FOUNDRY TRADE JOURNAL

EST. 1902

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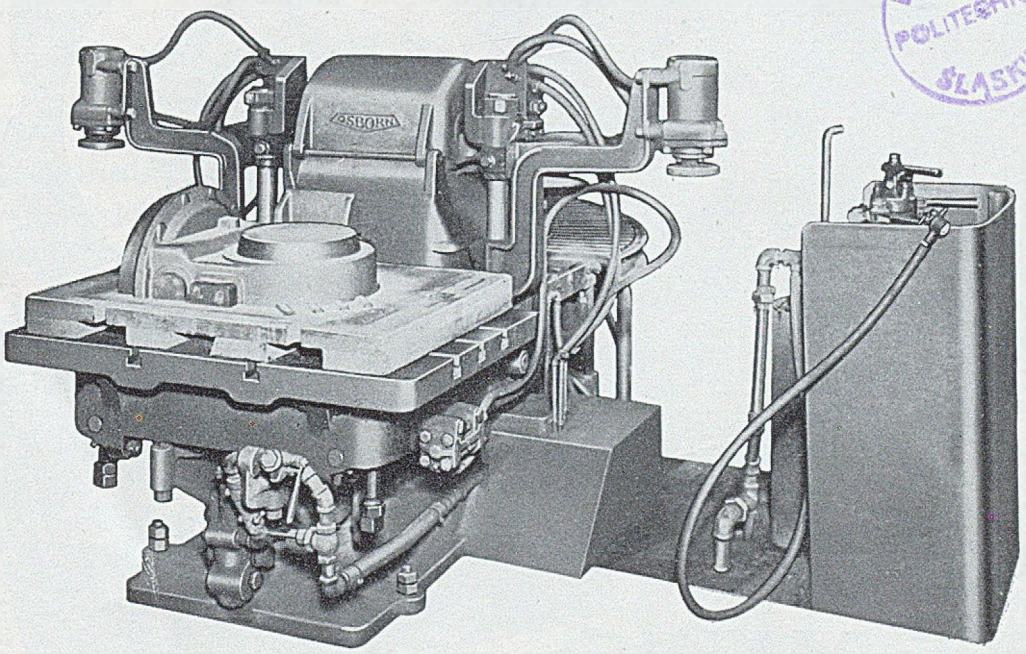
JACKMAN



OSBORN ROCKOVER JOLTER
SIZE 242 W

SPECIAL FEATURES

Pneumatic Clamps, which operate in tandem, to secure box during rockover.

Clamps rest on bottom board laid loosely on back of Mould and hence there is no reduction in box length capacity.

Air lock levelling mechanism to take care of variation in bottom boards.

Conveyor Rollers on levelling mechanism.

Oil controller pattern draw with slow and fast draw.

"T" slots in table for quick pattern change.

J. W. JACKMAN & COMPANY LTD.

VULCAN WORKS, BLACKFRIARS ROAD
MANCHESTER, 3

TELEPHONE: DEANSGATE 4648-9 TELEGRAMS: BLAST, MANCHESTER

A

ELECTRONIC CORE BAKING...

units installed and in production . . .

Electronic Core Baking Sets are now in full operation and have been producing cores on a continuous basis for the past 9 months.

Electronic core baking means production line baking and an end to one of the bottlenecks in the modern foundry. Speed is an important feature of these electronic units which reduce baking time from hours to minutes. A continuous flow of cores—each uniformly baked—emerges ready for immediate use. No green centres; no overbaking—casting surfaces are of improved quality. Less time is required for knock-out.

Model 900A—shown above—processes cores of 3 per cent. moisture content at the rate of 750 lbs. per hour.

Model 1,800A processes cores of 3 per cent. moisture content at the rate of 1,500 lbs. per hour.

METALECTRIC FURNACES LTD.

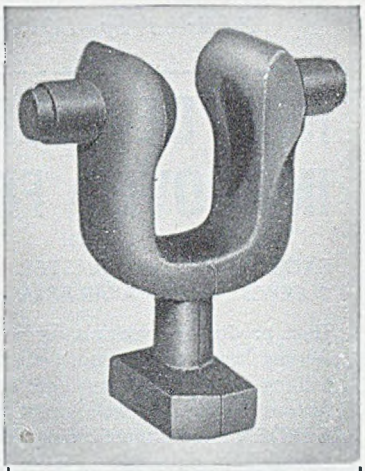
SMETHWICK • ENGLAND

PHONE SMETHWICK 1561 & 2 LONDON OFFICE - 16, GROSVENOR PLACE S.W.1. Phone SLOANE 7803 & 9818

FORDATH'S WORD IS THEIR BOND

—and GLYSO is their word

GLYSO CORE BONDING COMPOUNDS combine a range with characteristics so varied as to meet exactly the requirements of any given job in the core shop. They have been in daily use in foundries large and small for many years.



Careful selection from the Glyso range of binders provides exactly the green and baked strengths required.

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.

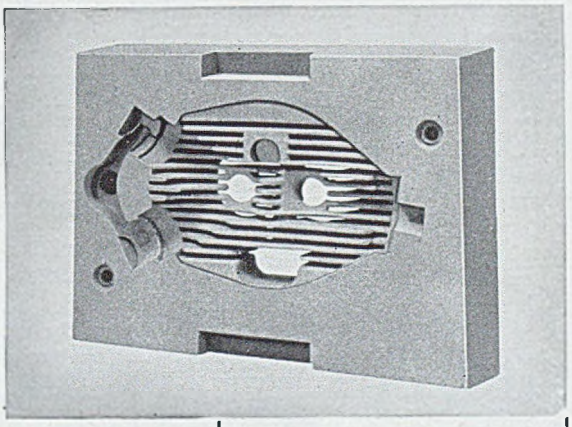
Permol Core Oils are in seven grades, selection being governed by relating dried strength requirements to binder cost. Permol bonded cores have good knock-out after casting.

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.

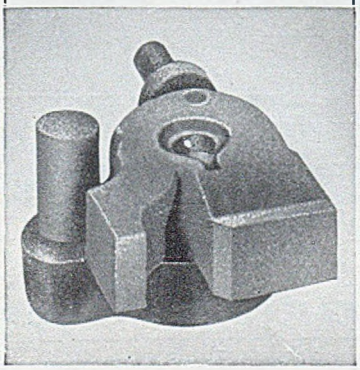
Glyso Resyns. A range of synthetic resin binders for quicker drying of cores by short-period stoving, or by dielectric heating. Excellent knock-out. Enquire also about Glyso Spray Oils, Fordavol, Fordath Parting Powder, Fordath Moulding Sand Regenerator and Fordath Paint Powders.



When Glyso is the bond the core makers skill is seen at its best.

PHOTOGRAPH BY COURTESY OF MESSRS. CENTRAL FOUNDRY CO. LTD.

The confidence with which the core maker uses a Glyso-bonded mix is amply justified in the finished core.



Full details obtainable from

THE FORDATH ENGINEERING CO. LTD.

Hamblet Works, West Bromwich, Staffs.

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

Foseco News Letter

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

NEW DEVELOPMENTS IN IMPROVED FEEDING

EXOTHERMIC & PLASTER SLEEVES NOW AVAILABLE

Heat producing materials for lining feeding heads to give more efficient feeding in both ferrous and non-ferrous castings, are well known and FEEDEX Exothermic Feeding Compound is in daily use in large and small foundries throughout the country.

FEEDEX first supplied in powder form only, can now also be obtained as prefabricated sleeves. They can be had in a range of sizes or made up in your own core boxes.

A more recent development is KALMIN INSULATING PLASTER sleeves which, although not as efficient as FEEDEX sleeves, are recommended for use with certain non-ferrous alloy castings. Such insulating sleeves, usually used with a top 'cover' of FEEDEX, are sometimes preferred where the runner system fills the feeding head with really hot metal.

DUPLICATE PATTERNS EASY TO MAKE

Duplicate patterns help greatly to speed up limited run jobs. They are easy to make in hard-setting PATTREX '100' Pattern Stone Compound. PATTREX '100' powder is mixed with water to a slurry and cast into sand or plaster moulds. Patterns so produced are true to size, remarkably hard and long wearing and have a glass-smooth surface. Complete single or double sided pattern plates for use on moulding machines can also be made. (2)

MODIFICATION—

"Salts" v Sodium Metal

Recent experimental work comes out strongly in favour of the "salts" method of modifying high silicon aluminium alloys. It produces a more gradual modification than sodium metal and there is less chance of hydrogen absorption.
Modifying salts are available in the efficient and easy to use form of MODIFYING COVERAL No. 29A. (3)

NEW ZIRCONIUM LADLE ADDITION

Zirconium in the form of ZIRCELLOY Ladle Addition acts as a graphitiser and desulphuriser for cast iron. It refines the graphite and promotes a more uniform distribution of ferrite. Better castings with improved machinability result. (4)

DEGASSING AND GRAIN REFINING OF NON-FERROUS MELTS WITH LITHIUM

From evidence available, lithium in the form of Deox L Tubes, must be regarded as a most efficient degasser for such copper-nickel alloys as nickel bronze, nickel silver, Monel, etc. It acts also in cleaning from the surface of the melt, the scum formed during deoxidation with magnesium. (5)

STOP PRESS

SEPAROL 'III'

LIQUID PARTING

Further news in later edition.

HELPFUL LITERATURE AVAILABLE

We shall be glad to send you free of charge further information on any of the above subjects. Just mark on this coupon the number corresponding to the paragraph in which you are interested, pin coupon to your letterhead and post to us.
We'll do the rest !

Please send me information on the subjects ringed

1 2 3 4 5

Attach to your letterheading and post to

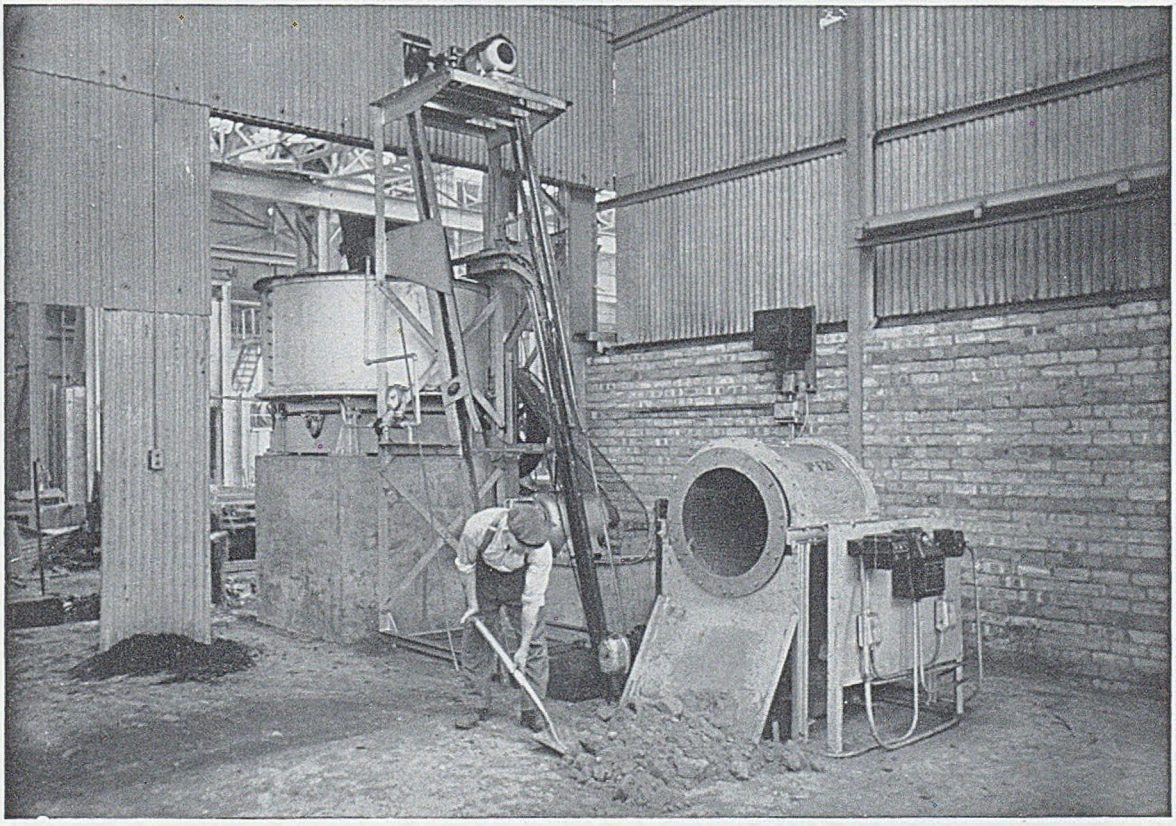
FOUNDRY SERVICES LTD., LONG ACRE, NECHELLS, BIRMINGHAM, 7

No. 1.

L.G.B.

PNEULEC *facing sand plant unit*

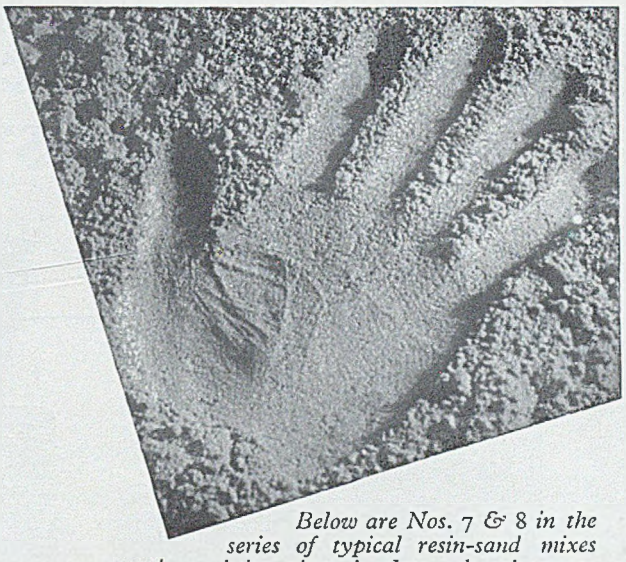
The illustration shows our facing sand plant unit which includes shovel fed rotary screen, collecting belt conveyor, magnetic pulley, loader and 6ft. 0in. diameter mill with disintegrator. The recommended batch capacity of the plant for facing is 6 cwts. and the normal batch cycle 6 minutes. This is 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 looks good!



Below are Nos. 7 & 8 in the series of typical resin-sand mixes being given in these advertisements.

The clear, sharp impressions left in core sand made with THOR are a sure sign of the many outstanding qualities of these core-binding resins.

THOR foundry resins, in fact, meet *all* normal requirements and give in addition numerous advantages. Thus they are enabling the many foundries where they are now in regular use to produce cores better, faster and cheaper than ever before.

These foundries appreciate, too, the service provided by THOR Technical Representatives and the THOR Sand Laboratory. Practical demonstrations (without any interference with normal production), on-the-spot advice and assistance in developing resin-sand mixes to suit special and individual requirements are all part of the service. It is free and available to all.

MIX No. 7

Somerford Silica Sand (clay-free)	100	lbs.
Liquid P/F resin (THOR SB-109)	2.0	,,
Green Bond	1.0	p.s.i.
Dry Tensile	200	p.s.i.

MIX No. 8

Congleton Silica Sand	90	lbs.
Bromsgrove Red Sand	10	,,
Dextrine	1.5	,,
Water	1.0	,,
Liquid P/F resin (THOR SB-109)	1.0	,,
THOR Parting 203	0.125	,,
Final Moisture Content	1.5%	
Green Bond	2.0	p.s.i.
Dry Tensile	220	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

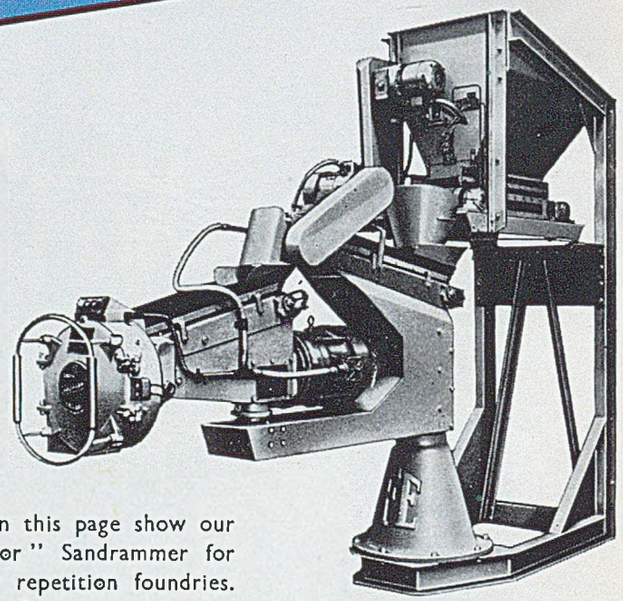
LEICESTER, LOVELL & CO. LTD.

NORTH BADDESLEY, SOUTHAMPTON. TELEPHONE: ROWNHAMS 363

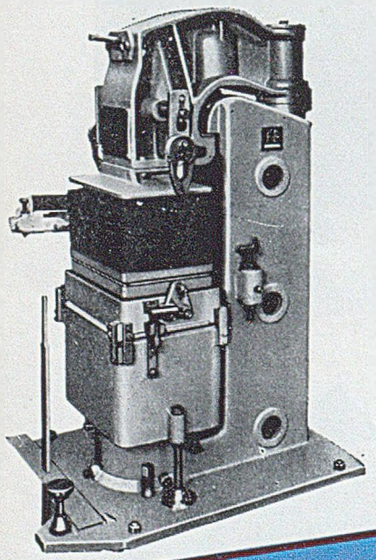
FE
for
Foundry Efficiency
TRADE MARK

APRIL 27TH CASTLE BROMWICH BRITISH

This year we have 1,400 sq. ft. of space packed with new and improved machines to aid foundrymen throughout the world. We shall give practical working demonstrations of the machines illustrated, together with many other items of equipment. Our Representatives will be in attendance to give you every possible service.



"JUNIOR" SANDRAMMER



B.1. MOULDING MACHINE

The illustrations on this page show our well-known "Junior" Sandrammer for use in jobbing or repetition foundries. This is one example of our extensive range of Sandrammers. The machine on the left is our famous B.1 Hydraulic Boxless High Speed Moulding Machine now available, for the first time, with Independent Oil Hydro-Electric Pump Unit, dispensing with expensive large pumps and accumulators and long pipe lines. Visitors will also be able to see our F.E.2 Hydraulic Under Sand Frame Moulding Machine operated, for the first time, with a similar compact unit.

