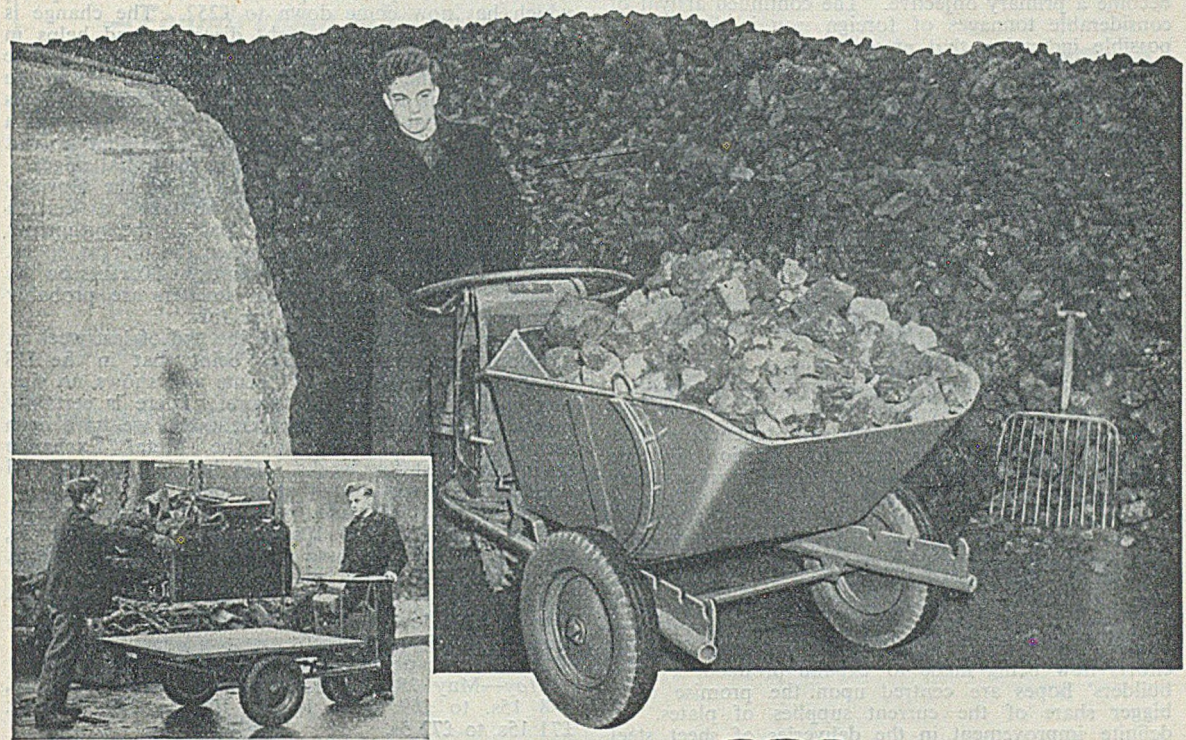
FIVE MILLION mauve National Insurance cards are now due to be exchanged for new cards. The Ministry of National Insurance asks everyone holding mauve cards to exchange them promptly at local National Insurance Offices before June 6. Every year about 750,000 cards are exchanged more than three months late. This delay means a good deal of extra work and expenditure of public money in investigation. It may also lead to delay in settling claims for benefit and even to loss of benefit.

THE OLD beam-type combined condensing engine at the mill of John Croysdale & Sons, Limited, flour millers, at Whitley Bridge, near Pontefract, is to be dismantled in order to make way for modern electrical equipment. In constant service since about 1850, this engine, which has driven all the machinery at the mill, is believed to be the only remaining one of its type in the country. It has a record non-stop run of 504 hrs. and in some weeks has run for 144 hrs. Castor oil is used to lubricate a crankshaft, about a gallon a week being consumed over the past 30 yrs.

THE WORKS of British Insulated Callender's Cables, Limited, will be closed for two weeks for the receipt of goods during the following periods:—Prescot, Helsby, Melling and Huyton Quarry Works, Willenhall Foundry, Willenhall, Staffs, Saturday, July 25, to Saturday, August 8; Erith Works, Belvedere, Kent, Saturday, July 18, to Monday, August 3; Anchor Works, Leigh, (1) Saturday, July 4, to Saturday, July 11, (2) Saturday, September 12, to Saturday, September 19. All dates are inclusive, but arrangements have been made for a skeleton staff to be on duty to deal with customers' urgent requirements.

SIR BEN LOCKSPEISER, secretary of the Department of Scientific and Industrial Research urged industry to take greater pains to apply scientific discoveries to industrial processes, when he spoke in Birmingham on May 28 at a meeting of the Midland branch of the National Union of Manufacturers. If a company is to progress technically, said Sir Ben, it must arrange to be kept aware of the work carried out by the sources of scientific and technical information and it must make arrangements for the routine study of company products and processes. Such routine study would throw up the particular technical problems requiring solution and scientists would then be faced with a healthy demand from firms for specific information.

We've proved it pays!