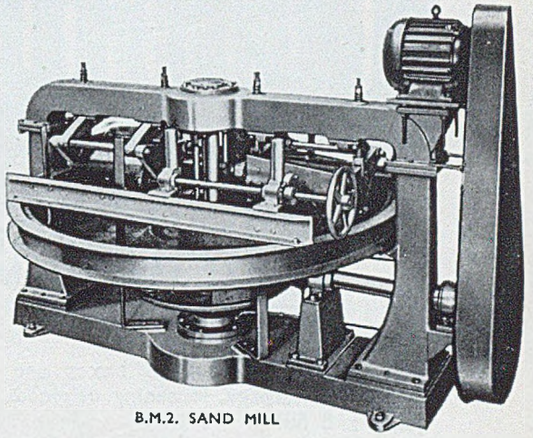
STAND

FOUNDRY EQUIPMENT LTD.

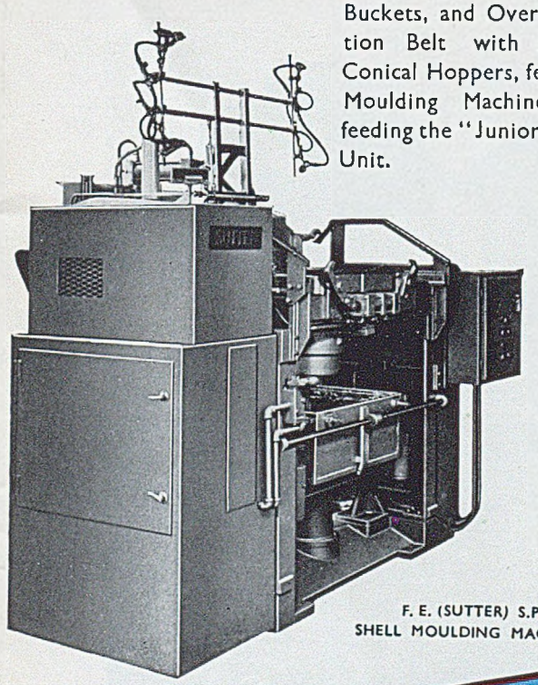
Telephone: LEIGHTON BUZZARD 2206-7-8 Telegrams: "EQUIPMENT" LEIGHTON BUZZARD

MAY 8TH BIRMINGHAM INDUSTRIES FAIR

The B.M.2 Sand Mill needs no introduction, and this will be seen in operation together with the Electro-Vibratory Screen, Feeder Belt with Magnetic Pulley, Vertical Elevator fitted with our latest self-cleaning and clearing Stripper Buckets, and Overhead Distribution Belt with spring loaded Conical Hoppers, feeding our two Moulding Machines, and also feeding the "Junior" Sandrammer Unit.



B.M.2. SAND MILL



F. E. (SUTTER) S.P. 1000
SHELL MOULDING MACHINE

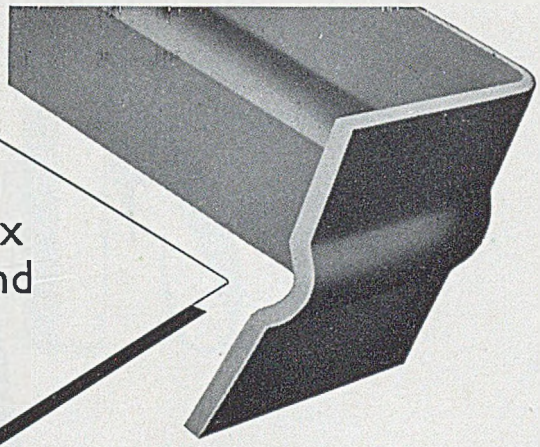
For the first time in Europe, foundrymen will be able to see a British made F.E. (Sutter) Shell Moulding Machine producing complete shells in automatic cycles. The latest design of Resin Sand Mixer will be shown in conjunction with this machine. We have already announced our appointment as sole manufacturers and distributors for the whole of Western Europe and other territories for all machines previously manufactured and sold only by Sutter Products Company of Dearborn, Michigan, U.S.A.

No. D.301/200

SUTTER

LINSLADE WORKS,
LEIGHTON BUZZARD, BEDFORDSHIRE

PATENTS GRANTED, PENDING OR APPLIED FOR IN ALL INDUSTRIAL COUNTRIES, COVERING ALL MACHINERY ON OUR STAND

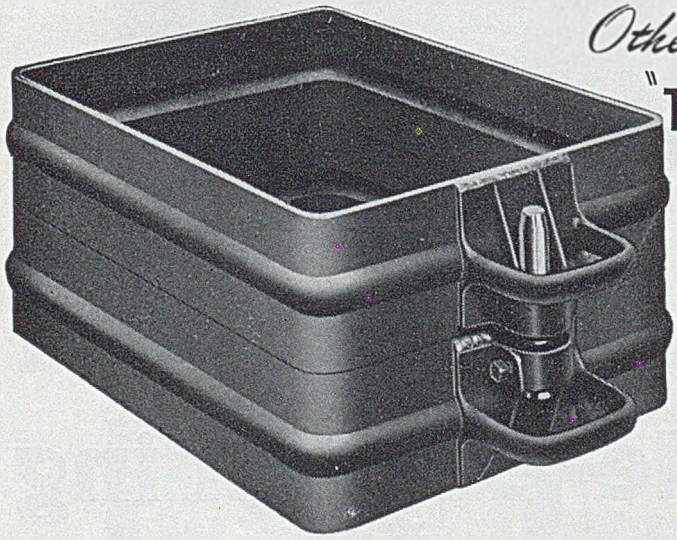


This special corrugated section of the "Talbard" Moulding Box affords strength, lightness and rigidity *with*

MAXIMUM SAND RETENTION

Talbard Moulding Boxes are precision manufactured from rolled steel of special analysis and are available in a full range of sizes from 8in. by 6in. to 48in. by 30in.

These boxes are standardised for interchangeability of moulding-box equipment but special boxes can be made for individual requirements.



Other special features of

"TALBARD" Moulding Boxes

- Cast malleable lugs and fittings
- Accurately ground box faces
- Precision ground pins adjustable for length
- Full range of loose pin and multi part boxes
- Accurate pin centres and guaranteed interchangeability
- Renewable steel bushes, round or elongated
- Straight lifting handles optional
- Special brassfounders boxes
- Range of bars, clamps, etc., as required
- Specially finished and packed for export

E. TALLIS & SONS LIMITED

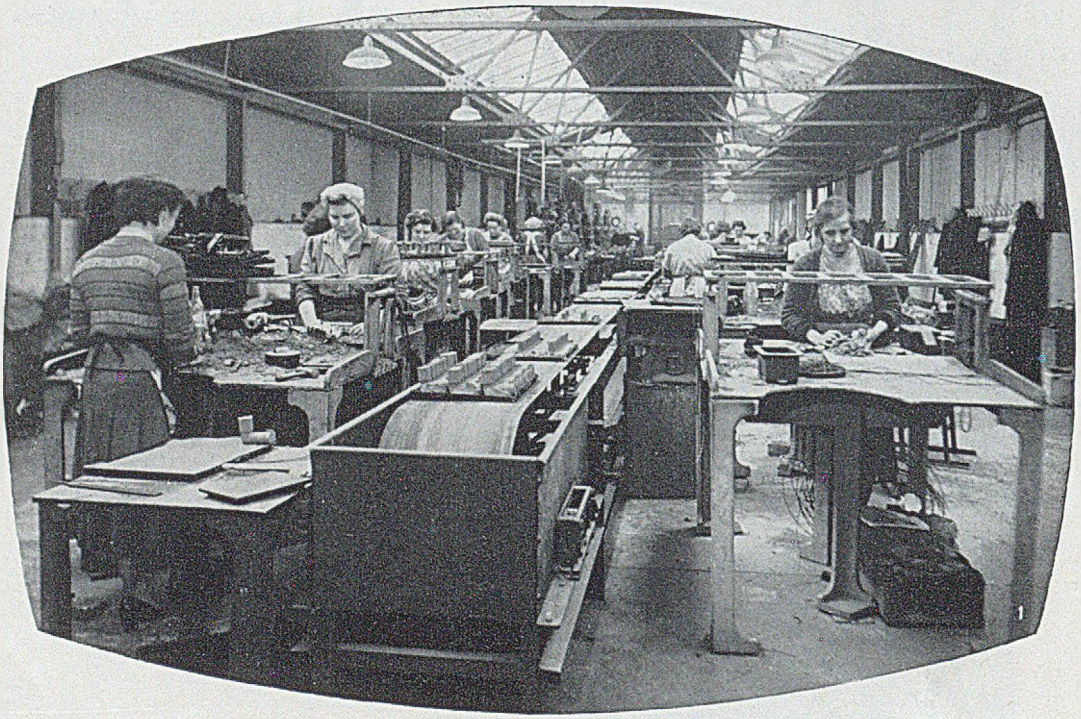
TALBARD WORKS, CHARLES HENRY STREET, BIRMINGHAM 12

(Phone : MIDland 4387 and VICtoria 2072)

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

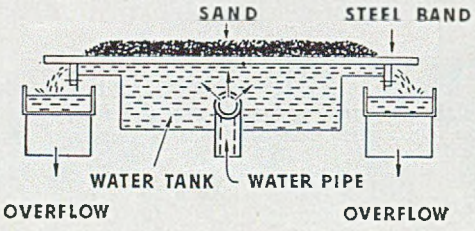
C

MODERNISE YOUR CORE SHOP . . .

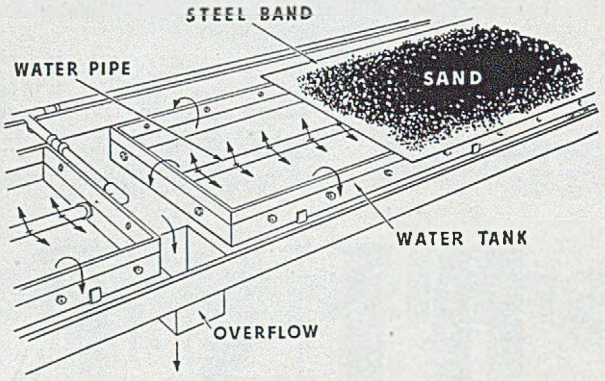


This photograph shows one of our many conveyors conveying cores from the benches to the drying stove.

WITH STEEL BAND CONVEYORS



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



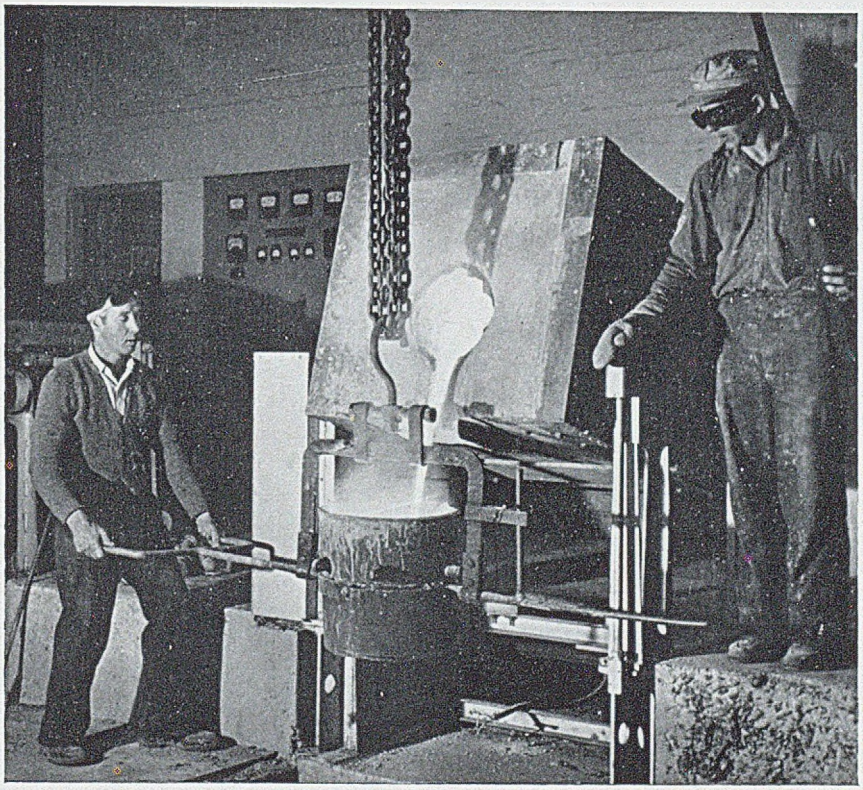
SSBC

SANDVIK STEEL BAND CONVEYORS LTD

DAWLISH ROAD, SELLY OAK, BIRMINGHAM, 29

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

How to increase the life of your furnace linings



Pouring metal from an Allis Chalmers high frequency furnace with Silester bonded lining at the works of Messrs. J. P. McKellar (Alloys) Ltd., Craigton Industrial Estate, Glasgow, S.W.3.

Monsanto's ethyl silicates, Silester A and Silester O, are widely used as the bonding agent in cast refractories for lining arc furnaces and high temperature ovens, in rammed monolithic linings for high frequency furnaces, and in washes for furnace linings.

These Monsanto chemicals make possible the casting of intricate shapes from fillers such as finely graded alumina, sircon, sillimanite and silicon carbide, and are particularly suitable for casting ceramic shapes for retaining electrical elements.

Write now for full information.

SILESTER O *Ethyl silicate*
SILESTER A *Amine modified ethyl silicate*

MONSANTO CHEMICALS LIMITED,
Victoria Station House, Victoria Street, London, S.W.1.

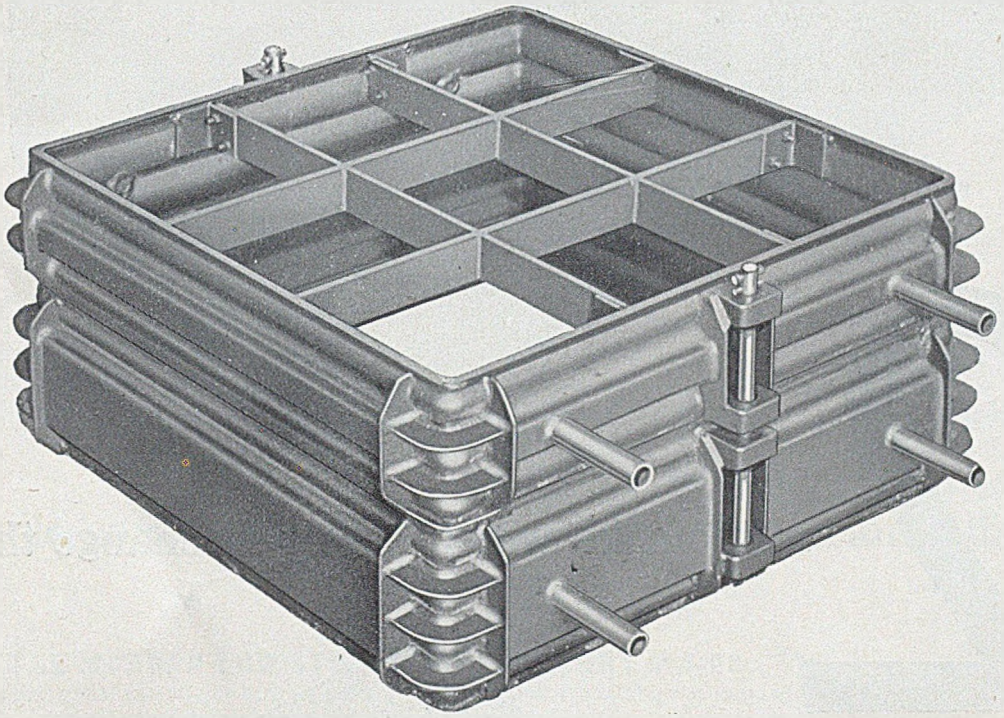
In association with: Monsanto Chemical Company, St. Louis, U.S.A. Monsanto Canada Ltd., Montreal. Monsanto Chemicals (Australia) Ltd., Melbourne. Monsanto Chemicals of India Ltd., Bombay. Representatives in the world's principal cities

MONSANTO

D

PAGET

Standard Heavy Duty Steel Moulding Boxes



- Fixed or loose pins, single or double lugs, as required.
- Fixed pin mounting easily removable, leaving lugs ready for loose pins without extra drilling or bushing.
- All pins ground, to avoid damage by scoring or burring.

Strength, Lightness and Rigidity all combine in the " Paget " Standard Heavy Duty Steel Moulding Box.

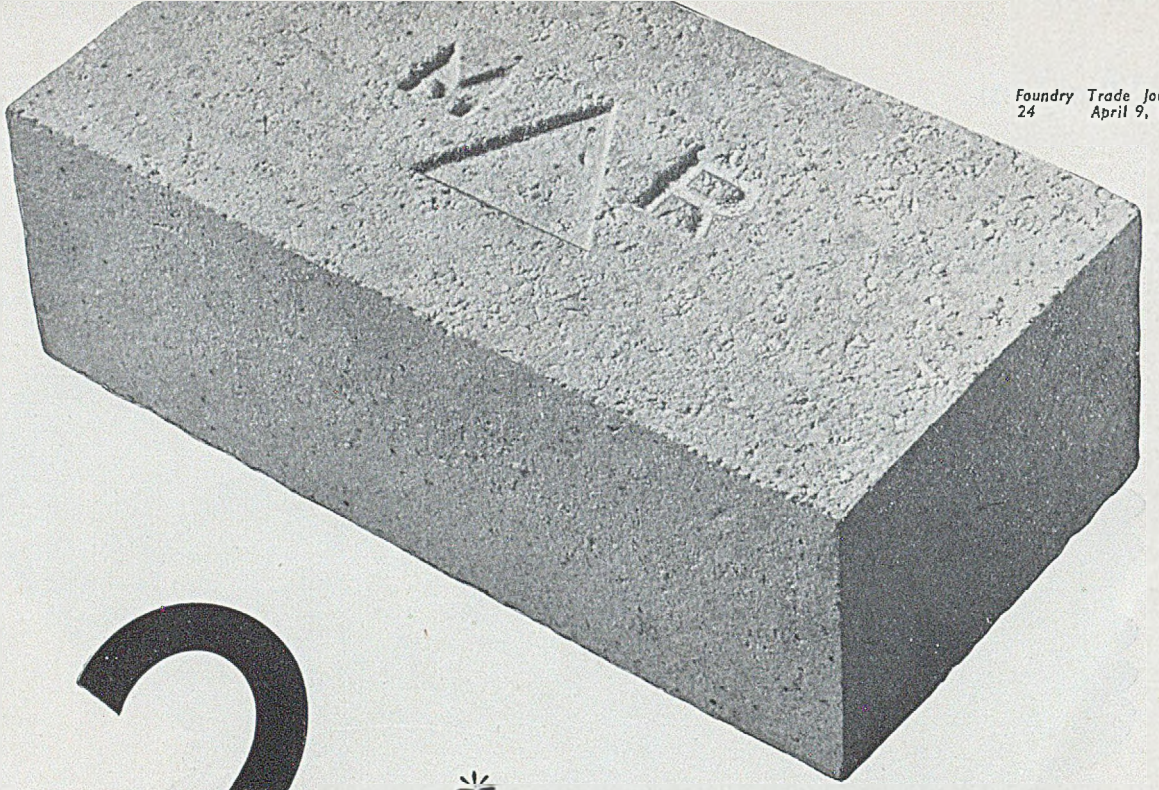
Ranging in sizes from 20in. sq. to 42in. sq. and based on the well-known " Paget " Swaged Section, the walls are reinforced with pressed channel, and corners strengthened by means of special gussets.

This type of Box has already proved satisfactory in many Foundries both Jobbing and Mechanised.

THE PAGET ENGINEERING CO. (LONDON) LTD

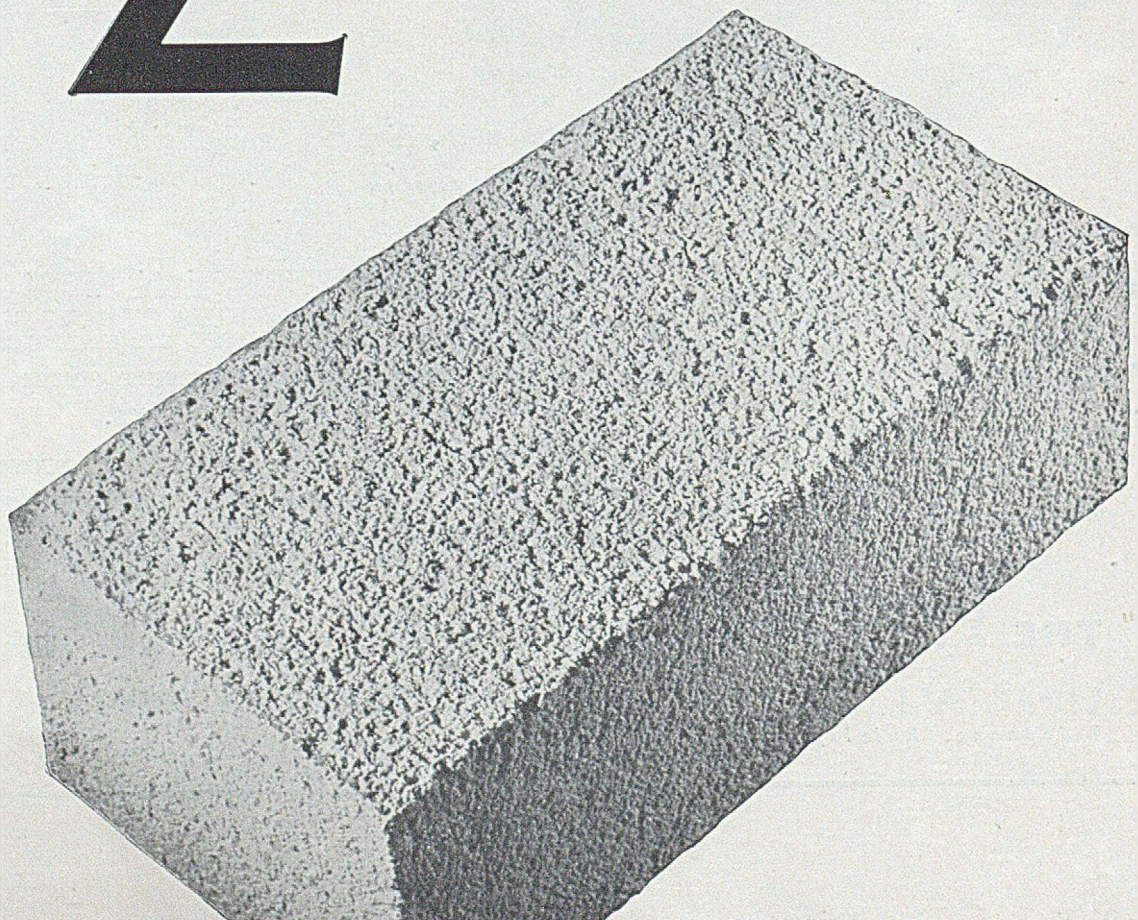
BRAINTREE ROAD · SOUTH RUISLIP · MIDDLESEX

Telephone: Ruislip 6011 *Telegrams: Paget, Ruislip*



2

refractories which may well change the



Foundry Trade Journal
April 9, 1953 25

* THE MORGAN M.R.1

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

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

TYPICAL PROPERTIES OF M.R.1

Approximate Chemical Analysis		
Silica	(SiO_2)	52/53%
Alumina	(Al_2O_3)	43/44%
Iron Oxide	(Fe_2O_3)	less than 1%
Titanium Oxide	(TiO_2)	less than 1%
Magnesia	(MgO)	less than 2%
Lime	(CaO)	
Potash	(K_2O)	
Soda	(Na_2O)	

Physical Characteristics	
Refractoriness ...	Cone 35 (1770°C)
Refractoriness under load (25 lb./sq.in.)	
Commencement of subsidence	1600°C
10% subsidence	1700°C
Bulk density ...	132-137 lb./cu.ft.
After-contraction (2 hrs. 1600°C) ..	less than 1.0%
Thermal expansion ..	4/5 x 10^{-6} per °C.

whole conception of furnace maintenance and efficiency

* THE MORGAN LOW STORAGE REFRACTORY M.I.28

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

At these temperatures it has a lower conductivity than any other type of refractory and therefore provides a greater reduction in the losses from the outside of the furnace. But that is less than half the story. The M.I.28 is only one-third the weight of an ordinary refractory and consequently would require only a third of the heat to raise it to the same average temperature. But, with the same furnace temperature, the average temperature of an M.I.28 is much lower (owing to its lower conductivity), and this still further reduces the amount of heat it takes up. With the same heat input, therefore, furnaces built from M.I.28 bricks heat up rapidly. On batch furnaces the bricks can double the furnace output—to say nothing of the saving in fuel. There have been hot-face refractories before. What is new about the M.I.28, then? In theory nothing. . . . but in manufacture Morgans have put the whole of the theory into practice. The bricks are made on entirely new plant with scrupulous attention to detail and rigorous quality control from the purification of the clay to the final grinding to size. As in the case of the M.R.1., bricks of this quality have been available for some years in the U.S.A., and the improvements they can make in furnace efficiency have been firmly established.

TYPICAL PROPERTIES OF M.I.28

Maximum Service Temperature		1538°C (2800°F)
Thermal Conductivity'		
Mean Temperature	538°C(1000°F)	2.4 B.Th.U/hr.(sq.ft.)(in.)(°F)
	816°C(1500°F)	2.9 B.Th.U/hr.(sq.ft.)(in.)(°F)
Bulk Density		47.5 lb./cubic ft.
Refractoriness		1710°C (3110°F)
Modulus of Rupture		greater than 120 lb./sq.in.
Heat Capacity Factor		0.105
(the ratio of the heat stored in a M.I.28 furnace wall relative to that stored in a firebrick wall of the same area, and of a thickness giving similar hot and cold face temperatures)		

MORGAN refractories ARE WORTH FAR MORE THAN THEY COST

THE MORGAN CRUCIBLE COMPANY LTD.
Battersea Church Road, London, S.W.11. Tel: Battersea 6822

INDEX TO ADVERTISERS

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

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

INSTITUTE OF BRITISH FOUNDRYMEN

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

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PRINCIPAL CONTENTS

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Factory Report for 1951

This newly issued Report* carries about four and a half pages devoted to accidents in foundries. Unfortunately, whilst fatal accidents in foundries, at 22, were lower by two than in 1950, the non-fatal accidents during the year rose to 293 to 11,033. This is very disturbing, as there was a continuous reduction ever since 1948 until 1951. The period, however, saw a much higher number employed in foundries. This increase in accident rate was largely reflected under four headings.—from liquid metal 119; handling goods 102; lifting machinery 63 and falling bodies 62. The Chief Inspector says that a piece-work moulder, even when assisted by a labourer, lifts during a normal day's work about 18 tons and the figure is distinctly higher than for other types of factories. There is a recommendation to use aluminium moulding boxes because it reduces the total lift by 25 per cent. By attention to design, the objections as to lack of strength in light-alloy boxes have been overcome by some managements.

The Report calls attention to the large number of foot accidents which could be overcome by the wearing of safety boots and spats and deplores the lack of enthusiasm by the older workers. Seventy per cent. of the burning accidents from liquid metal were foot injuries. Obsolete cranes and the overloading of cranes have also been criticized, as also were sand-mixing machines not provided with lids carrying an interlocking device to prevent men from putting in their hands whilst the machine is running. Jar-squeeze-turnover machines also cause accidents, but no fool-proof cure for a type of accident reported (crushed hand) has been found. A second fatal accident (head injury) occurred during the cleaning down of the machine. The proportion of eye accidents is also higher for foundries than for most industries and actually accounts for no fewer than 8 per cent. Here, the Chief Inspector says that he is "unable to understand why workers are so ready to take the risk of total blindness." He does not subscribe to the view that all goggles and shields are uncomfortable.

After many years of virtual immunity, there have been four cases of lead poisoning in the vitreous-enamelling trade. Now, the factory concerned has changed over to using a lead-less enamel. Only three fatalities due to silicosis from "sandblasting" (surely this word should be changed to "shot-blasting," unless some other industries still use sand?) were reported—the lowest ever recorded—and steel dressing, too, at six fatalities from this cause, was lower than for many years. Finally, there is the usual toll of accidents due to horse-play and for these, beyond providing the lads with nursemaids, there is no remedy.

* Annual Report of the Chief Inspector of Factories for 1951. Published by H.M. Stationery Office, Price 6s. 6d. net.

Fifth Foremen's Training Course

Over 170 registrations are reported for the fifth Foremen's Training Course organized by the Institute of British Foundrymen for April 23 to 25 at Ashorne Hill, Leamington Spa.

Registration and a technical film display occupy the evening of arrival at Ashorne Hill and the programme really begins on the Friday morning at 9.15 with an address by Dr. C. J. Dadswell, B.SC.(ENG.), M.I.MECH.E., INGENIEUR E.S.F. (president of the Institute). This is to be followed at 9.30 by "The Place of the Foreman in Management," by S. Leetch (works controller, Hadfields, Limited) and at 11.10 a.m. by "Producing Castings for the Buyers'-Market," by J. Blakiston (consulting foundry engineer). After the luncheon interval, "Problems of the Small Jobbing Foundry Foreman," by H. Stone (manager, John Hall & Son (Oldham) Limited), will be given and after dinner, at 8.30 p.m., discussion groups will be organized. These will consider "Producing Castings for the Buyers' Market"; "Problems of the Small Jobbing Foundry Foreman" and "The Place of the Foreman in Management." Saturday's programme begins at 9.30 a.m. with "The Foreman's Part in the Training of Apprentices," by H. Parkin (education and training officer, English Steel Corporation, Limited), and also before luncheon "Methods of Controlling Quality," by D. Killingworth, A.I.M. (foundry technical staff, Ruston & Hornsby, Limited). At the final session at 2 p.m. on Saturday afternoon a paper "Heavy Castings for Power Hammers," will be given by W. S. Spenceley (foundry manager, Joseph Berry, Limited).

Following the presentation of each paper, there will be an opportunity for general discussion. A booklet to be distributed among those participating contains a synopsis of all the contributions.

Association of Bronze and Brass Founders

The January-March Bulletin of the Association of Bronze and Brass Founders reports that its technical committee has been engaged upon the revision of B.S. 1400:1948; the specification of various types of alloys made by members, for most of which little justification could be seen. The standardization of inspection procedures has been handed over to the Ministry of Supply and the Admiralty for consideration. It was suggested that creep tests on gunmetals and the rapid determination of the constituents of copper-base alloys were suitable subjects for research. Congratulations were extended to Mr. H. A. Cruse and Mr. F. G. Burrell on their inclusion in New Year's Honours list.

Finally, there is some interesting correspondence on flexible cut-off wheels, in which the supplies being used in this country are reported as free from unpleasant odours.

Dinner

I.B.F. SCOTTISH BRANCH

The annual function of the Scottish branch of the Institute of British Foundrymen was held recently at the Grosvenor Restaurant, Glasgow. Mr. A. J. Black presided and at the high table were:—Bailie Arthur G. Murray; Dr. C. J. Dadswell; Mr. G. M. Menzies; Professor A. W. Scott; Dr. H. T. Angus; and Mr. T. Makemson, M.B.E. This successful function was, as usual, organized by Mr. John Bell, the honorary secretary.

Committee on Duty-free Entry of Machinery

The committee on duty-free entry of machinery held its first meeting on April 2. The committee will welcome evidence in writing from interested persons or organizations. Letters or memoranda should be addressed to the Joint Secretaries, Board of Trade, Room 3135, Horse Guards Avenue, London, S.W.1, and should be submitted before May 15. It is requested that individuals or organizations intending to submit such evidence should inform the joint secretaries to that effect at once.

Those intending to offer evidence should bear in mind the terms of reference of the committee which are:—"To consider and report whether it is in the national interest to provide for the duty-free admission into the United Kingdom of machinery, either by classes or in individual consignments; and, in this connection, to review the provisions of Section 10 of the Finance Act, 1932, and their administration, and to recommend what, if any, changes should be made."

Pitch in Moulding Sands

Mr. Av Olof Carlsson, writing in *Gjuteriet*, has made the following *resumé* of an article on the use of pitch in moulding sands.

"The use of pelleted foundry pitch in moulding sands has been investigated. When casting small or medium-size castings in green-sand moulds, smooth surfaces were obtained with 2 per cent. pitch in the sand. When using coal-dust, a content of 5 per cent. was needed to obtain the same result. If the moulding sand is used repeatedly, an addition of pitch must be made after each cycle of operation. This addition is only half as large as that needed when using coal-dust. The effect of pitch and coal-dust on the properties of moulding sands at different moisture contents have been studied. By using pitch in dry-sand work, stronger moulds are obtained and the risk of mould cracks in drying is reduced."

Belgian Iron and Steel Meeting

The Liège section of the Centre National de Recherches Métallurgiques (C.N.R.M.) is organizing, with the collaboration of the Société Française de Métallurgie, the Verein Deutscher Eisenhüttenleute and the Iron and Steel Institute, an international meeting in Liège, on May 7 to 9, to discuss low-shaft furnaces and blowing of steelmaking converters.

There will be works visits to S. A. Espérance-Longdoz; S. A. John Cockerill and S. A. d'Ougrée-Marihaye, and also a visit to the low-shaft furnace pilot plant. This meeting is being held in the University of Liège during the period of the Liège International Fair, which is open from April 25 to May 10.

International Committee of Foundry Technical Associations. The officers for the year 1953 are:—president, Mr. Shannon (U.S.A.); vice-president, Mr. A. Brizon (France) and honorary secretary, Mr. T. Makemson, M.B.E.

Calendars Received. We acknowledge with thanks the receipt of a very useful calendar carrying a picture of Her Majesty the Queen from Metropolitan-Vickers and also one from the Eyre Smelting Company, Limited, decorated with charming pictures of Westminster Abbey, the changing of the guard, and other similar scenes.

Developments in Steel Castings in the Heavy Power Plant Industry*

By F. Buckley, B.Sc.

Though the application of steel castings in the field of the prime-mover is selected as a basis for treatment, the opportunity is first taken of mentioning developments inside the foundry that appertain to manufacture and inspection. The trend towards more-stringent service conditions has augmented the responsibility of the foundry for the production of castings free from defects. There are indications that the designer and user of castings can with advantage pursue and develop the tendency to break down designs into relatively simple constructions that can be fabricated together at a later stage, and examples of this type of construction are given. Where this trend is impracticable, a strong case can be made for the concentration of allied types of work in relatively few foundries. Mention is made of the trend of research as applied to steel castings, and the lasting importance of methods departments is stressed.

Introduction

This Paper, in addition to containing a brief outline of developments in the science of foundry production and practice, is primarily concerned with trends in the application of castings within the heavy engineering industry. To narrow the field of review, whilst still retaining a representative cross-section, a choice has been made of the steel casting problems encountered in the manufacture of heavy prime-movers and power generators.

Among the prime-movers, the application of the cast form ranges from the high-pressure castings, cylinders, and valve bodies, of the steam turbine to the impulse and reaction-type runners employed in hydraulic practice. The choice of manufacture is dictated by considerations of shape; the necessary complexity of steam passages, for example, or the streamlining of runner blades—alternative methods of manufacture being largely prohibited by cost considerations. In addition, steel castings are extensively employed in traction engineering as bogey frames, motor frames, armature hubs, etc., on account of their excellent resistance to the considerable shock stresses experienced in service.

All these branches of engineering have been subjected to most extensive development within the last decade. The trend towards higher efficiencies can have no better example than the modern steam turbine, which is now operating at steam inlet temperatures of 566 deg. C. (1,050 deg. F.) and 1,500-lb. per sq. in. pressure, with the possibilities of even higher conditions in the near future. Developments of this type necessarily place heavier demands on the component parts, and dictate higher standards of inspection; hence, in the latter respect we have witnessed the initiation and rapid adoption of new methods, including those associated with non-destructive testing.

In addition, there has been extensive work of a fundamental character, and much of a more practical nature, devoted to all phases of the solidification of steel castings. The prime purpose of this work has been the avoidance of the many troubles associated with the decrease in volume that occurs as the molten material cools from the casting temperature and on solidification. Since the resultant troubles from this phenomenon increase as the complexity of the design increases, it is not surprising that the design of castings of the highest duty is moving towards less complicated structures, incorporating in many instances a composite cast and welded construction.

In the latter instance, components which would add to the complexity of the moulding technique are now cast or produced separately, being subsequently welded into a composite whole.

Though a universal interest is naturally exhibited in the many new techniques and the new equipment that have been evolved to increase the productivity of the steel foundries, the trends towards improved quality as a result of more exacting service duties are of equal if not greater importance, and these will be the ones to receive most attention in this paper.