Loading scrap metal for cupola

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Raw Material Markets

Iron and Steel

The further expansion of pig-iron production has become a primary objective. The continued arrival of considerable tonnages of foreign iron is the clearest possible indication that present blast-furnace capacity is insufficient to satisfy all requirements, and the engagement of additional units is urgently needed. With this end in view the blast furnaces are accumulating good stocks of home and foreign ore, but coke deliveries are no more than sufficient for immediate needs. Trade in iron castings is still in the doldrums and interest in No. 3 foundry iron is correspondingly restricted. But, to a varying extent, all other grades of iron are in short supply. Steelmakers are clamouring for more basic and hematite iron. Engineers are not always able to obtain the grades of iron they require to make up their furnace mixtures and makers of refined iron have an abundance of specifications in hand.

Much the same conditions prevail in regard to supplies of semi-finished steel. There has been a quickening in the deliveries of steel semis from British steelworks, but re-rollers are still dependent upon imported material to keep their mills in action. Further purchases of both steel semis and finished steel products of foreign origin are reported.

The outstanding feature of the steel trade at the present moment is the overwhelming demand for flat steel products. Shipbuilders may not be booking many new orders, but they have three or four years' work in hand and are behind with their deliveries. Outputs are conditioned largely by the availability of steel plates and, pending practical results from the vigorous efforts now being made to expand production, shipbuilders' hopes are centred upon the promise of a bigger share of the current supplies of plates. A definite improvement in the deliveries of sheet steel is a material factor in the rising output of the motor trade, and requirements of the heavy engineering industry are very impressive. Marine engineers are so overwhelmed with orders that propelling machinery for British ships is now being built on the Continent. On the other hand, the light engineering trade is patchy and there has been a decline in the demand for re-rolled bars.

Non-ferrous Metals

Considering that the Whitsun holiday formed an opening to last week and that by the close of business last Friday the country was on the eve of celebrating the Coronation, the amount of business done in non-ferrous metals was surprisingly large. The outstanding feature on the Exchange was the lead market, where by the time trading for May came to an end on Thursday the premium for that month had increased from £9 to £10. This is the worst squeeze seen since the market opened, and seems to suggest that supplies are tighter than ever in this country. This is certainly not a fact, for, so far as can be determined, no consumer is short of lead at the present time. Nor for that matter is there anything like a famine in other parts of the world. True, in the States the quotation has advanced to 13¼ cents from the low point of 12 cents recently established, but it can hardly be doubted that this rise has been due more to the influence of events in London than to any special developments on the other side of the Atlantic.

Continental buying has been rather more promising, and it has been stated that producers there have not been such ready sellers of late. It would seem that Australian shipments have been delayed in some way, or it may be, of course, that metal intended for the United Kingdom has been diverted to the United States where the price is more attractive than it is here.

Users of copper have received a kind of Coronation bonus in the shape of a pound reduction in the price, which has now come down to £252. The change is trifling, but it is in the right direction and helps in mitigating the severity of the fall which most people expect when the free market is established. As to the extent of that fall opinion is still divided, but it is right to say that sentiment is not so bearish as it was a few weeks ago, when it was widely held that no bid above £200 was likely to be seen in the initial stages.

While stocks in this country held by the Government are certainly high it may be taken as certain that there is no intention on the part of the authorities to press this tonnage for sale when the market opens. Meanwhile, copper in the US stands at 30 cents on the domestic market, while custom smelters are probably prepared to sell at 29¾ cents for July.

Zinc reacted sharply towards the end of last week in London, one reason perhaps being that in the US the quotation remains at 11 cents and shows no sign of climbing up above this figure. There is certainly plenty of zinc on hand at present and we have even seen a modest contango on the Metal Exchange during the past few weeks. Tin has lost ground and does not look very happy at present.

Official prices of refined pig-lead were as follow:—

May—May 28, £90 10s. to £91. *June*—May 29, £82 15s. to £83 5s.; June 1, £86 to £86 15s.; June 3, £87 15s. to £88.

August—May 28, £81 5s. to £81 15s. *September*—May 29, £82 15s. to £83 5s.; June 1, £84 to £84 10s.; June 3, £84 5s. to £84 10s.

Official zinc prices were:—

May—May 28, £68 15s. to £69. *June*—May 29, £68 15s. to £69; June 1, £71 10s. to £72; June 3, £71 15s. to £72 5s.

August—May 28, £69 5s. to £69 10s. *September*—May 29, £69 to £69 10s.; June 1, £71 10s. to £72; June 3, £71 15s. to £72.

Official tin quotations:—

May—May 28, £725 to £727 10s. *June*—May 29, £707 10s. to £710; June 1, £710 to £712 10s.; June 3, £717 10s. to £720.

August—May 28, £725 to £727 10s. *September*—May 29, £707 10s. to £710; June 1, £712 10s. to £715; June 3, £715 to £720.

WITH HUMBLE DUTY the Council of Ironfoundry Associations tenders loyal and affectionate felicitations to Her Majesty the Queen upon the occasion of Her Majesty's Coronation. The Council earnestly prays that Her Majesty may long be spared to reign over her peoples throughout the British Commonwealth of Nations, secure in the knowledge of their heartfelt devotion.