The assembly of the components of a very large machine over a period of months, necessitating a co-ordination of finished parts to a rigid time schedule, can be completely disorganized by rectification and possible rejections at a late stage in manufacture; and no article is more liable to give trouble in this respect than a steel casting. It is natural and desirable, therefore, that the designer and user of steel castings should be fully conversant and in active collaboration with developments in the steel-castings industry as a whole. The opportunity is taken, therefore, of first summarizing briefly the present position with regard to the factors directly affecting production in the foundry.

Foundry Production Developments

Few industries have suffered more severely than iron and steel founding from man-power shortage, and the replacement of manual effort in all foundry operations has become essential and urgent. Hand operations, such as ramming, pattern-drawing, and rolling-over, have to a large extent been rationalized

* Paper presented at a general meeting of the Institution of Mechanical Engineers arranged in conjunction with the industrial administration and engineering production group. The Author is chief metallurgist, English Electric Company, Limited.

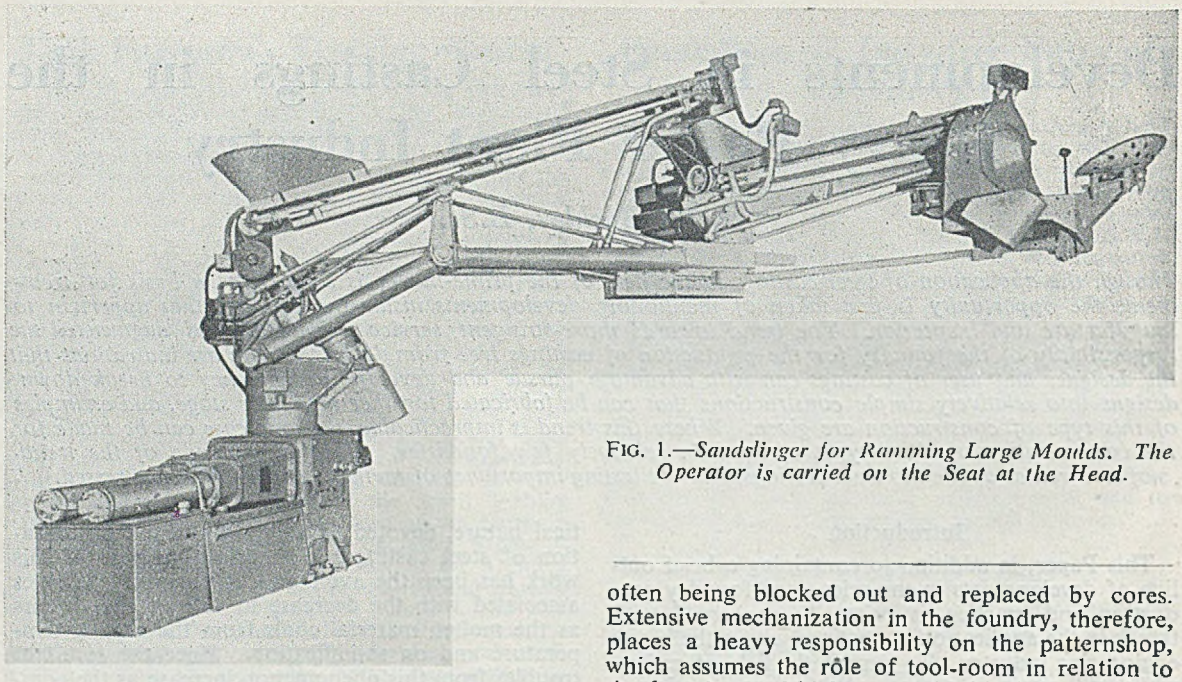


FIG. 1.—*Sandslinger for Ramming Large Moulds. The Operator is carried on the Seat at the Head.*

by the employment of jolt-squeeze power-operated machines for small and medium-size work, the whole sequence of operations being incorporated in the one machine where possible. For larger work, plain jolting machines and sand slinging machines have been extensively developed, the evolution of the latter being typified in Fig. 1, by a machine capable of ramming sand at the rate of 20 cub. ft. per min. It follows that the efficiency and economic application of expensive machines of this type are related directly to the effective hours of operating time, which in turn dictates specialized pattern construction—undercuts on the pattern that require hand-ramming often being blocked out and replaced by cores. Extensive mechanization in the foundry, therefore, places a heavy responsibility on the patternshop, which assumes the rôle of tool-room in relation to the foundry, and higher costs in this department are inevitable.

In the case of the heavier castings, after the ramming operation is completed, the rolling-over and pattern-drawing are carried out independently by overhead cranes, but the tendency here again is towards self-contained units with equipment specifically designed for this purpose. There are in operation power-operated roll-over machines, working in conjunction with sand slinging machines, which are capable of rolling over loads of 14 tons, with box sizes up to 13 by 9 ft. (Fig. 2). The machine illustrated is working in an iron foundry, but similar arrangements have been adapted and are in use in steelfoundry practice.

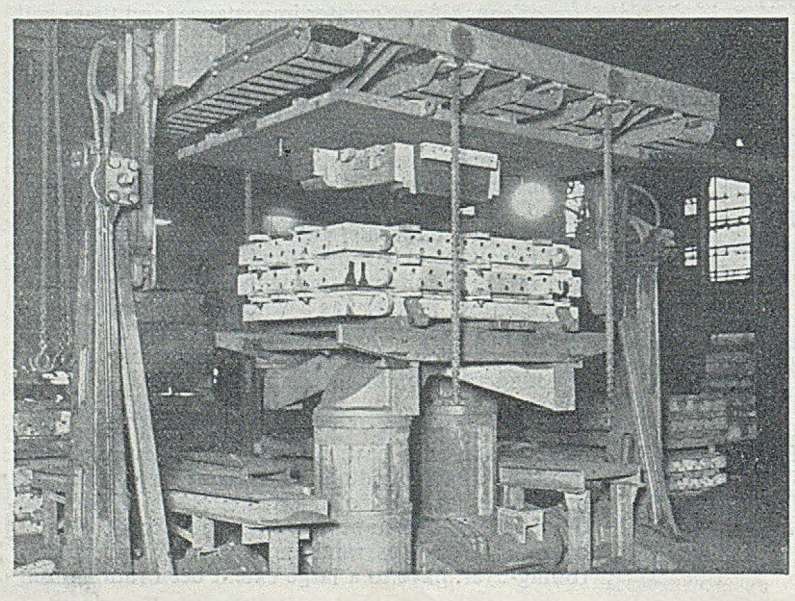


FIG. 2.—*Roll-over Moulding Machine of Large Capacity.*

Every opportunity has been taken of incorporating specialized devices for the transportation, mixing, and distribution of sand, to various points of utilization; and elaborate belt conveyors for feeding the used sand to a central milling position are common.

Cleaning Operations

One of the most difficult and arduous operations connected with the foundry is the stripping of the casting from the moulding boxes, after the necessary cooling time has elapsed. It is

particularly gratifying to see the evolution of mechanically-operated shake-out grids which accomplish this operation in a matter of minutes. Machines of this type are capable of taking up to 50 tons of dead load and consist of spring-mounted tables vibrated at high speed by eccentrically-loaded rotating shafts, the knock-out sand being conveyed back to storage prior to milling and re-use (Fig. 3).

After castings have been removed from the moulding boxes, cleaning operations commence, and mechanical innovations in this field have not only increased productivity but also substantially reduced health hazards. Removal of cores is effected by means of jets of water and sand at pressures of up to 1,700 lb. per sq. in. (Fig. 4) controlled by the operators from either outside or inside the chamber—the latter condition necessitating the use of special protective clothing. This decoring operation is usually followed by shot-blasting; modern equipment is almost universally of the airless type, the shot being flung by centrifugal impellers and impinging at varying angles upon the casting, which is placed on a rotating table, as in Fig. 5. In certain cases, neither of these treatments is adequate for removing burnt-on sand, and it is then necessary to supplement it with pneumatic chisels, although modern developments utilizing powder cutting and powder washing appear to be efficacious in this respect. In these processes, a stream of iron powder is added to the oxy-acetylene flame, which is then applied to the affected surfaces.

Moulding Materials

These mechanical developments have served the dual purpose of improving the working conditions and increasing the output for a given labour force. Alongside this trend, a general standardization of practically all materials appertaining and contributing to the manufacture of castings has been realized. For most purposes, natural sand has been replaced by synthetic sand, this comprising washed silica-sand initially free from binding agent, to which is added a clay binder, such as one of the montmorillonite clays. For cores, a binder of an organic type that burns away after casting is invariably used, to allow easy collapsibility.

For castings of a heavier type, fire-clay and sand mixtures are still used, since the impingement of large quantities of molten steel on mould surfaces increases the danger from sand washing. Modifications of these mixtures possess an advantage over the synthetic sands in that the clay content of the latter shows a peak hot-strength at about 900 deg. C. (1,652 deg. F.), above which temperature this property is quite low, whereas materials composed principally of aluminium clays do not attain a peak strength under temperatures of 1,150 deg. C. (2,102 deg. F.).

Control Phases

In furnace development, the electric-arc furnace, predominantly basic-lined, has gradually superseded all other types, and a further development of particular importance is the introduction of oxygen

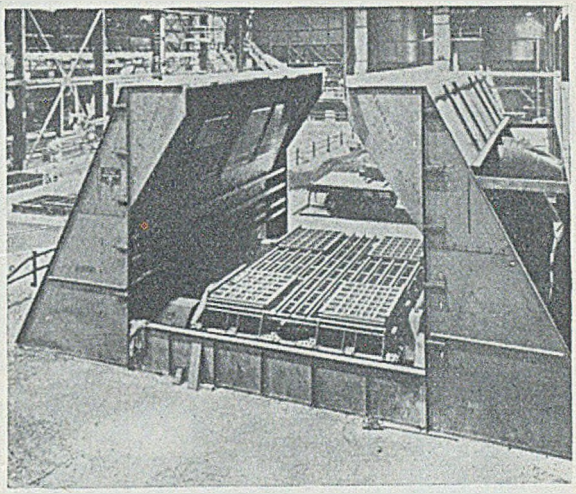


FIG. 3.—*Mechanically-operated Shake-out Grid.*

to the molten metal. This has been applied with marked success to the melting of stainless steel, and the higher melting temperatures attained allow a much higher scrap content in the raw charge.

The importance of casting temperature, which is of vital moment for all thin-section and complicated castings, has been fully realized and has led to the fairly wide adoption of immersion pyrometers for its measurement. The thermocouples are usually of the platinum/platinum-rhodium type; the e.m.f. being applied to a mains-driven high-speed amplifier and recorder and enabling true temperatures to be determined within a matter of seconds. Modern practice favours the installation of the recording gear in a central position; to it are linked various

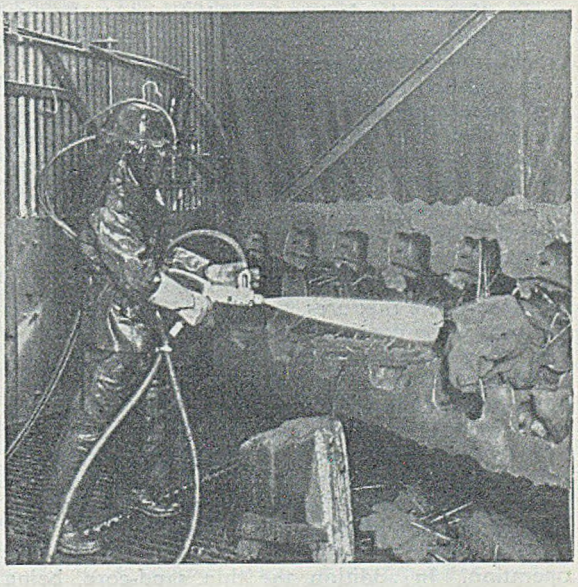


FIG. 4.—*Removal of Sand by High-pressure Water Jet in a "Hydroblast" Plant.*

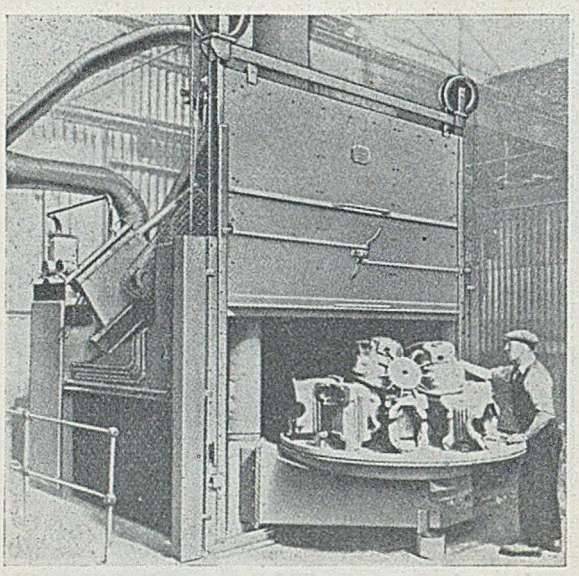


FIG. 5.—*Shot-blasting Equipment of the Airless Swing-table Type.*

control points enabling rapid ladle-determinations to be made in strategic positions throughout the foundry.

The composition of the steel used is, of course, dependent on the service duties of the casting; but, irrespective of the analysis, increased attention is being paid to the attainment of low sulphur contents, from the point of view of the benefit resulting in improved resistance to hot-tear formation. The deleterious action of this element, and similar contaminants, is associated with a tendency to form low-melting-point grain-boundary films which, under the mechanical stresses induced during the cooling process, aggravate and enlarge initial minor cracks into severe defects (Pellini)*.

In addition to ensuring the correct level of casting temperature it is equally important to maintain the heat of the risers in relation to the main casting, since these must compensate for the liquid shrinkage within the latter. The development of scientifically-designed riser shapes has been accompanied by the widespread utilization of exothermic compounds for lining and covering riser areas; these materials are predominantly powdered aluminium and iron-oxide mixtures, and in addition to liberating heat when coming into contact with the molten steel, they exert a powerful thermal insulating effect. Similarly, the provision of subsidiary electric arcs have been adopted for heating molten risers, the arc being started immediately the mould is filled.

A further development is to utilize a thin wafer of sand at the junction of the riser with the main body of the casting. This appreciably reduces the area of contact between the casting and riser and facilitates removal of the latter after the cooling operation. In addition the thin sand-core, being almost completely surrounded by molten metal, acts as a heat insulator and delays the solidification of the neck of metal joining the riser to the casting.

* An alphabetical list of references is given at the end.

Inspection Procedures

Defects exposed as a result of the cleaning operations, for example, scabs, buckles, etc., can be appreciated in relation to the service duties almost immediately, and welding rectification can be carried out if permissible. Of far greater importance are the defects likely to be revealed at an advanced stage of machining, particularly where the casting is a component of a large assembly. It is highly desirable, therefore, that the initial visual inspection should be augmented at this stage in every way possible so that a complete layout and summation of the defects can be ascertained, which in turn involves utilization of one or more specialized methods, ranging from chemical pickling to radiography and magnetic crack-detection. It should be emphasized that improved standards of inspection do not necessarily mean increased rates of scrapping, since a full assessment of defects facilitates a much more accurate determination of the possibilities of repair.

(*a*) *Magnetic crack detection.* The principle of this method of examination is based on the interruptions in a magnetic field produced by defects such as hot-tears, shrinkage cavities, and allied phenomena. The areas under observation, usually associated with fillets and changes of section, are surface-ground, and magnetized either directly or by induction. Magnetic powder is applied in the wet or dry state over the area, which for greater efficiency is often painted with a suspension of zinc oxide in acetone and cellulose acetate.

The process is only applicable to magnetic materials, but, for other metals, detection methods based on the penetration of dyes into the defect are quite common. The dye is contained in organic materials that have a low surface tension and high penetrating power, these are applied to heated

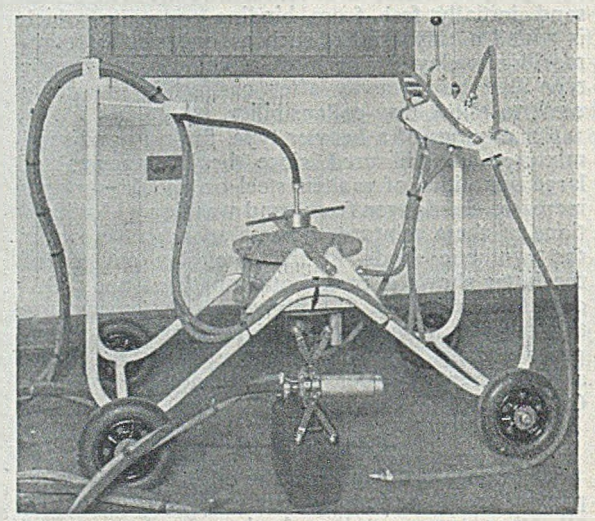


FIG. 6.—*Apparatus for handling Radon and Radio-active Isotopes.*

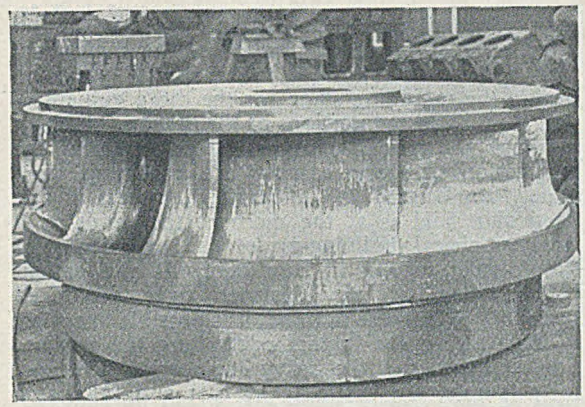


FIG. 7.—*Francis Runner Casting in the Same Position as that in which it was Poured.*

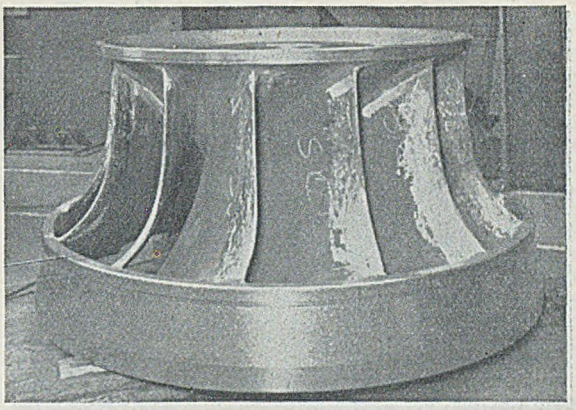


FIG. 8.—*Francis Runner Crown Plate and Skirt Ring Casting with Vanes inserted by Welding.*

surfaces and allowed to soak in, and the surplus layers are removed by wiping. The area under investigation is then coated with a white pigment, the dye seeping out from the defective areas and effectively revealing their presence.