THE INSTITUTION OF PRODUCTION ENGINEERS announces the election of Mr. Walter C. Puckey as president for 1953/54. He is widely known throughout the engineering world and in public affairs. He has recently retired from the Ministry of Supply where, as Deputy Controller of Supplies (Aircraft Production), he has spent the past 2½ yrs. Before being invited to join the Ministry in a temporary capacity, Mr. Puckey was a director and general works manager of Hoover, Limited. He is also a director of British Tabulating Machine Company, Limited. The election of Mr. Harold Burke, M.I.MECH.E., as chairman of Council, joint managing director of Concentric Manufacturing Company, Limited, Birmingham, and of Mr. G. Ronald Pryor as vice-chairman, managing director of Edward Pryor & Son, Limited, Sheffield, is also announced.

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

(Delivered unless otherwise stated)

June 3, 1953

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £13 18s.; Birmingham, £13 11s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £16 14s. 6d., 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, £17 0s. 3d.

Scotch Iron.—No. 3 foundry, £16 11s., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £18 3s.; South Zone, £18 5s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £19 3s.; South Zone, £19 5s. 6d.

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 12s.; Scotland (Scotch iron), £16 18s. 6d.; Sheffield, £17 13s.; Birmingham, £17 19s. 6d.; Wales (Welsh iron), £16 18s. 6d.

Basic Pig-iron.—£14 6s. 6d. 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 25s. 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.

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 12s. 6d.; tested, 0.08 to 0.25 per cent. C (100-ton lots), £26 2s. 6d.; hard (0.42 to 0.60 per cent. C), £28; silico-manganese, £33 16s. free-cutting, £28 16s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £32 12s.; case-hardening, £33; silico-manganese, £34 17s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £29 16s.; basic, hard, over 0.41 up to 0.60 per cent. C, £30 16s.; acid, up to 0.25 per cent. C, £33.

Sheet and Tinplate Bars.—£25 11s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £30 6s. 6d.; boiler plates (N.-E. Coast), £31 14s.; floor plates (N.-E. Coast), £31 15s. 6d.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £28 9s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £32 4s. 6d.; flats, 5 in. wide and under, £32 4s. 6d.; hoop and strip, £32 19s. 6d.; black sheets, 17/20 g., £41 6s.; galvanized corrugated sheets, 24 g., £50 13s. 6d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £51 14s. 3d.; nickel-chrome, £73 3s. 6d.; nickel-chrome-molybdenum, £80 18s. 3d.

Tinplates.—57s. 9d. per basis box.

NON-FERROUS METALS

Copper.—Electrolytic, £252; high-grade fire-refined, £251 10s.; fire-refined of not less than 99.7 per cent., £251; ditto, 99.2 per cent., £250 10s.; black hot-rolled wire rods, £261 12s. 6d.

Tin.—Cash, £717 10s. to £720; three months, £715 to £720; settlement, £717 10s.

Zinc.—May, £71 15s. to £72 5s.; August, £71 15s. to £72.

Refined Pig-lead—May, £87 15s. to £88; August, £84 5s. to £84 10s.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £100 10s.; rolled zinc (boiler plates), all English destinations, £98 5s.; zinc oxide (Red Seal), d/d buyers' premises, £99.

Other Metals.—Aluminium, ingots, £161; magnesium, ingots, 2s. 10½d. per lb.; antimony, English, 99 per cent., £225; quicksilver, ex warehouse, £70 5s. to £70 10s. (nom.); nickel, £483.

Brass.—Solid-drawn tubes, 23d. per lb.; rods, drawn, 32⅜d.; sheets to 10 w.g., 255s. 3d. per cwt.; wire, 30½d.; rolled metal, 242s. per cwt.

Copper Tubes, etc.—Solid-drawn tubes, 28⅞d. per lb.; wire, 282s. 9d. per cwt. basis; 20 s.w.g., 311s. 9d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £160 to £218; BS. 1400—LG3—1 (86/7/5/2), £172 to £238; BS. 1400—G1—1 (88/10/2), £254 to £375; Admiralty GM (88/10/2), virgin quality, £254 to £380 per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £275 to £385; L.P.Bl, £215 to £275 per ton.

Phosphor Bronze.—Strip, 368s. per cwt.; sheets to 10 w.g., 389s. 9d. per cwt.; wire, 45½d. per lb.; rods, 40½d.; tubes, 38½d.; chill cast bars: solids 3s. 3d., cored 3s. 4d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 2s. 5¾d. per lb. (7 per cent.) to 3s. 8¾d. (30 per cent.); rolled metal, 3 in. to 9 in. wide × .056, 2s. 11¾d. (7 per cent.) to 4s. 2¾d. (30 per cent.); to 12 in. wide × .056, 3s. to 4s. 3d.; to 25 in. wide × .056, 3s. 2d. to 4s. 5d. Spoon and fork metal, unsheared, 2s. 8¾d. to 3s. 11¾d. Wire, 10 g., in coils, 3s. 6¼d. (10 per cent.) to 4s. 8¾d. (30 per cent.). Special quality turning rod, 10 per cent., 3s. 5¼d.; 15 per cent., 3s. 11¼d.; 18 per cent., 4s. 4d. All prices are net.