(*b*) *X- and gamma-radiography.* Although not used primarily as a criterion of acceptance as regards heavy castings, X- and gamma-radiography play a major part, not only in the exploration of pilot castings in the foundry, but also in the routine examination of specialized zones of large castings. Thus, for example, those areas of steam-turbine casings that are subjected to abnormally high temperatures and pressures are examined by this method. It is also advisable to check repairs involving extensive welding, particularly if the base material is a complex steel. The widespread application of this method of inspection has been impeded by the heavy cost of X-ray equipment, but with the advent of the relatively cheap isotopes (the results of neutron irradiation of various substances in the atomic piles) there has been a rapid application of gamma-radiography to steel castings. Defects must be of sufficient size to yield differential absorption of the radiation; shrinkage cavities, blowholes, and gas pockets, are readily recognized, but cracks and fine discontinuities must be parallel to the incident rays to be capable of detection.

Although portable X-ray equipment is available in sizes up to 250 kv.—allowing effective examination of material 2½ in. thick—the larger sets of 400 kv. and upwards—suitable for thicknesses of 4½ to 7 in. and over—necessitate permanent installations with protective measures for the operators. For greater thicknesses, examination of heavy sections with rays generated by orbital accelerators are now being employed. These accelerate particles to high energies, and liberate X-rays after bombarding targets.

The energy from X-rays generated at medium voltages up to 400 kv. are relatively easily absorbed, and plates of high contrast are obtained provided sections of approximately the same thickness are examined on the one plate. Where marked changes of section are involved, precautions against loss of detail at edges and changes of section are necessary; but, when these are taken, a higher degree of contrast can be obtained than with gamma radiography.

The chief sources of the latter are radium, radon, and the isotopes. The first-named is obtained from natural sources; radon is a gas, the product of spontaneous disintegration of radium. This gas is adsorbed in activated charcoal within a glass tube and, in common with all these materials, emits gamma rays at a rate decreasing with time. The principal isotopes are iridium and cobalt, and, with the exception of iridium, radiation from all these materials is very similar. They have a low absorption capacity and no special precautions with variable thicknesses are necessary. Iridium 192, which has a low gamma-ray emission, yields relatively high contrasts, and is suitable for thicknesses up to 2 in.; cobalt 60 and radon applying to greater thicknesses. The smaller the source of radiation, the sharper the image, and radon fulfils this requirement for a high specific activity, which is the chief consideration for heavy-section radiography.

The isotopes and radon are obtained in sealed capsules and are stored in heavy containers, of lead or tungsten alloy, so as to minimize strong radiations. Handling presents difficulties from the point of view of safety to operators, but much special equipment is now available; the apparatus illustrated in Fig. 6 is characteristic, the capsules containing the isotope being blown into and ejected from the self-centring head by means of compressed air, which also operates the collapsible spring arms.

(*c*) *Supersonic examination.* The use of supersonic impulses is now an accepted form of non-destructive testing, particularly as applied to forgings, welded assemblies, etc. By this method a short train of supersonic waves produced by electrically exciting a quartz crystal is transmitted into the region of the material under examination, and discontinuities cause part of the energy to be reflected to a receiver where it is amplified and shows as a deflexion on a cathode-ray tube. Though this method is of vital importance in the

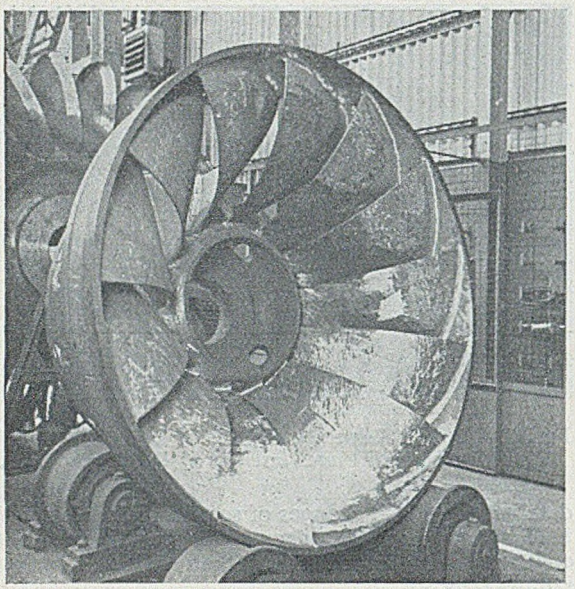


FIG. 9.—*Francis Runner Welded Assembly (another view).*

examination of forgings, its application to castings is limited for many reasons. These include the difficulties associated with rough surface conditions and the discrepancies inherent in castings, which are of minor importance from the point of view of service duties but which complicate the reflection patterns produced by this method of examination.

Interpretation

Identification and assessment of defects by any of these methods must be related to the service duties. If repairs are possible, these usually involve complete removal by chipping and grinding followed by an agreed welding technique and corrective heat-treatment.

It is impossible to outline the application and development of the final product in the heavy engineering field without discussing on a broad basis the vital question of contact and collaboration between the designer and founder. The production of a sound casting involves the pouring of a liquid of limited fluidity and high shrinkage characteristics, both in the liquid and solid states, into a friable compacted sand mass of dubious mechanical properties. Further, the latter offers major resistance to the free contraction of the casting at temperatures corresponding to minimum strength conditions in the steel. Success can only be achieved, therefore, if the designed shape readily responds to the stringent conditions imposed during the casting and cooling operations. Active collaboration, therefore, between the designer and foundry experts is of paramount importance and in general follows three main lines of action:—

First, the designer, by appreciating the physical changes involved in the process, can often, without sacrifice of strength or rigidity, modify and eliminate potential areas of weakness and unsoundness. Secondly, the foundryman must have the full knowledge of the service duties of the component that would allow him to make special provision during the moulding stage for the more vulnerable and highly-stressed portions of the casting. Finally, although the fundamental principles governing the production of sound castings are becoming more widely appreciated and understood, success in any particular field is at the moment the result of a slow empirical building-up of the experience of the founder, which in turn demands the patient collaboration of the designer over prolonged periods. With these in mind, it is possible to review in more detail the factors controlling the production of castings in the heavy engineering field and, for example, the assembly of cast and fabricated parts, Figs. 7, 8 and 9, can be envisaged.

Material

The engineer has a wide choice of steels in the cast form. In addition to having the carbon steels, he can take advantage of the increased strength/weight ratio of the alloy steels and of the properties of increased resistance to corrosion, wear, and high temperatures, offered by the accepted compositions. The various types of material are covered in a wide range of British Standard specifications, sixteen in number, giving the limits of composition and physical-test requirements at room temperature for the various grades. Tensile strength and yield stress form a direct basis for design, in so far as service stresses and conditions are known and can be fully appreciated. For components stressed and operating at room temperature, the service loads dictate the size and shape of structure and type of material to be used, and it is possible to obtain factors of safety comparable to those of alternative methods of manufacture involving welding or forging.

For complex conditions, such as high-temperature duty under stress, room-temperature physical properties are secondary, and specialized compositions evolved as a result of long-term tests on forged or rolled samples have been readily adapted. It is recognized practice in steam engineering to employ the 0.5 per cent. molybdenum bearing steels for castings at temperatures up to 480 to 490 deg. C., and test-pieces cut from cast slabs have shown creep strengths of the same order as those accepted for bar material (Tapsell and Prosser, 1940). For higher temperatures, the 0.5 per cent. molybdenum, 0.25 per cent. vanadium steels are used; they are used even for the highest steam temperature yet employed in Great Britain, 566 deg. C., although

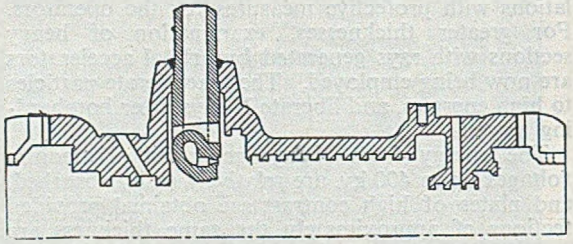


FIG. 10.—*Steam Cylinder for a 60-megawatt Turbine (approximately 9 ft. long).*

at that temperature modifications in the form of chromium and tungsten additions are applied. Steel containing 3 per cent. chromium, 0.5 per cent. molybdenum, 0.75 per cent. vanadium, 0.5 per cent. tungsten—which has been used extensively for high-temperature forged components, such as discs for jet aircraft—has been successfully adapted for castings for these extreme steam conditions. The temperatures indicated are at the moment practically on the limit of the service range of ferritic steels for the length of life required for land turbine practice, and controversy exists as to the advisability of utilizing austenitic steels for the combination of stress- and scaling-resistance necessary for these maximum service conditions. Adoption of the latter type of steel would have severe cost repercussions on heavy cast components, such as high-pressure cylinders for steam turbines, particularly when it is remembered that only a relatively small part of the casting, consisting of the steam zones adjacent to the initial stages of blading, is subjected to the maximum heat conditions. However, the system of breaking-down castings into composite parts and welding these together allows the employment of materials highly resistant to creep in the essential zones, whilst the main castings are of a lower alloy content. Fig. 10 illustrates this type of construction, the nozzle chamber subjected to the severest conditions being the chromium/vanadium/molybdenum/tungsten (ferritic) alloy, although austenitic castings, with modifications, have been used in similar positions and applications. For all these purposes, incorporating extensive welding techniques, strict control of the carbon content is essential. This must be kept at a minimum in order to minimize the air-hardening characteristics. For the higher-temperature conditions encountered in gas-turbine practice, austenitic alloys, chiefly of the 19/9 stabilized type, have been adapted to castings up to 3 or 4 tons in weight and of considerable complexity.

(To be continued)

Purchase Tax Scheme for Overseas Visitors

Notice No. 77F, which outlined the British purchase-tax coupon scheme for overseas visitors, issued by the Commissioners of Customs and Excise, has been reprinted, and visiting foundrymen may be interested to acquire copies. The new notice supersedes that issued in June, 1951, and incorporates various charges notified in the Press. Further changes of a minor nature have been made to remove doubts and difficulties, and attention is specifically drawn to the modified wording of the certificate to be signed by the visitors using the scheme. Trade associations wishing for copies for distribution to members who actively participate in these arrangements may obtain reasonable quantities on application to the secretary, section 20(D), H.M. Customs and Excise, King's Beam House, Mark Lane, London, E.C.3.

HAYWARD TYLER & COMPANY, LIMITED, have had plans prepared to carry out extensions to their brass foundry at Crawley Green Road, Luton, Beds.

Foundry Productivity Praised

Means adopted by founders for increased productivity are commended in the current issue of *Target*, the Government monthly bulletin devoted to recording such matters. First, there is a major article on newly-developed handling methods at Hepworth & Grandage, Limited, piston, ring and liner manufacturers. Here it is stated that 400 tons of castings are now produced from the mechanized foundry as compared with 220 four years ago. The company have developed and are operating a four-station centrifugal casting machine for cylinder liners, which works on a cycle of approximately 2 min. for a complete series of operations.

Praised for methods of passing information on their trading position to employees are George Kent, Limited, of Luton, John Thompson, Limited, of Wolverhampton, and F. H. Lloyd & Company, Limited, Wednesbury. The first and last of these firms used posters, one showing piles of coins variously divided according to the way their money was distributed, and the other doing the same with pictures. The third firm organizes regular meetings of an association formed by 120 of their supervisors. Another item featured in the same issue is the use of a mechanical wheelbarrow in the foundry of Villiers & Company, Wolverhampton, which is said to have four times the capacity of an ordinary barrow and yet be low enough to go under the discharge point of the sand mixer.

Latest Foundry Statistics

Record Production of Iron Castings

The production of iron castings in this country was last year, at 3.830,737 tons, a record. Over the last 13 years it has been as is shown in Table I.

TABLE I.—*Annual Production of Grey Iron and Malleable Castings.*

Year.	Production.
1940*	2,769,200
1941	2,443,900
1942	2,467,800
1943	2,408,200
1944	2,140,500
1945	1,979,200
1946	2,537,300
1947	2,846,400
1948	3,283,900
1949	3,388,121
1950	3,486,892
1951	3,754,527
1952	3,830,737

* Partly estimated.

The increase over 1951 is of the order of 67,000 tons. Dealing with the fourth quarter production of last year, the Bulletin of the Council of Ironfoundry Association comments: "Automobile and building and domestic castings show some signs of recovery from their depressed conditions in the third quarter, but engineering, jobbing and railway castings show a considerable decrease in importance. In fact, the fall off in total in the second half of the year would have been very much greater if it were not for the continuous expansion of pipe and ingot-mould output."

According to the Ministry of Supply notice, the output of aluminium-alloy castings in 1952 was:—Sand, 27,021; gravity-die, 40.386 and pressure-die, 9.941 tons. The production of magnesium castings was 3.406 tons. Figures for earlier years for aluminium-alloy castings were 1950, 57,516; 1951, 72,245 and last year 77,348.

Iron and Steel Bill

Lords Discuss Foundry Inclusion

THE MARQUESS OF SALISBURY, Lord President of the Council, moved the second reading of the Iron and Steel Bill in the House of Lords last week. He said that violent fluctuations between unrestricted private enterprise and totalitarian socialism were not likely to be an advantage either to the industry or the country. The Government recognized that fact and they were not proposing in the Bill to return the industry to unrestricted private enterprise. They had tried to find some middle line between the opposing views.

Among other speakers, VISCOUNT BRUCE OF MELBOURNE said that the Government should reconsider the decision to appoint a certain number of full-time members to the Board. Unless the appointments were part-time the Government would not get the great figures on the management side of the industry to serve, nor would the trade unions be best represented by an official who had severed his connection with his trade union in order to accept a full-time appointment.

LORD JESSEL, in a maiden speech, said that the independent ironfounders saw no reason why they should ever have been included in the Bill and put under the supervision of the Board. The tied foundries had been excluded from the Bill, but the independent foundries had not. That was illogical.

Hope of the Industry

VISCOUNT DAVIDSON said that, under the Bill, control would be handed back to those who knew how to run the industry. His belief, moving among men and management, was that this was an agreed Bill. The industry had one hope, that having been given its freedom it would not be interfered with again but would be allowed to continue in peace. He dreamed of the time when we had a property-owning democracy, with men engaged in the industry having a stake in it because they had faith in their own industry; it would have been completely denied them if this great industry had remained in the ownership of the State.

VISCOUNT RIDLEY said that the Bill would be a welcome and practical relief to the industry. It was a mistake, he thought, to have included the iron foundries, but the provisions could not do them any harm.

VISCOUNT LONG suggested that a clause should be inserted to bring in the iron foundries only in the event of a crisis.

LORD WINSTER said that the realization agency would have a difficult task. It would be better if the assets were made the responsibility of the Board, who in turn should be responsible to the Minister of Supply. The Board should also group the assets before sale, while the agency should be responsible only for the financial aspect.

EARL JOWITT said that the Board was a sham, a mere façade, and if it was not to be given more power it might as well be cut out of the Bill. The Opposition would move amendments to strengthen it. At present it appeared that the Iron and Steel Federation would run the industry. If the industry was to be efficient the Government must have power to control development.

VISCOUNT SWINTON, Secretary of State for Commonwealth Relations, said that there was agreement about the need for effective public supervision. The real issue was whether nationalization was necessary to get an efficient industry.

Foundries used the same materials as those used by heavy steel makers and used them in large quantities. That was the argument for bringing them under a measure of supervision, but the Bill recognized the special position of those firms.

Reducing Fire Hazard in Pressure-die-casting

In the pressure-die-casting shop, with liquid metal being handled, there is a serious fire hazard if there be a sudden leakage of the hydraulic fluid in the pump, unless this fluid be of a non-inflammable character. It is learnt that, for ten years, the Americans have been using a non-inflammable fluid manufactured, *inter alia*, by the American associate of Monsanto Chemicals, Limited, Victoria Station House, Victoria Street, London, S.W.1. This company, before introducing the material—marketed as Aroclor 1248—in this country, initiated a large-scale practical investigation at their research laboratory, Fulmer Hall (not to be confused with the Fulmer Research Institute). Here the non-inflammable qualities were thoroughly established, but much more work was concentrated on the wear of the pump components of the die-casting machines, for the new fluid is very searching. As a result of these investigations, it is recommended that slight modifications should be made to the pumps used. For instance, the type of gaskets need to be carefully chosen, and rubber should be replaced by other materials. The wear tests carried out appear to have given satisfactory results. Full details are available to readers interested in pressure-die-casting by writing to Victoria Station House and asking for the laboratory report on the subject.

Institution of Production Engineers

The Institution of Production Engineers is to hold its biennial conference this year at Harrogate from June 25 to 28. The theme will be "Production for Plenty" and an endeavour will be made to strike a note of confidence in the future in contrast to the "work or want" type of propaganda which, however true, has a negative and depressing effect. The principal speakers at the conference will include Sir Cecil Weir, K.C.M.G., K.B.E., president of the Institution and head of the United Kingdom delegation to the European Iron and Steel Community; Sir Hubert Houldsworth, Q.C., D.SC., chairman of the National Coal Board, and Sir Charles Goodeve, O.B.E., D.SC., F.R.S., director of the British Iron and Steel Research Association. The conference will be summed up by Mr. E. W. Hancock, M.B.E., director and general works manager, Humber Limited. A number of discussion groups will be organized.

R.T.B. Training School

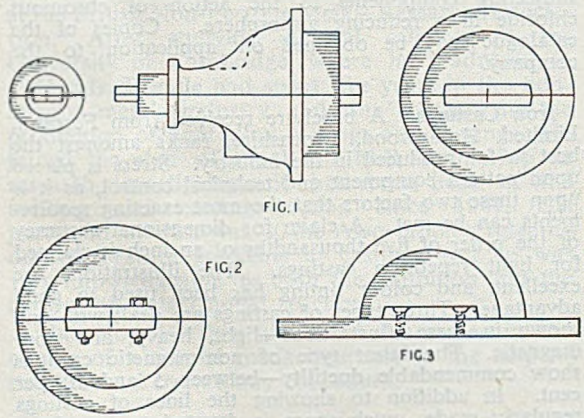
Work is shortly to begin on preparing the site for the new £35,000 training school at the Cookley Works of Richard Thomas & Baldwins, Limited, Brierley Hill. It is hoped that the school will be completed by the end of this year. The present temporary training school (to which a small grey-iron foundry has recently been added) was begun, experimentally, with 18 youths. To date, some 250 operatives have been trained there. It is thought that the new school will provide facilities for the training of 48 apprentices as well as for new employees, while the lay-out also includes a rehabilitation room for the use of employees recovering from accidents or illness. The new school will provide a floor space of approximately 12,000 sq. ft., and it is confidently believed that it will be among the finest centres of its kind in the country.

Machining Methods for Master Patterns

By "Checker"

When metal patterns are cylindrical in shape, and have to be turned in the lathe to obtain their finished sizes, it is very often an advantage to make provision for holding the work while it is being machined. For this purpose, extensions can often be incorporated at each end of the master pattern. They are usually in the form of bosses or lugs. Fig. 1 illustrates a master pattern, with extensions fixed at each end on both halves. Their length is, of course, governed by the core-print diameter on to which they are positioned. In all cases, they should be smaller in diameter than the finished print, to allow a definite length dimension to be turned at the end.

When pattern castings of metal have been obtained from the master patterns, the first operation is usually to make the pattern joint on both halves straight and true. Then they can be dowelled together and this ensures a definite location being obtained each time they are placed together. The use of $\frac{3}{16}$- or $\frac{1}{4}$-in. dia. mild-steel rod is satisfactory for this purpose. Both halves must then be firmly



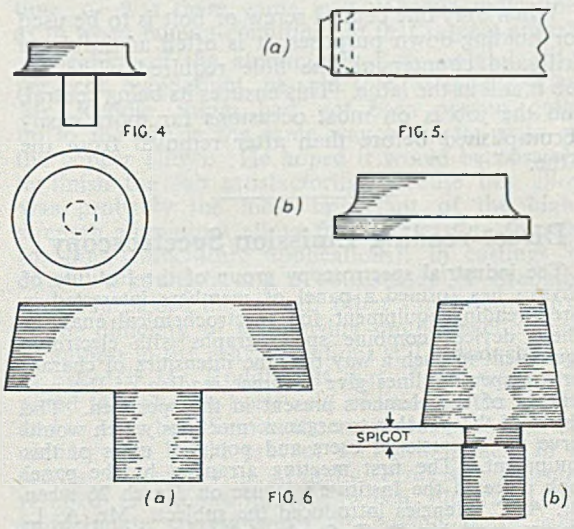
FIGS. 1 TO 3.—*Machining Methods to suit various Pattern Constructions; Fig. 1, Straight Turning of a Master Wooden Pattern, allowing End Extension Pieces; Fig. 2, Using the Extension Pieces for Bolting Metal Half-patterns together; and Fig. 3, using the Same Holes for fixing the Patterns to a Plate.*

secured together prior to placing in the lathe for turning both core-prints and flanges. Here the extension pieces provided at each end can be utilized. By drilling two holes at each end, these can be used for receiving bolts which secure the metal half-patterns, as shown in Fig. 2. The machining lugs allow the full length of core-print to be clear for turning at both ends.

Fixing to Boards or Plates

Metal pattern equipment is usually made for fixing to patternplates or boards for use on moulding machines. On many occasions it is therefore unnecessary to remove the machining lugs provided at each end, for being beyond the core-print length, the impression they leave in the mould is kept separate from the casting shape when the core is in position, and no metal will enter when casting. They can, however, be used to assist in securing the half-patterns on the plates by making use of the existing holes. Bolts can be placed through both lug and plate with nuts underneath, or the patternplates can be provided with suitable tapped holes for countersunk bolts or machine screws, as shown in Fig. 3.

Sometimes in metal patternmaking it is good practice to make a boss or bosses separately from the main pattern and fix them in position later. On these occasions, it may be necessary first to make a master pattern for these bosses with a machining allowance for turning to size in the lathe. On the back of each boss an extension of suitable diameter and length should be incorporated for holding in the lathe chuck while turning, as illustrated in Fig. 4. With this machining provision added, bosses are easily and



FIGS. 4 TO 6.—*Machining of Individual Bosses; Fig. 4, Shaped Boss to fit flush with Pattern Surface; Fig. 5, Multiple Production of Bosses from Rod Material; and Fig. 6, Boss to be recessed in the Pattern Face.*

accurately positioned in the lathe, and are completely machined to size without being disturbed or re-chucked.

Another useful way for making bosses of small diameters, and especially where several of the same diameter are required, is to use lengths of round rod. Brass or aluminium are the most suitable for this purpose. The rod is fixed into the lathe chuck, and the bosses are turned and parted-off one at a time from the end, as shown in Fig. 5(*a*). On some occasions it is found desirable to have the bosses recessed

Machining Methods for Master Patterns

into the main pattern. When this occurs, an amount corresponding to the recessed depth is allowed on the boss below the radius, as shown in Fig. 5(*b*), thus eliminating a sharp fillet edge. This method can often be used when bosses have to be fixed on a curved surface, and the surplus metal around the fillet radius can be carefully blended into the pattern shape after they have been fixed in position.

Core-prints

Core-prints are on many occasions added to the metal pattern as one of the final operations. Here again, a machining extension should be provided for all core-prints which are to be turned to their finished size in the lathe. Fig. 6(*a*) illustrates a large print with a holding extension allowed for on the master pattern. A smaller core-print shown in Fig. 6(*b*) has a similar extension. This also shows how it is possible to turn part of the extension and utilize it as a spigot. By this means a more rigid and firm seating for the print is obtained. The depth to which a spigot is let into the pattern can, of course, be varied according to requirements, providing the necessary amount has also been allowed for holding in the lathe.

When only one central screw or bolt is to be used for holding-down purposes, it is often advisable to drill and countersink the hole required while the job is still in the lathe. This ensures its being central, and the job is on most occasions far more easily accomplished before than after removal from the lathe.

Direct-reading Emission Spectroscopy

The industrial spectroscopy group of the Institute of Physics has formed a panel of members interested in direct-reading equipment for spectrochemical analysis. These devices combine spectrographs with electronic equipment in such a way that the intensities of characteristic spectral lines give a direct reading of the percentage of the elements present in the specimen. The object of the panel is to organize meetings which would serve the interests of users and potential users of this equipment. The first meeting arranged by the panel took place in the Institute's House on March 26 when Dr. A. C. Menzies introduced the subject. Mr. A. L. Pendrey and Mr. R. T. Staples followed with accounts of their experiences and there followed a general discussion. Readers who would like notices of the meetings on this subject are invited to join the group, particulars of which may be obtained from the secretary of the Institute, at 47, Belgrave Square, London, S.W.1.

Prefabricated Aluminium-alloy Buildings. Chamberlain Industries, Limited, of Staffa Works, Leyton, London, E.10, have issued illustrated details of a standard, yet dimensionally variable, aluminium building. By means of the insertion of a knuckle joint member between the roof and the wall, the width can be nearly doubled, whilst the wall height is increased by 3 ft. This ingenious method of enlarging buildings of this type has much to commend it. Readers can have fuller details by writing to Staffa Works.

New Catalogues

Thermal Storage. G.W.B. Electric Furnaces, Limited, Dibdale Works, Dudley, Worcestershire, have sent us an eight-page catalogue well covering equipment designed for thermal storage in connection with space-heating. The work is done automatically by means of electric water heaters in conjunction with a thermal storage system. The plant is known as the "Autolec."

Laboratory Furnaces. To meet the demand for laboratory tube muffle furnaces capable of operating at temperatures up to 1,400 deg. C. Wild-Barfield Electric Furnaces Limited, Watford By-pass, Watford, Herts, have developed a new tube furnace, model CC22, designed to take two standard combustion tubes 1⅛ in. o.d. and rated at 1.75 kw. The furnace is heated by silicon-carbide rods. Details are available to readers on writing to Watford.

Chromium Diffusion. Carbide-tipped tools are a good example of saving expensive metals, as the shanks are of ordinary grade steel. Similarly, when chromium diffusion was originated, there was no hint of its possible application to iron castings. However, a pamphlet just issued by Diffusion Alloys, Limited, London Bridge House, London, S.E.1, shows that it can be used for cooker parts, pump casings, and many other cast-iron components. The process is based on subjecting components to the action of chromous chloride in a reducing atmosphere. Copies of the catalogue may be obtained on application to the company.

Iron Castings. A brochure received from Ferranti, Limited, Hollinwood, Lancashire, ranks amongst the best so far produced in the industry. Stress is placed upon pattern equipment and technical control, as it is upon these two factors that the most exacting requirements can be met. A claim for dimensional accuracy of the order of five thousandths of an inch is claimed for light repetition castings. The illustrations are excellent, and colour tinting has been used to good advantage. Three types of castings are dealt with and shown in these illustrations—light, heavy, and non-magnetic. The latest type of non-magnetic castings show commendable ductility—between 5 and 10 per cent. In addition to showing the lines of castings regularly made, much space is devoted to the shops where they are produced, including the welfare facilities provided for the operatives. As a sales brochure it does credit to the industry.

Lecture on Shell Moulding

In the Department of Mechanical Engineering at Borough Polytechnic, Borough Road, S.E.1, a lecture on shell moulding will be given by J. E. Worthington, B.SC., at 7 p.m. on Thursday, April 16. The method of producing castings, by hand and mechanized shell-moulding processes, will be briefly outlined and some of the implications of the process, as it affects both design and production engineers and the whole foundry industry will be dealt with. Principles underlying the economics of the process are to be touched upon and specimens of typical castings in various metals, and the shell moulds themselves will be on view. Technicians will be on hand to answer questions at the conclusion of the lecture. The fee for the course is 5s., payable at the Borough Polytechnic before 7 p.m. on the evening of the lecture.

Metal/Mould Reaction

Joint Discussions between the London branch of the Institute of British Foundrymen and the London section of the Institute of Metals

The joint meeting of the London section of the Institute of Metals and the London branch of the Institute of British Foundrymen, which is an annual event, was held this session at the headquarters of the former Institute at 4, Grosvenor Gardens, London, S.W.1. Dr. C. E. Ransley presided, and a paper on "Mould Reaction"* was presented by Mr. R. W. Ruddle, M.A., A.I.M.

THE CHAIRMAN, opening the meeting, said the London section of the Institute of Metals extended a warm welcome to the president (Mr. D. Graham Bisset) and members of the London branch of the I.B.F.

The subject to be discussed, he continued, was of very considerable interest to both bodies, and, of course, the precaution was taken to choose a very able man for the task of presenting it. Mr. Ruddle was head of the melting and casting section at the British Non-Ferrous Metals Research Association. After studying natural sciences at the University of Cambridge, where he graduated in 1941, Mr. Ruddle had spent five years in the non-ferrous metals industry and was engaged in the production of light-alloy castings and forgings. He joined the staff of the B.N.F.M.R.A. in 1946 as research investigator and had been head of the melting and casting section since 1947. His particular interest was in the Association's research on temperature gradients in castings and he was very knowledgeable on both the inhibition and the control of metal/mould reaction.

MR. RUDDLE then presented his paper in the course of which he made reference to the help he had received from many colleagues.

Alternative Mould Materials

PROFESSOR A. J. MURPHY accepted the Chairman's invitation to open the discussion, and said the meeting had had the advantage of a very lucid account of the magnificent work which the British Non-Ferrous Metals Research Association had done in the face of many disappointments, trials and setbacks over a number of years. They had shown that they could achieve the practical results to which the work was aimed. He did not think there was much doubt, nowadays, that the principles were right, and that the explanations of dispersed and concentrated unsoundness were valid. It would be very interesting to have a series of tests made with a non-aqueous bond for the mould material. He did not mean molasses or anything like that, but something which did not give hydrogen. Suppose the work was done with nitrogenous bonding materials, either having no hydrogen at all or very low hydrogen content, to see what happened then to the copper- and aluminium-base alloys, for which, all the way through, the common feature had been that the unsoundness was associated with the hydrogen from steam. He imagined the answer would be what we should like it to be, that there would not be unsoundness

It seemed, he continued, that phosphorus content of the gunmetal was a rather serious matter in practice and asked how the man who controlled the job in the foundry could know that he was not badly out in one way or the other, that he had not too much or too little phosphorus. Was it recommended practice to have some preliminary means of finding the time and temperature of working to give the right phosphorus at the right time, or was there some instantaneous indication as to when correct conditions in that respect arose?

Speaking of the aluminium alloy containing 10 per cent. magnesium, he said that, as indicated by Mr. Ruddle, things had not been proven quite up to the hilt in the same way as in the case of the copper alloys. He hoped it would be possible to finish the job satisfactorily, because this alloy was probably the most important of the high-strength aluminium alloys for sand casting (except for high-temperature applications); in castings it offered a strength, and a consistency of strength, which surpassed that of any other aluminium alloy.

The difficulty of suppressing mould-reaction unsoundness in the heavier sections still remained, and he asked if Mr. Ruddle felt that, if one were prepared to make the boric-acid addition to the mould and to have beryllium in the aluminium/magnesium casting, one could prevent the unsoundness in a section of (say) 4 in. Finally, Professor Murphy recalled an interesting case which illustrated the unfortunate consequences of having boron and alkali elements together. He asked if he were right in thinking that in the early days one modifying agent proposed for the 11 to 12 per cent. silicon alloy was sodium borate, and said it would be interesting if Mr. Ruddle could find any records showing that with this modifier there was any unsoundness of the type that had been illustrated.

MR. RUDDLE answering Professor Murphy's suggestion about the use of a non-aqueous bond for the mould material, said that the Association's investigators had in fact carried out some experiments with moulds made from sillimanite bonded with ethyl silicate. On firing, these moulds were converted to sillimanite and silica and, as was to be expected, no detectable mould-reaction was found using these moulds.

* Printed in the JOURNAL, February 5, pp. 145-152. When printing the paper it should have been made clear that Figs. 6 to 10, 12 and 13 were reproduced by kind permission of the Institute of Metals.

Metal/Mould Reaction—Discussion

PROFESSOR MURPHY said he was thinking of using some medium that would give a vapour, but not steam.

MR. RUDDLE replied that they had not tried anything of that kind and he would not like to say what would be the result of using such a mould. Dealing with the question about the control of phosphorus contents in using controlled mould-reaction to improve the soundness of bronze castings, in practice that proved not quite so difficult as feared. It had been found that if, for example, a phosphorus content of 0.06 per cent. was desired, it was quite satisfactory in normal foundry procedure to add 0.08 per cent., allowing 0.02 per cent. for melting loss.

Inhibition in Thick Sections

Referring to Professor Murphy's question about the inhibition of mould-reaction in 4-in. sections, he enquired whether Professor Murphy had in mind round or flat sections since the two were very different as regards rate of freezing.

PROFESSOR MURPHY said he meant sections with a heat centre equivalent to 4 in. diameter.

MR. RUDDLE replied that he believed mould-reaction could be inhibited in sections up to that diameter. The measures recommended—0.004 per cent. of beryllium in the metal and 4 to 5 per cent. of boric acid in the sand—provided fairly adequate inhibition in sections up to about that size. Large castings in the aluminium/10 per cent. magnesium alloy generally suffered very badly from shrinkage, whether or not mould-reaction occurred, and it seemed to him that the only way in which to get rid of this defect in heavy sections was to chill the casting severely so that it would solidify more rapidly than in a normal sand mould; this would also have the effect of reducing the time available for mould-reaction. Therefore, it was suggested that the problem of making heavy sections in this alloy might be solved by using inhibitory measures and at the same time to chill the castings rather severely.

The Author added that he did not know anything about the modification of aluminium/silicon alloys by sodium borate, but agreed that if in fact that was done in the past, it would be very interesting to know what had been the result.

Reactions with Stainless Steel

MR. J. F. LANCASTER (A.P.V. Company, Limited) raising the problem of porosity in stainless steel (after all, it was only nominally a steel and he felt it was just as good a non-ferrous metal as any other from certain points of view) said that this type of casting made in green-sand moulds was subject to porosity, and as the result of some of the work done by his colleague, Mr. Dawson, it had been concluded that such porosity resulted fundamentally from metal/mould reactions. The porosity in question was not like that which occurred in aluminium/magnesium alloy or in gunmetal; it occurred sometimes in the form of round cavities, but most frequently in the form of elongated cavities or "worm holes." Small castings were particularly subject to this defect.

When Mr. Dawson and he had started the work on that problem, naturally they had thought the trouble was due to hydrogen. Various attempts were made to introduce hydrogen into steel melts, but it soon became evident that the initial hydrogen content was not the most important factor. From subsequent investigations, it appeared that there were two factors involved, and that the development of porosity required the simultaneous presence of a critical amount of moisture in the mould and a critical amount of nitrogen in the metal. Stainless-steel melts absorbed quite a lot of nitrogen, up to 0.2 per cent. or even more. In dry-sand moulds, even when there was a high content of nitrogen in the metal, no porosity appeared.

Another interesting point was that porosity could be entirely inhibited from stainless-steel castings by the addition of sulphur to the metal. Tellurium and selenium had the same effect.

The conclusion reached as the result of the work was that the critical factor in starting porosity was a metal/mould reaction. It seemed clear that hydrogen was being formed at the mould surface, whence it diffused into the metal and initiated the reaction. From that point it became a little difficult to say just how the presence of nitrogen was essential in causing porosity and just how sulphur entered into the reaction. What might be happening was that the hydrogen which was formed by the metal/mould reaction was diffusing into the molten metal and nucleating the nitrogen bubbles there, and the effect of sulphur was to inhibit that nucleating action. It was known that, in sulphur-bearing stainless steels, the oxide particles which were always present were very frequently absorbed by the relatively large inclusions of sulphide, and it was quite within the realms of possibility that the particle size was thereby increased beyond the critical size required for nucleating gas bubbles.

MR. RUDDLE said the case described seemed to provide a new example of mould-reaction, and a most complex one. He offered congratulations to Mr. Lancaster and his colleague Mr. Dawson, for they seemed largely to have solved their own problem. Asking why it was suggested that the nitrogen had to be nucleated, he said that apparently the view taken was that a critical content of nitrogen was present, which was above the solubility limit, but not so high that bubbles could readily nucleate.

A MEMBER said it might be that the hydrogen bubble formed more readily on the nuclei than did the nitrogen bubble.

MR. RUDDLE said that was a possible explanation. He recalled a curve he had shown in the Paper, illustrating the distribution of porosity, there being at the surface a high level of porosity, which tailed off towards the centre of the casting. If, in the experiments on stainless-steel castings, the nitrogen content were just a little above the solubility limit, it would probably be unable to form bubbles and would tend to diffuse into the heat

centres; the introduction of a fair quantity of hydrogen into the surface regions of the casting during freezing might cause bubbles to nucleate there, in which event the nitrogen would diffuse into the bubbles and expand them and might thus account for the " worm holes."