Obituary

LORD ABERCONWAY

LORD ABERCONWAY, chairman of John Brown & Company, Limited, Clydebank, died at his home, Bodnant, Tal-y-Cafn (Denbighshire), on May 23, at the age of 74. His family history reveals a bent for leadership. His grandfather, Duncan McLaren, of Glenorchy (Argyllshire), became Lord Provost of Edinburgh and was Liberal M.P. for that city from 1865 to 1881. His father, the first Lord Aberconway, who died in 1934 at the age of 83, passed from a successful career at the Bar to an equally successful career in industry.

The Right Honourable Sir Henry Duncan McLaren, second Baron Aberconway, elder son of the first Lord Aberconway, followed his father in his interests in shipbuilding, engineering, and allied concerns, becoming chairman of John Brown & Company, Limited, and of Thos. Firth & John Brown, Limited. In 1951 he resigned from the chairmanship of the latter company, as a protest against the interference of the Iron and Steel Corporation, which secured the resignation and prevented the re-election of a number of his fellow directors. Asked to continue in office, he declined, saying that without the technical and business knowledge of his colleagues he could be of no use.

He was chairman of English Clays Lovering Pochin & Company, Limited; Firth Brown Tools, Limited; Markham & Company, Limited, mining, mechanical and structural engineers, of Chesterfield; Sheepbridge Company, Limited; Sheepbridge Engineering Company, Limited, until October last, when he resigned but remained a director; Westland Aircraft, Limited; and Wickham, Limited, machine-tool specialists, of Coventry. He was also a director of the National Provincial Bank, Limited, and of London Assurance.

Lord Aberconway became Liberal M.P. for West Staffordshire in 1906, losing his seat in 1910, but succeeded his father in that year as Liberal M.P. for the Bosworth division of Leicestershire until 1922. He was Parliamentary Private Secretary to the Chancellor of the Exchequer from 1908 to 1910. He is succeeded by his eldest son, the Hon. Charles Melville McLaren, vice-chairman of John Brown & Company, Limited, and a director of many of the companies of which his father was chairman.

MR. E. R. DESOUTTER, managing director of Desoutter Bros. (Holdings), Limited, pneumatic and electric tool manufacturers, of London, N.W.9, died on May 11.

MR. GEORGE REEVES SLATER, director of Walker & Hall, Limited, Mellowes & Company, Limited, and the International Linotype Company, has died at Bournemouth at the age of 70.

MR. MARK RADCLIFFE MILNES, who has died at the age of 67, was chairman and managing director of Heywood & Porteus, Limited, hydraulic engineers and ironfounders, of Gomersal, near Leeds.

The death is announced of MR. G. ERNEST WELLS at a Beccles (Suffolk) hospital. Mr. Wells was educated at Wesley College, Sheffield, and in Paris. Much of his working life was at Edgar Allen & Company, Limited, where he became director and foundry manager. As a young man, he assisted Mr. Tropenas in the development of the side-blown Bessemer converter. During the 1914-18 war, he was appointed Director of Steel Castings in the Ministry of Munitions. In later life, he became a director of K & L (Steelfounders & Engineers), Limited, of Letchworth. His French schooling endowed him with an agile mind and a zest for good living, yet the chief and unforgettable trait in his character was the help he invariably accorded to youth, and the present writer must be one amongst many who has cause to be everlastingly grateful to him.

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

FOUNDRY FOREMAN / MANAGER wants position full charge small foundry Midlands; 44; M.I.B.F.; fully practical, rates, costs, sales; not afraid work, responsibility.—Box 3520, FOUNDRY TRADE JOURNAL.

GENERAL / FOUNDRY MANAGER, M.I.B.F., A.M.I.P.E., Inter. B.Sc. (Eng.); 45; greatly interested in position offering prospects, security; life experience High Duty, Grey, Malleable (Whiteheart), Non-ferrous; specialist economic production, administration, sales, costs, commercial; practical foundryman, metallurgist; wide knowledge modern methods, contacts: small foundry Midlands preferred; immediate salary secondary, prove ability salary/results basis.—Box 3521, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER, A.M.I.B.F., desires change; experience in all classes of foundry practice; mechanised, M/c tool, marine engine casting up to 6 tons; rate fixing, costing, estimating; used to being in complete control.—Box 3502, FOUNDRY TRADE JOURNAL.

WANTED: position of Foreman-Manager, ferrous or non-ferrous; take full responsibility of small Foundry; life experience; prospective accommodation.—Box 3503, FOUNDRY TRADE JOURNAL.

PRACTICAL FOUNDRYMAN, thirty years' experience, seeks post with small Foundry; willing to build up foundry if run down; capable of training labour; Managerial qualifications. — Box 3504, 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.

N.W. LONDON. — Non-ferrous Foundry, wishing to expand, requires REPRESENTATION or AGENT (full- or part-time), with good connections and ideas. Lucrative inducements offered to right person. Strict confidence observed.—Box 3519, FOUNDRY TRADE JOURNAL.

REPRESENTATIVE required by well-known bronze foundry, manufacturing all types sand castings, maximum 2 tons. For area London including Home Counties. Salary and commission. Great opportunity for experienced man with live connections among buyers of sand and chill castings. Existing accounts will be handed over and the appointment carries remuneration at present worth four figures per annum. — Write in confidence: Managing Director, CHARLES CARR LTD., Grove Lane, Smethwick, 40, Staffordshire.

SITUATIONS VACANT—*Contd.*

EXPERIENCED WORKING FOREMAN required for Aluminium Gravity Diecastings Department, Lancashire.—RANGEMASTER (BLACKBURN) Co., Blakewater Street, Blackburn, Lancs.

LARGE IRON FOUNDRY, West Birmingham, requires a LABORATORY ASSISTANT. Knowledge of sand control and cast iron analysis preferred, but not essential.—Please state experience and salary expected to Box 3518, FOUNDRY TRADE JOURNAL.

VACANCY for Junior Draughtsman (North London). Age 21 years or over; preferably experienced in design of tools for Gravity Die Castings (Aluminium).—Box 3494, FOUNDRY TRADE JOURNAL.

ALLIED IRONFOUNDERS, LTD., invite applications for the posts of PLANT ENGINEER and PRODUCTION ENGINEER, for their new factory in Melbourne, Australia. The posts carry considerable responsibility and technical training, and Industrial experience in highly mechanised Foundry Maintenance and general Works Planning and Production Control are essential.—Applications to the SECRETARY, Allied Ironfounders, Ltd., 28, Brook Street, London, W.1.

MINE SURVEYOR.—There is a vacancy for a surveyor in a metalliferous mine in the North of England. Candidates should be between 27 and 35 years of age, and must have been educated to School Certificate standard and have a Certificate of Competency in mine surveying. An underground Manager's Certificate is desirable. They should also have had at least three to five years' experience as a Coal Mine Surveyor. Salary will depend on qualifications and experience, and there are good prospects for the right man.—Write, quoting reference number C2, giving full details of qualifications, experience, etc., Box 3516, FOUNDRY TRADE JOURNAL.

BRIGHTON EDUCATION COMMITTEE.

PRESTON TECHNICAL INSTITUTE.
Principal: L. W. PALMER, M.A., B.Sc.

FULL-TIME ASSISTANT TEACHER FOR FOUNDRY THEORY AND PRACTICE required from September next. Ability to assist with Elementary Machine Shop Practice an advantage. Burnham Technical Scale for Assistant (Grade A), £415×£18 to £670, with allowances for training and experience.

Application forms and further particulars from the undersigned. Completed forms to be returned to the Principal, Preston Technical Institute, Coombe Road, Brighton, within 14 days.

W. G. STONE, M.A.,
Director of Education.

Education Office, 54, Old Steine, Brighton.

SITUATIONS VACANT—*Contd.*

FURNACE MAN, experienced, required for light alloy diecasting foundry; Croydon area.—Box 3513, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required for small Iron foundry in West Riding, engaged on Machine Tool castings up to 7 tons. Must be capable administrator and experienced in control of labour.—State age, experience, and salary required to Box 3511, FOUNDRY TRADE JOURNAL.

REQUIRED, by old-established firm, YOUNG TECHNICIAN, qualified as enamelling chemist, but also with some experience of foundry work. Position holds prospect of appointment abroad in administrative capacity.—Apply, in confidence, with full particulars of training and experience, to Box 3515, FOUNDRY TRADE JOURNAL.

ESTIMATOR required for steel foundry. Applicant must have first class knowledge of all aspects of estimating for steel castings and sales office procedure. Persons not possessing these qualifications need not apply. State age, experience and salary expected to Box 3490, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE required by Vitreous Enamel and Ceramic Colouring Oxide Manufacturers. Knowledge of the Enamelling Trade essential. Position superannuated. Applicants should state in confidence: age, their complete experience and salary required.—MAIN ENAMEL MFG. CO. LTD., Gothic Works, Angel Rd., Edmonton, London, N.18.

WANTED: Foundry Metallurgist for large engineering foundry in the Glasgow district. Work covers engineering grades of cast iron and a wide range of gunmetals, complex brasses and nickel alloys. The work calls for a sound knowledge of metals and melting practice coupled with some experience of moulding and moulding materials. Preferred age 25-30.—Box 3507, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST for Modern Mechanised Non-Ferrous Foundry required to take charge of Physical and Chemical Laboratories and maintain high standard of production control at all stages of process. Analytical experience essential. Must be a man with definite initiative and leadership. Excellent prospects, salary according to qualifications and experience.—Box 3510, FOUNDRY TRADE JOURNAL.

AGENCY

WELL-ESTABLISHED Midland Grey Iron Foundry engaged in making light castings, require agent on Commission basis. Reply stating terms, etc., Box 3499. FOUNDRY TRADE JOURNAL.

MACHINERY WANTED

WANTED.—SKLENAR FURNACE, oil fired. 2 to 4 tons capacity brass; in good condition.—Price and details to Box 3514, FOUNDRY TRADE JOURNAL.

VIBRATORY Knockout required. Approximately 3 ft. by 2 ft. 6 in. size. State maximum weight which can be handled.—Box 3512, FOUNDRY TRADE JOURNAL.

WANTED: 4 ft. or 4 ft. 6 in. shell diam. Cupola, also 5 ft. to 6 ft. underdriven Sand Mill.—FRANK SALT & Co., LTD., Station Road, Blackheath, Staffs.