Experiments on 88/10/2 Gunmetal

MR. P. G. FORRESTER said there were many who would agree with Professor Murphy that the work which Mr. Ruddle had described had very greatly increased our understanding of what happened when metal was introduced into a mould. Referring to some experiments with which he had been concerned on an 88/10/2 gunmetal casting which was particularly prone to porosity, he said nitrogen degassing phosphorus content and temperature had been investigated, in order to estimate their separate effects and also their interactions. It was expected the best results would be obtained from nitrogen degassing, medium- or high-phosphorus content and possibly high temperature, but in fact the best results had been obtained without nitrogen degassing, with a low phosphorus content (below 0.02 per cent.), and a low temperature.

MR. RUDDLE said that without further details he could not attempt to explain the results obtained and asked what kind of casting was involved in the work described.

MR. FORRESTER said it was a semi-cylindrical bearing-shell, having a quite small section as compared with its diameter, which made it difficult to pour the extremities. The defect was concentrated porosity most of the way along the centre of the casting, particularly towards the extremities. The thickness was $\frac{3}{8}$ in.

MR. RUDDLE was surprised that, when using the higher phosphorus content, the degassed metal did not produce the best result of all. He asked whether a fairly good result was obtained in those conditions, or whether it was a bad result.

MR. FORRESTER replied that it was somewhat intermediate.

MR. RUDDLE said the fact that good results were obtained without degassing and bad results when degassing was used suggested that the casting needed a fair amount of gas in the metal, either introduced before pouring or as the result of mould-reaction. He asked whether experiments were made at up to fairly high phosphorus contents.

MR. FORRESTER replied that the phosphorus contents ranged up to about 0.2 per cent., which was high in a gunmetal. The range was from about 0.4 to 0.2 per cent.

MR. RUDDLE said that he could not, on the spur of the moment, throw any light on the results obtained; possibly the casting shape was not one which was suited to the application of mould-reaction.

MR. FORRESTER said it seemed that the high temperature itself could produce mould-reaction.

MR. RUDDLE agreed that the higher the temperature, the more violent the reaction; he liked to keep pouring temperature down, so that the reaction became more controllable. Even with 0.04 or 0.05 per cent. of phosphorus in a gunmetal one would expect substantial reaction if it were poured too hot.

THE CHAIRMAN asked if anyone present could be persuaded to condemn the business of permitting some gas absorption as amoral, and to say that the best thing to do was to inhibit mould-reactions and design castings properly.

Effect on Mechanical Properties

A MEMBER was rather perplexed about the mechanism that had been described; it was extremely difficult, he said, to explain why inhibition should be effective in the case of aluminium/magnesium alloys and detrimental to the aluminium-silicon alloys. Discussing copper alloys, he said all knew it was a good thing to produce a casting which did not leak under pressure, but he wondered whether the means by which it was attained were really worth while. It was noted from the diagrams which Mr. Ruddle had exhibited that pressure-tightness was achieved at the cost of some deleterious effect on mechanical properties; and he asked if Mr. Ruddle had made tests to determine whether the concentration of porosity at the surface, which founders were bound to get by the method used, was likely to lead to reduced fatigue or corrosion resistance.

He would have thought that the results obtained from a pressure test depended more on the distribution of the porosity than on its amount. It was surprising that good results were obtained, because he would have thought that porosity obtained as the result of mould-reaction would be a worse form than that occurring without mould-reaction.

MR. RUDDLE said that the speaker was not correct in saying that mould-reaction achieved pressure tightness at the expense of mechanical properties. Admittedly, the illustration (Fig. 12) showed that mould-reaction reduced the strength of the well-fed DTD test-bars but it also showed that the strength of the poorly-fed disc castings was actually increased by the correct degree of mould-reaction. The essence of the matter was that mould-reaction reduced the strength of well-fed castings, but increased both the strength and pressure-tightness of poorly-fed castings; since many industrial bronze and gunmetal castings were in fact inadequately fed, controlled mould-reaction had a valuable application.

Apparently the member thought that mould-reaction produced a high concentration of porosity near the surface of the casting which would be deleterious to the properties of the casting. In fact, in the case of bronze and gunmetal castings, the surface concentration was not particularly high and not anything like as high as suggested by the porosity-distribution curves which he had shown, which referred to aluminium castings. Without mould-reaction, the disc casting illustrated showed a very severe concentration of porosity in the central boss, but when a limited amount of mould-reaction was permitted this was largely dispersed and the porosity was more or less uniform throughout the casting, as shown by Fig. 10.

Metal/Mould Reaction—Discussion

DR. E. SCHEUER suggested that the previous speaker probably meant that open channels would be formed between the crystals of the casting, producing leakage through the casting's skin. The explanation as to why that was not the case when gas was introduced was simple. Presenting his explanation by means of a sketch, Dr. Scheuer said that in alloys passing through a pasty stage during solidification there were crystals, mostly dendritic in shape and having layers of liquid eutectic or low-melting-point material in between. If the metal contained gas in appropriate amounts, a number of bubbles would be formed in these layers and between the bubbles there would still be liquid. The liquid displaced towards the centre by shrinkage was then partly replaced by the bubbles, and enough of the mixture of liquid and bubbles remained behind to prevent the formation of open channels. However, if there were no gas bubbles, shrinkage might lead to the formation of long, open channels. The porosity which did *not* produce channels—and channels meant leakage—was the type produced by introduction of gas, whereas porosity induced by shrinkage alone was much more likely to produce leakage.

MR. RUDDLE said that the explanation given by Dr. Scheuer was probably quite correct. There was however another factor governing the tendency of the porosity in the casting to link up and form interconnected channels, namely the total amount of porosity. In regions where the total amount of porosity was high, as, for example, in the boss of the disc casting in the absence of mould-reaction, porosity of an interconnecting nature occurred and leakage resulted. Mould-reaction produced a more uniform distribution of porosity and, provided that the general level was not too high, interconnecting porosity was largely avoided.

Vote of Thanks

MR. TIPPER on behalf of the Institute of British Foundrymen, and particularly the London branch, proposed that a hearty vote of thanks be accorded to the Institute of Metals for their hospitality that evening and to Mr. Ruddle for his Paper. As a member of the Birmingham branch of the I.B.F., he said that in the Midlands they had not the opportunity very often to attend such joint meetings; and that was said with regret, for most of his interest was in the non-ferrous field, a field in which the Institute of Metals fostered discussions and arranged works visits. Foundrymen in the London area were concerned with a wide variety of interests, and this particular meeting had been extremely stimulating, focusing attention on an important problem. He also appreciated the fact that during the evening there had been an adjournment for refreshments. That was in itself a very nice gesture, and it afforded an opportunity to chat with one's friends.

On the subject of Mr. Ruddle's Paper, Mr. Tipper said that on a former occasion he had had the privilege of studying some of the work discussed, but that evening Mr. Ruddle had presented a complete picture of the whole subject as it had been evaluated to date. He shared the feeling that there was a lot of theory which did not work out consistently in practice. Speakers had given examples of castings which apparently did not react to quite the same procedure or range of compositional values as had been mentioned in the Paper. Nevertheless, he believed that if founders studied their problems with this theory in mind they would arrive at sound conclusions, even if all the examples did not necessarily fit the same facts. Although figures had been worked out for particular compositions in certain castings, they did not necessarily apply to any other casting. For example, Mr. Forrester had mentioned his experience with a particular job, where different circumstances applied, but Mr. Tipper did not think it discounted the basic work that had been done by the British Non-Ferrous Metals Research Association; it did not mean that the assumptions made under the conditions of the Association's tests were not correct. What one would like was an easy way of determining the correct gas content, or the amount of reaction that was necessary to produce the least-damaging porosity in a particular casting. The answer at present was that each case must be studied on its merits.

MR. R. G. HARPER, seconding in a whimsical vein, said that one reason why he had particularly enjoyed Mr. Ruddle's most lucid exposition of the subject was that it afforded an example of a change of outlook on some of the problems of the foundry industry. Most foundrymen spent a large part of their lives in chasing things such as blowholes and trying to eliminate them. Mr. Ruddle, however, was a kindly man, and that was not his way. He had taken the blowholes by the hand and told them that if they behaved properly they could be useful members of society, rather than saboteurs; thereby he had put to useful work things always regarded as being very dangerous.

Mr. Harper drew attention to the statement made by Mr. Ruddle, when giving examples of the benefits accruing from the work described, that in one case, by applying the knowledge gained, it had been possible to reduce scrap from ten to two per cent. That was probably as great a technical achievement as would be the reduction of scrap from 100 per cent. to 10 per cent. At very high scrap levels one could usually find out what was going wrong but when seeking the cause of occasional troubles, it was necessary to discard such criteria as the separately-cast tensile test-bar, to which founders had been wedded far too long, and use statistical methods. Such work usually occupied a very long time, but Mr. Ruddle had shown how useful it could prove in the end.

The vote of thanks was accorded with acclamation and the discussion then terminated.

Change of Address. Heathcote & Coleman, chartered accountants, who are the secretaries for a number of foundry employers' associations, have taken new offices at 69, Harborne Road, Edgbaston, Birmingham, 15, telephone No. EDGbaston 4141 (six lines) and telegraphic address "Clarify, Birmingham 15."

Foundry Studies

From a private letter received from Mr. James Timbrell, permission has been given for the following abstracts of general interest to be made:—

"The presentation painting by Mr. J. Mitchell (JOURNAL, February 10) interested me very much, as I have often wondered if any foundry subjects have been recorded by artists, apart from the many shown in commercial art which are indeed excellent work. The reproduction in the JOURNAL, of course, can give no indication of colour—moulding-shop subjects are difficult as they provide little contrast, particularly so in the older type of foundry where heavy gear and traditional routine is unavoidably necessary.

"'Mortuary Black' seems to be the prevailing colour in most foundries; no wonder some of the old time gaffers used to wear a bowler and a white coat; they stood out like a half-crown on a chapel collection plate! The scene Mr. Mitchell portrays will bring to mind many similar ones, where the 'heavy squad' usually gather round awaiting the alert to stand to, all staid and placid, with feeding rods, skimmers shovels, and so on.

"Notice the old hands round a big job, how they always look behind them, noting any obstruction likely to interfere with a hasty retreat, in the event of a 'bang off,' or a real volcanic mould vomit, (not unknown), caused by some mug 'plugging' a main vent, to *keep the metal out*, he would say! Siamese cats are sluggish compared with slow moving foundrymen hit with a few hot pellets, propelled at high velocity down the shirt front; non-jumpers and the like are handicapped.

Disturbed Times

"Another side of heavy 'stuff' not easily depicted is the tense anxiety, felt by the bloke who can think of no 'buck passing' excuses to the directors in the event of the job going 'west.' If the job stays quiet after pouring, he gets another spasm, when the top is lifted off a few days later, and another when the casting is 'riven out by the roots.' Regaining his composure after a night or two's sleep, he calls 'casual-like' at the marking-out table, and is told confidentially that one of the sixty-odd cored holes is out of line by about 16 ft. This dilemma is usually put all square at the local, by tipping the job a bit, and marking fresh datum lines on the smoke-room table. He gets a real stab later, when some 'progress reporter' drops in on him, and whispers that the water jackets are 'weeping' under town-water pressure. 'Weeping,' 'ye gods,' a foundryman, like a Greek, has a word for it.

"In the meantime he's cast another. No wonder 'heavy-bay bummers' after forty years, either go deeply religious or cynical. But, seriously though, to a man who is really boss of it, the job sits light, and there are always candidates for the honours. After fifty-odd years, I would start all over again at the beginning, there is not a job so interesting or creative, or a branch with the same scope for individual leadership. It is not all easy, much of it is hard, but where can you find a happier crowd than foundrymen.

Tricks of the Trade

"Just one of dozens, was a character of forty years ago, answered the nickname of 'Tick,' a wisp of a fellow about seven stone, who didn't mind being shut up in an un-cored closed mould, to see if the joints were good and so on. He taught me a lot, (when he had no further use for the experience), he could black-up a 'green' mould in no time, without a trickle or a swab mark. He used to bring his own swabs, already 'teased out,' we never saw one till he had it in use. We could not find what material it was made of, until, one night, one of the boys took his sister out, and found out it was lengths of silk waste, tied up, 'hemp-swab' fashion, then beaten on a stone slab till it had the taper and shape necessary—it worked like an artist's sable!

"He mixed his own blacking, too, and when his dried moulds were poured, they always gave off the odour of brewers' barley sugar. He reckoned it was brown ale, but as he spoke Scotch and boasted about his Aberdeen connection, it was doubtful, but it may have been beer in some form or other. His mould coats were like enamel, 'fast as a church,' and peeled off the casting a snip. He brought his own blacking bucket, a large 'sea-sider' with a plate division soldered down the middle, to form two compartments, one for the 'witches brew,' and one for the 'diluter,' taking a dip in each as the need arose. There were no blind letters or filled-up bosses. A modern spray couldn't match it to-day.

"Can you imagine the younger end nowadays living their job and liking it as the old-timers did?"

B.S.F.A. Customer/Founder Convention

The detailed programme for the convention and exhibition of the British Steel Founders' Association to which customers are invited has now been issued:—

Wednesday, April 15

12 noon. Opening by the Minister of Works, the Rt. Hon. David Eccles, P.C., M.P. (Exhibition remains open until 7 p.m.)

Thursday, April 16

9.45 a.m. Chairman's opening address, followed by:—

10.00 a.m. *First session:* "Steel Castings and their Application," by Frank Rowe, B.SC., F.I.I.A., managing director (K. & L. Steelfounders & Engineers, Limited).

2.15 p.m. *Second session:* "Customer Experience with Steel Castings," by A. C. Annis (Metropolitan-Vickers Electrical Company, Limited), and Mr. R. A. Riddles, C.B.E., M.I.MECH.E. (British Railways executive). (Exhibition open from 9 a.m. to 7 p.m.)

Friday, April 17

9.30 a.m. *Third session:* "Quality Control and Inspection as a Part of the Manufacturing Process," by Dr. John Rait (Hadfields, Limited).

11.45 a.m. *Fourth session:* "Research as it Affects the Customer," by J. F. B. Jackson, B.SC., A.R.I.C., F.I.M., director, British Steel Castings Research Association.

2.15 p.m. *Final session:* "Policy Making and Fact Finding," by T. H. Summerson, chairman, British Steel Founders' Association.

Important Date

The annual convention of the Joint Iron Council will take place at the Café Royal, Regent Street, London, W.1, on Tuesday, November 3. The customary business meeting will begin at 10 or 10.30 a.m. and will be followed by luncheon. In the afternoon, an "open session" will be held, on the lines successfully adopted at the previous convention. This also will take place at the Café Royal and will end about 4.30 p.m., leaving members good time in which to return to their hotels and prepare for the annual banquet at the Dorchester Hotel, Park Lane.

IF NATIONALIZED INDUSTRIES show a loss, they should be told to bear it—that would be an incentive for them to get things straight, said Mr. Steven Hardie, former chairman of the Iron and Steel Corporation of Great Britain, speaking at Croydon recently.

An Ex-apprentice writes to his Former Master

By T. R. Harris

During the early years of the last century, a large number of small foundries were started in various localities to supply the needs of their immediate neighbourhoods. Some of these foundries developed into large engineering establishments, but others simply carried on in a small way and after a while went out of business.

An account of the beginning of a foundry at Canterbury in the middle of 1835 is contained in a letter from an old apprentice to his former master. Dated June of that year it reads:—

Honble. Sir, I have left my situation that I had when I was at home and likewise the manager of the concern, he has been with the firm for seventeen years, the reason is that the young master's conduct has been so bad and he is losing the connections very fast and we have been persuaded to go into business in a small way in the Foundry and Smithy line and most all tradesmen in Canty. will give us their support. There is a gentleman in Canty. that feels very much interested in it and has taken very extensive premises for us in the centre of the City and they are so adapted that we can begin to work with very little expense. I left the shop last night and am going to work at the new one tomorrow morning and I can assure you as a fact that we have above two hundred pounds worth of work ordered and some of the patterns are coming in to-morrow. We expect to begin to cast next week, we have 4 tons of pig iron coming in tomorrow from London, as our Capital is but small, about 3 Hundred Pounds and we shall be obliged to set on about 3 Pair of Hands and I am positive that I can cast from 20 to 30 Pounds of work in a week with my own hands and we want to keep our money as long as we can to pay the wages, and we are afraid to order too much iron from London as the dealers come down every three months, and I have been thinking if you will be so good as to let us have a few tons of pig iron from Wales, I will pledge my word as soon as we receive our money for the work we will remit it to you and what interest you will please to charge, as a great many Tradesmen do not pay under twelve months. I should like to have, if agreeable to you, about 10 tons of No. 1 and 10 tons of No. 2. I am sorry that we cannot give you any more security. My old master used to have his iron brought from Cardiff to London, by the Traders for about 12 shillings per ton freight and there is a Barge from London to Whitstable twice a week that goes alongside the Cardiff Traders and brings the goods down. If you be so good as to send any Iron please direct for Messrs. Drury and Biggleston, Iron Founders, Canterbury, Kent, or I should be highly honored with a letter of your advice, direct for me, Westgate, Canterbury. W. H. Biggleston.

By May, 1836, the firm had become Drury, Biggleston & Company, and Biggleston again writes:—

"Having from 50 to 100 Tons of cast iron to dispose of we have taken the liberty of writing to know if you are a buyer of the article, we would not part with it under any circumstances if it was not too large for our Furnace and we have no opportunity to break it. It has been used as furnace bars but is not much burnt many of them not being even marked it is from 6 to 12 inches square principally 8 inches, the lengths vary from 4 to 18 feet principally about 12 ft, some of the bars will weigh from 2 to 3 tons. We can chip or file it as wrought iron. We have with great exertion succeeded in breaking off an end through which there was a hole and it has all the appearance of pig iron, in fact if such a process is ever adopted we should say it has been run into the bars instead of pigs. It has not been used these 60 years and is now lying by the sea-side at Whitstable. Our impression was that any of the colliers could be freighted with it after they have discharged their cargo of coal. If you will favour us with a line in course of post stating your opinion of its value we should feel particularly obliged. . . ."

Nothing further has come to light, respecting this foundry, from the source the above was obtained, and it is wondered what the subsequent history of the firm may have been, whether it stayed the course or soon closed down.