ROTARY MELTING FURNACE, second-hand, oil fired, 2-4 ton copper capacity.—Box 3508, FOUNDRY TRADE JOURNAL.

MACHINERY FOR SALE

OFFERS invited "Wizard" Airless Shot Blast Plant by Constructional Engineers, Ltd., 40 in. by 32 in. Rumbler Type complete with all Electrical Equipment and Dust Extraction Unit. Can be seen working.—ATLAS MALLEABLE & GENERAL IRON WORKS, LTD., Ablewell Street, Walsall.

FOR SALE two half tonner (1952) Jolt Rollover Pneulec Machines, complete with spare Bumping Unit. Write CATTON & COMPANY, LTD., 29, Chadwick Street, Leeds, 10.

RECONDITIONED 750 PNEULEC MOULDING MACHINES for disposal. Contact Works Engineering Department for details.—K. & L. STEELFOUNDERS & ENGINEERS, LIMITED, Letchworth, Herts.

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.
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DELIVERY EX STOCK

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

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BUY FROM US AND SAVE MONEY

MACHINERY FOR SALE—*Contd.*

FOR SALE.

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

MARKLAND SCOWCROFT, LTD.,
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15/10	—	,,	1,460/960	,,	,,	,,	Brook £45
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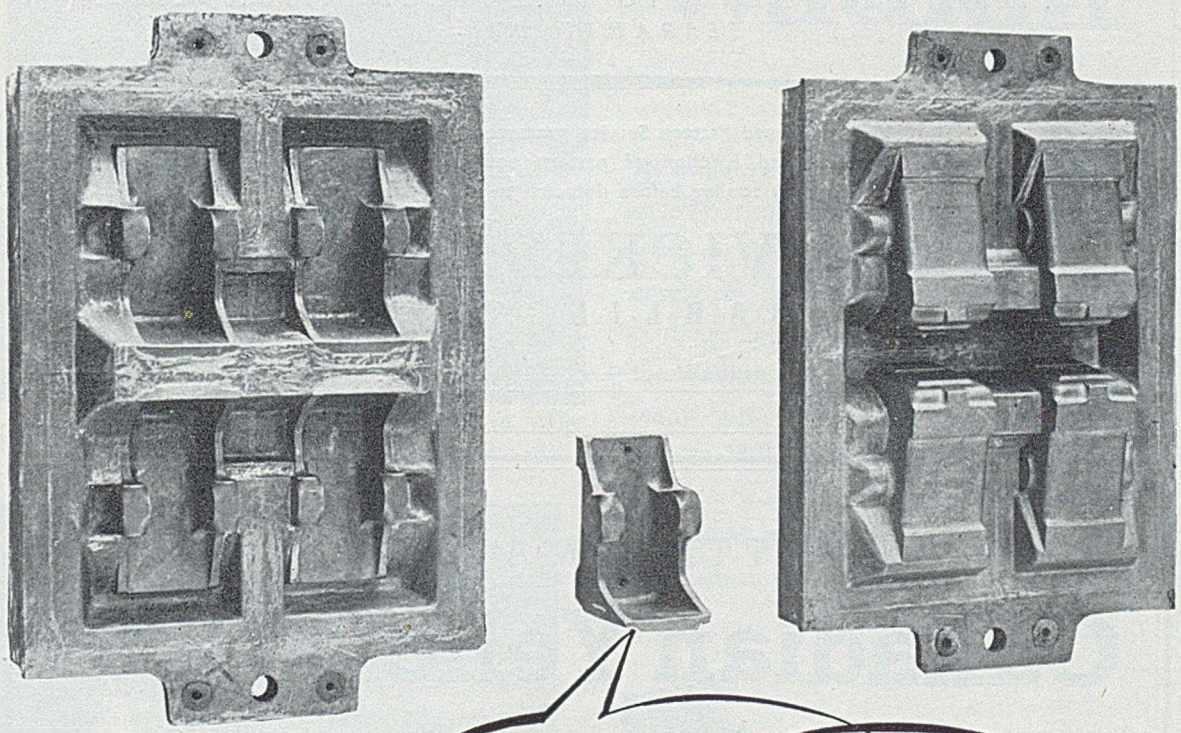

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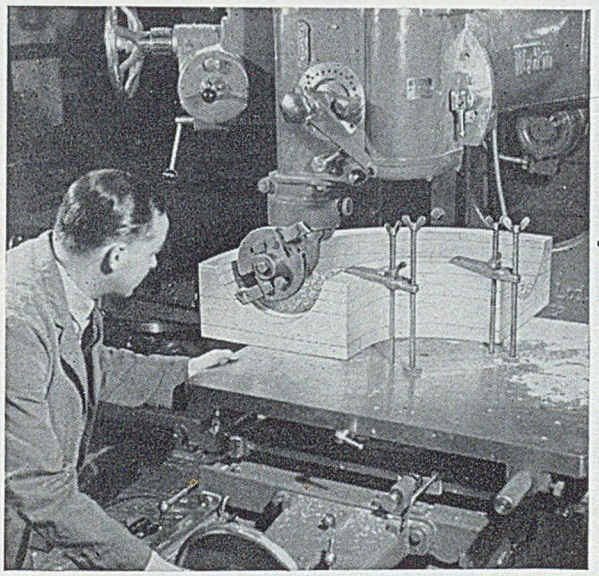
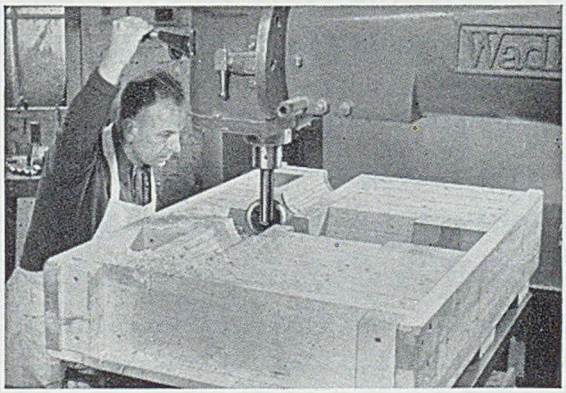


Machining a pipe-bend corebox. Diameters up to 14½ in. can be worked.



Machining a large corebox. 100 hours were saved on this job by the use of the Wadkin.

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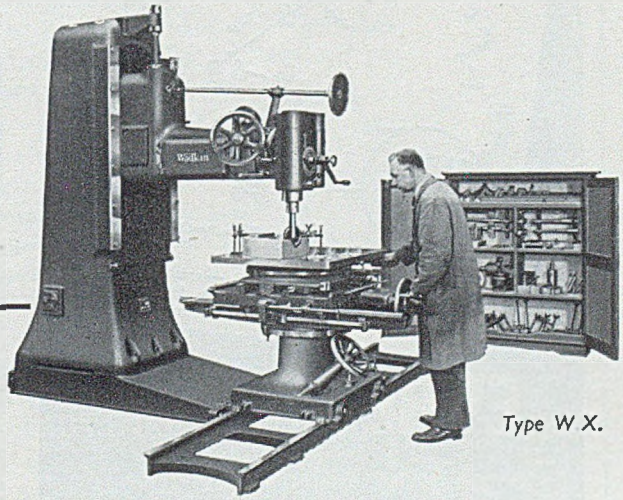

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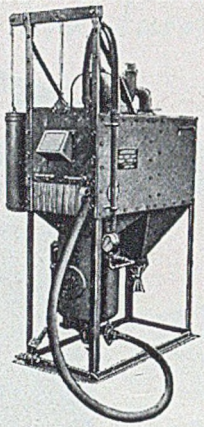

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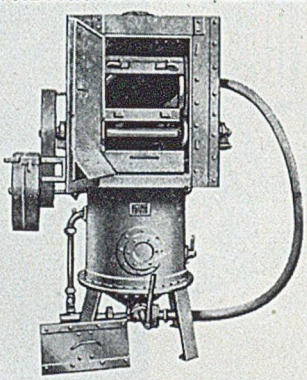

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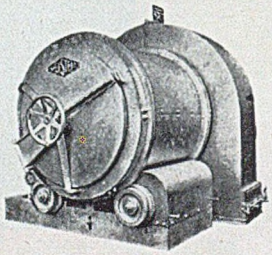

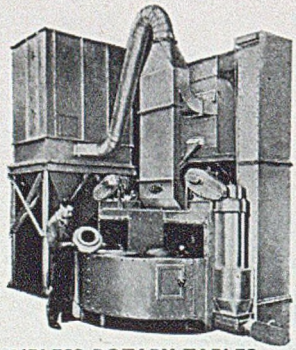

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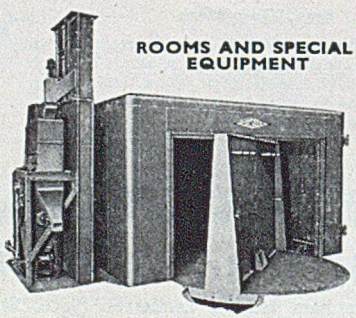

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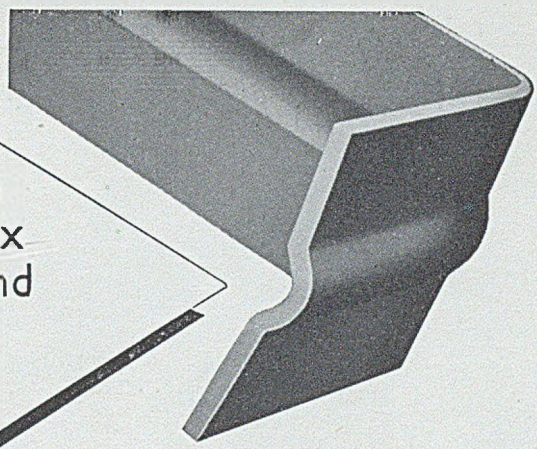

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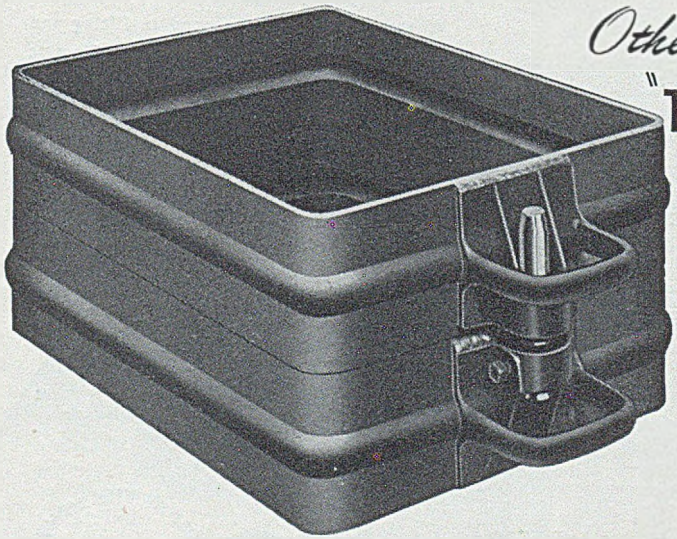

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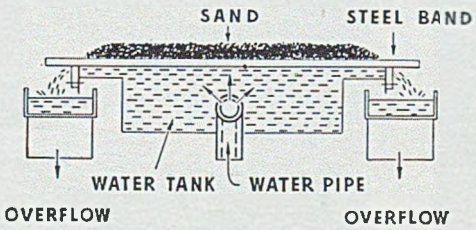

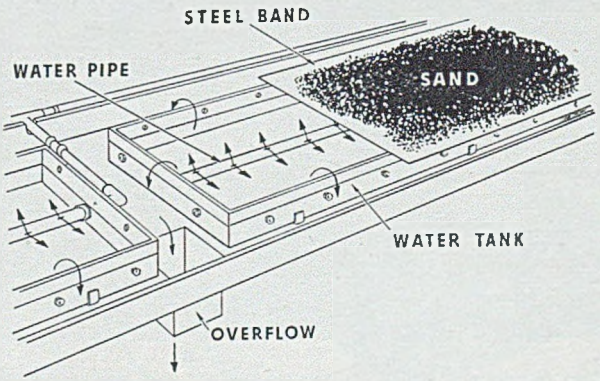

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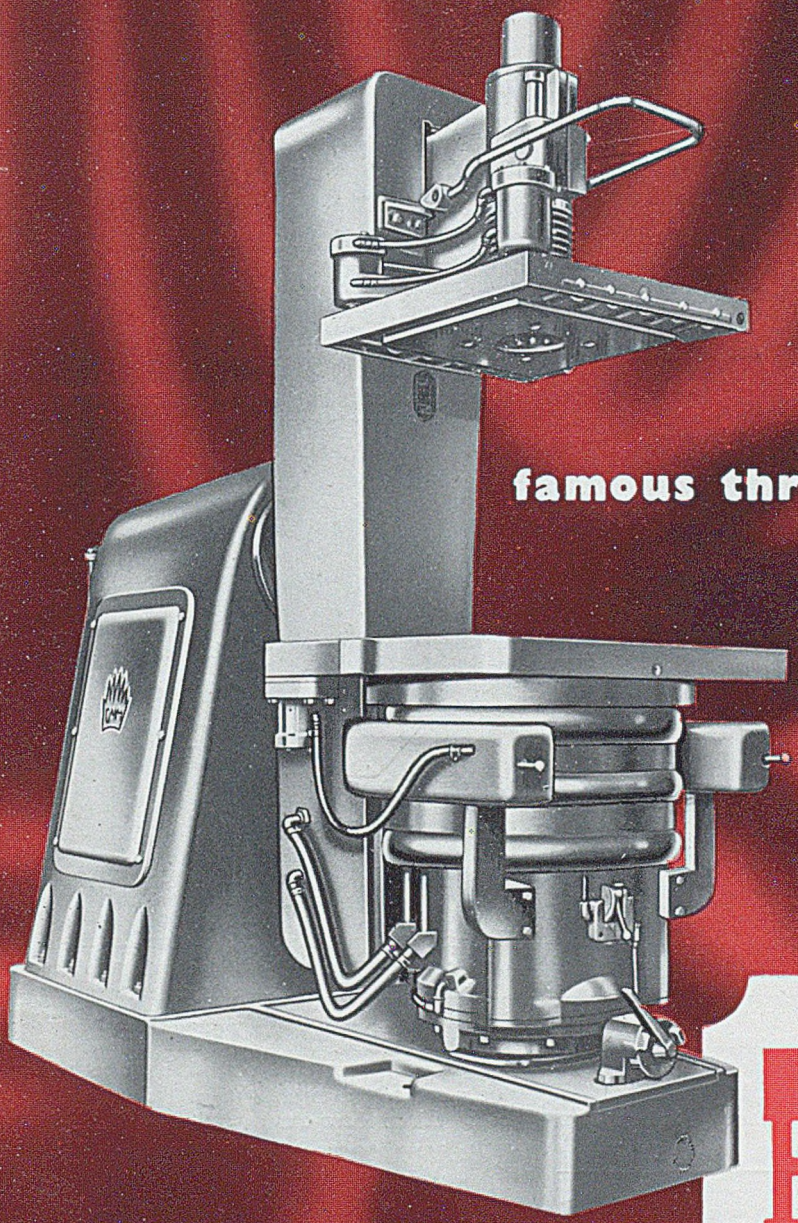

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