Discussions on Export Problems

A meeting was held at the Treasury last week between Mr. R. A. Butler, Chancellor of the Exchequer, accompanied by Mr. Peter Thorneycroft, President of the Board of Trade, and Mr. Duncan Sandys, Minister of Supply, and representatives of the Federation of British Industries, the Association of British Chambers of Commerce, and the National Union of Manufacturers.

The purpose of the meeting, the second in a series of informal conferences initiated last December between the Chancellor and representatives of industry, commerce, and trade unions, was to discuss certain commercial questions in the export field. Among the principal problems discussed which confront exporters were credit terms for U.K. exports and exports to countries short of sterling. There was a full discussion on this agenda during which the development of Government policy designed to help exports was explained in relation to each item. It was agreed that contact should be maintained.

Machine-tool Exports

A strong plea for the greater encouragement of machine-tool exports was made by the chairman, Mr. Robert W. Asquith, at the annual dinner of the Machine Tool Trades' Association, held at the Dorchester Hotel, London, on March 24. The principal guest was Lord Piercy, chairman of the Industrial and Commercial Finance Corporation, Limited, who said that some inducement should be offered to British industrialists to undertake additional investment in productive plant. The arrangements for writing off capital expenditure were much more liberal in other countries—for example, the United States and Sweden—than they were in Great Britain, and British industry suffered in consequence. If some easing of that situation could be achieved, it would be a good thing for British industry in general, and for the machine-tool industry in particular.

AN INCREASE of £203,459 to £639,667, before depreciation, in the group trading profit for 1952, is announced by the directors of the British Rollmakers Corporation, Limited.

Notes from the Branches

Bristol and West of England

The Bristol and West of England branch of the Institute of British Foundrymen has now completed a very successful winter programme. The average attendance at the lectures has been 40 members, a very satisfactory figure in view of the scattered nature of the branch.

On November 15 Mr. H. P. Hughes presented a paper on "Controlling the Composition and Structure of Cast Iron by means of Ferro-alloys." An interesting discussion followed, many members questioning the various recommendations made by Mr. Hughes, especially with regard to the use of cupola charges containing very high proportions of steel scrap. It was intimated that the percentage of steel scrap in many charges could be increased up to approximately 75 per cent. and some members considered this figure rather a high one for normal cupola operation.

Mr. P. G. Pentz visited the branch on December 13, and gave a very popular paper on the use of synthetic resins in the foundry. Indicating the progress which had already been made with resins for foundry use, Mr. Pentz suggested some possible future developments particularly with regard to "shell moulding" and similar application. The interest the paper aroused was evident from the fact that "question time" extended for more than an hour.

On January 24, Mr. J. Blakiston gave a paper entitled "Mechanical Aids in the Foundry." Illustrating his talk by means of slides and examples encountered in practice, Mr. Blakiston emphasized how many foundry handling operations could be simplified or speeded up by means of simple mechanical aids and a little commonsense. It was pointed out that, in considering mechanization, many factors must be taken into account. In a small foundry, mechanization might not be practicable but the use of mechanical aids could greatly help to increase output.

The meeting on February 21 took the form of a paper by Mr. B. Levy who dealt with patternmaking. In reviewing the many aspects of the subject, Mr. Levy pointed out that closer co-operation between the foundry, pattern- and core-shops would often simplify many of the problems encountered in everyday practice. An interesting and lively discussion followed the paper, and Mr. Levy was called on to answer many questions relating to the economics of metal/wooden composite patterns as opposed to all-metal patterns. Another topic causing much discussion was that of allowances to be made for the sagging of large cores. The location and arrangement of beads and core-prints also aroused much interest.

The last meeting at which a paper was given took place at the Queens Hotel, Exeter, on March 7, when the branch secretary, Mr. G. W. Brown, gave a talk on "Rapid Quality-control Tests and their use in the Foundry." Mr. Brown reviewed such tests as the chill, fluidity, "K" and "T" tests as well as rapid tests for sand control. Members were interested to know how metals were inoculated and treated once a test sample had been taken. Other members wished to know whether the lecturer advocated the use of several tests together, or was one particular test sufficient. In his replies Mr. Brown stated that inoculation and additions could be made to metals after test, when it was possible to make such additions in small ladles and ensure that a thorough stirring action was imparted to assist the solution of the additions. It was the experience of the lecturer that considerable information could be obtained from chill tests, and that fluidity and shrinkage tests could be used as an additional control factor.

The branch annual dinner and entertainment was held at the Grand Hotel, Bristol, on Saturday, March 21, and was attended by the national president, Dr. C. J. Dadswell, who was accompanied by Mrs. Dadswell, and Mr. T. Makemson, the general secretary. Other Institute guests present were Mr. Tomkins, president, and Mr. Wall, secretary of the South Wales and Monmouth branch. This year, guests from Bristol organizations were invited, and Mr. G. W. Wright, president of the Bristol branch of the Institution of Production Engineers and Mr. D. A. Wood, president of Bristol Engineering Manufacturers' Association, were present, and together with Mrs. Dadswell, responded to the toast of "Visitors and Ladies."

In responding to the toast of "The Institute of British Foundrymen," Dr. Dadswell described the work of foundrymen as being exciting and fascinating, and went on to add that one could get more of a sense of achievement from foundry work than members of any other profession, and the development of foundry technique contributed in no small way to the rapid growth of the industrial might of the country.

Mr. Balme, branch president, urged members to publicize and take part in works visits, and suggested that employers could profitably encourage some of their employees to attend such visits. Members should circulate knowledge of the industry more and more among the people who have scarcely heard of a foundry, he said.

Scottish—N.E. section

The last meeting of the present session of the North-eastern section of the Scottish branch of the Institute of British Foundrymen was held at Imperial Hotel, Arbroath, on March 18. Mr. J. F. Webster, the section president, occupied the chair, and Mr. J. Bell, the Institute's junior vice-president, attended. First, the annual business meeting was held, and in his report the secretary stated that during the second year in the life of the section eight meetings had been held. At these the average attendance had shown a definite increase. As previously, more than half this attendance was made up of non-members, which indicated that there were many interested foundrymen in the district. The section had some very enthusiastic members and several speakers had remarked on the high standard of the discussions. Adoption of the report and the financial statement followed.

Election of section officers for the next session then took place and the following were elected:—As *president*, Mr. H. J. M. Conacher; as *vice-president*, Mr. C. Scarcliffe; as *members of council* (for two years), Mr. J. Mitchell and Mr. G. N. Shepherd; and (for one year) Mr. J. Matchett. The *honorary secretary*, Mr. R. Leeks, was re-elected.

Mr. Webster then introduced Mr. Bell to the meeting. Addressing the members, Mr. Bell said it was a compliment not only to himself but to foundrymen in Scotland, that he had been elected to the office of junior vice-president. He referred to the progress the North-eastern section was making and mentioned the painting which had been presented to the Institute by a Dundee member, Mr. J. Mitchell.

Mr. W. W. Braidwood then gave his Paper entitled "Progress in British Ironfounding." In an informative, stimulating, and well-illustrated talk, he traced the development in all phases of foundry practice from 1940 onwards. A discussion followed during which the speaker was congratulated, and further technical details were elucidated. In closing the meeting, the president thanked Mr. Braidwood for his contribution

Notes from the Branches

to the session's activities. He also said that it was with confidence that he would hand over the presidency to Mr. Conacher, who had done so much to make the section successful. In his reply, Mr. Conacher promised to try and follow the fine example set by Mr. Webster and assured members that everything would be done to make the next session's programme at least as good as the one just being concluded. Finally, the secretary was asked to thank Mr. A. Brown, Mr. N. Crawford, Mr. A. Porteous, and Mr. J. Reid for their services during the session.

Scottish

The annual general meeting of the Scottish branch of the Institute of British Foundrymen was held in the Royal Technical College, George Street, Glasgow, last month, and there was a large attendance. The president of the Institute, Dr. C. J. Dadswell, the general secretary, Mr. Tom Makemson, M.B.E., and the assistant secretary, Mr. George Lambert, were present. After the minutes of the previous meeting had been dealt with, Mr. John Bell, hon. secretary, presented his Report on the branch's activities during the session, from which the following has been abstracted:—

Secretary's Report

Membership figures show the slight increase of eight from last year. The death occurred of the representative of a subscribing firm. He was Mr. R. Copleton of Irvine, who joined the Institute in 1944. The other three whom the branch lost by death all had a long membership; Mr. James McIntyre joined in 1931; Mr. W. McCulloch in 1925; and Mr. J. D. Moir in 1916. Mr. Moir lived in Bo'ness and the other two in Glasgow. All four were well known and highly respected, and Mr. McIntyre and Mr. McCulloch had each served for a period on the branch council.

During the year, five meetings of the branch have been held, this being the sixth. Attendances were higher than in the 1951-52 session, the average of 66 members and 12 visitors being recorded against 57 members and 12 visitors a year ago. The largest attendance was at the February meeting, when there were 92 people present. Five meetings of the branch Council were held against four last session. At one meeting the past-president, Mr. Ronald Taylor, intimated that the Institute's General Council had decided to nominate the writer of these notes for the position of junior vice-president of the Institute for session 1952-53. It was further intimated that should events move along normal lines, the annual conference of the Institute in 1954 would be held in Glasgow. An executive committee was elected forthwith consisting of Mr. Ronald Taylor, Mr. R. O. Patterson, Mr. R. S. M. Jeffrey and Mr. Daniel Brown, with Mr. Alexander Marshall as hon. secretary.

Meetings Held

During the session, the usual joint meeting with the Dundee Institute of Engineers was held, the speaker being Mr. Andrew J. D. Black, the branch president. There was a good attendance of foundrymen, including a fair number from the west. Naturally the members of the local North Eastern Section were well represented and, on the whole, this series of joint meetings amply justified the faith of those, in both Institutes, who inaugurated them some ten years ago. Reference to the North-Eastern section would not be complete without the mention of the picture painted by one of its members, Mr. James Mitchell, and presented by him to the Institute. It is now hanging on the walls of the general office in Manchester, at once a tribute to the ability and generosity of Mr. Mitchell. In other respects, the North-Eastern section have had a successful session and the thanks for that must go chiefly to the local office-bearers, especially Mr. Webster, president; Mr. Conacher, vice-president, and Mr. Lecks, hon. secretary. The Falkirk section has also had a successful session, and here, as is usual, the president, Mr. W. Bulloch, and hon. secretary, Mr. A. Bulloch, have done a very good job indeed.

Branch Awards

The branch again shared in the Institute honours. On this occasion the recipient was Mr. Joseph Gorman, who was awarded a diploma for the excellent paper entitled "Cross-section of a Non-ferrous Jobbing Foundry." In the "John Surtees" Competitions held during session 1951-52 the names of these winners are: *Senior competition*, Mr. John McGrandle; *junior competition*, Mr. R. J. Campbell and equal first, Mr. John Q. Dickie; *supplementary*, Mr. Allan Campbell and equal first, Mr. A. Jackson. The winners of the Sir Archibald McInnes Shaw prizes were invited to the October meeting of the branch, when the president congratulated them on their successes. They were, in foundry practice, Mr. William J. Martin, and in patternmaking, Mr. William Smith.

The branch dinner at the close of last session was noteworthy for the opportunity taken to make a presentation to Mr. Makemson.

Your branch secretary has been called to still higher service, and, all being well, he will become president of the Institute in 1954. Meantime, he would like to express his deepest thanks for all the friendship and kindnesses with which you have surrounded him in the years that are passed. He welcomes the appointment of Mr. Alexander Marshall as his assistant secretary in session 1952-53, and he hopes this arrangement will continue in session 1953-54.

One final word—the list of our past presidents is a long and growing list. It contains the names of many, who in former years gave of their best that the Scottish branch and the Institute might prosper. Each brought their divers gifts, no two have been alike, but all had this is common—a desire to give of the best they knew and the best they had to the office to which they had been elected. By this standard, Mr. Black, this year's president, measured up to the stature of those who had gone before, and for all he has done we thank him. We hope he will have many happy memories of his year of office.

Election of Officers

The following members of the branch were elected to the various offices for the next session:—As *president*, Mr. J. Cameron, Jr.; as *senior vice-president*, Mr. Daniel Brown; as *junior vice-president*, Mr. J. M. Douglas. As *members of council* (3 years), Mr. R. Connell, Mr. A. I. Donaldson, and Mr. C. B. Scorcliffe, and (1 year) Mr. John McGregor. As *representatives to general council*, Mr. J. Cormack, Mr. A. Marshall, Mr. Tom Shanks, and Mr. R. R. Taylor; and as *representative to technical council*, Mr. James McPheat. The *hon. secretary* (Mr. John Bell) was confirmed in office.

After the business meeting, members heard a Paper "Practical Application of Some Modern Ideas in the Brass Foundry," by Mr. J. M. Douglas and Mr. W. S. Richardson. On the evening of the same day the annual dinner of the branch (reported elsewhere in this issue) was held.

Average Weekly Earnings Rise

An inquiry instituted by the Ministry of Labour and National Service in October, 1952, reveals that weekly earnings of 6,500,000 manual wage-earners in manufacturing industries and certain principal non-manufacturing industries in the U.K. amounted to £7 11s. 11d. This is an increase of 185 per cent. on the 1938 earnings. It is estimated that returns received from employers cover more than two-thirds of the total number of wage-earners employed in the industries concerned.

The earnings include overtime, piecework, etc. There are wide variations between different industries; in each the proportion of skilled workers varies, as do opportunities for extra earnings. Thus, it is not possible to compare similar classes of workers in the various industries. Table I gives particulars of average weekly earnings in the last pay-week in October, 1952, in selected industrial groups.

The weekly hours of work in different groups, except coalmining, of industry were also included in the inquiry. The average over all industries included totalled 46.1 compared with 46.5 in 1938. Table II shows the average hours worked in the last pay-week in October, 1952, in selected industries.

Monthly statistics issued by the Ministry of Labour show that the index of weekly rates of wages stood at 135 at the end of February, compared with 134 at the end of January. The changes in rates of wages during the month resulted in an aggregate increase of £543,000 for about 1,635,000 workpeople, employed mainly in building, civil engineering, construction, and coalmining.

TABLE I.

Industry group.	Men (21 years and over).	Youths and boys (under 21 years)	Women (18 years and over).	Girls (under 18 years).	All workers.
	s. d.	s. d.	s. d.	s. d.	s. d.
Treatment of non-metalliferous mining products other than coal	183 5	86 6	92 2	62 8	158 5
Chemical and allied trades	176 3	79 11	97 2	62 8	154 6
Metal manufacture ..	201 11	85 7	99 5	61 4	188 4
Engineering, shipbuilding, and electrical goods ..	188 3	71 0	101 8	61 10	164 7
Vehicles	193 0	67 3	108 3	69 2	173 8
Metal goods not elsewhere specified ..	186 11	74 11	94 1	60 11	151 2
All manufacturing industries	184 9	73 1	96 10	61 2	150 10
Mining and quarrying (excluding coal) ..	173 9	88 7	97 4	—	168 4
Building and contracting	174 6	81 6	85 9	—	165 9
Gas, electricity, and water	169 10	75 9	94 9	—	163 7
Principal non-manufacturing and manufacturing industries	178 6	74 11	96 4	60 9	151 11

TABLE II.

Industry group.	Men (21 years and over).	Youths and boys (under 21 years)	Women (18 years and over).	Girls (under 18 years).	All workers.
	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.
Treatment of non-metalliferous mining products other than coal	40.0	44.4	41.4	42.9	47.1
Chemical and allied trades	47.0	43.5	42.0	42.8	45.9
Metal manufacture ..	47.8	43.7	41.3	41.9	47.1
Engineering, shipbuilding, and electrical goods ..	48.4	44.0	42.3	42.5	47.1
Vehicles	46.8	43.7	42.0	42.4	46.1
Metal goods not elsewhere specified ..	47.6	44.2	41.1	42.3	45.4
All manufacturing industries	47.6	44.0	41.9	42.7	45.7
Mining and quarrying (excluding coal) ..	48.4	44.9	43.5	—	48.2
Building and contracting	48.1	45.9	39.1	—	47.9
Gas, electricity, and water	47.8	44.2	40.5	—	47.5
Principal non-manufacturing and manufacturing industries	47.7	44.4	41.8	42.7	46.1

Increased Export of German Iron and Steel Products

In 1952 Western Germany's iron and steel exports accounted for only 6.3 per cent. of total West German exports, compared with 8.7 per cent. in 1950 and 20-25 per cent. before the war. The steel industry has, however, contributed substantially to an increase in exports of engineering and other steel-using industries between 1950 and 1952. Exports in these industries rose from the equivalent of £200,000,000 to £575,000,000 during that period.

Internal steel consumption per head rose from 213 kg. in 1950 to 301 kg. in 1952. Iron-ore imports doubled during that period, amounting to 11,000,000 metric tons in 1952.

According to Herr Schwede, director of the foreign trade group of the Iron and Steel Association, the reduction of iron and steel exports in favour of iron and steel products was due partly to a fall in export prices below those realized in the domestic market, and partly to export limitations imposed on the iron and steel industry to secure adequate supplies of raw materials for German manufactures.

Iron-ore Imports

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

Country of origin.	Month ended February 28.		Two months ended February 28.	
	1952.	1953.	1952.	1953.
	Tons.	Tons.	Tons.	Tons.
Sierra Leone	87,380	54,790	132,765	87,218
Canada	4,050	35,185	32,430	88,785
Other Commonwealth countries and the Irish Republic ..	700	3,098	2,970	4,067
Sweden	254,618	250,602	572,041	443,806
Netherlands	300	—	850	930
France	40,584	29,515	66,362	75,574
Spain	55,317	53,093	110,295	92,306
Algeria	123,720	128,708	294,449	281,194
Tunis	20,655	30,950	62,985	77,520
Spanish ports in North Africa .. .	26,450	—	46,138	5,600
Brazil	10,261	8,450	10,261	17,403
Other foreign countries	50,256	80,373	86,976	174,240
TOTAL	674,291	674,764	1,418,522	1,348,703

Economic Prospects this Year

Dependence on Metal Supplies

Maintenance of an economic balance this year hinges on the production of more coal and steel for use at home and sale abroad, says the Government's "Economic Survey for 1953," published last week. Over a large part of the economy the course of production seems likely to depend on what happens to demand at home and on industry's success in selling abroad; but further expansion would be impossible without adequate supplies of coal, steel, and other raw materials. Inflation must continue to be held in check. Costs and prices at home must be kept in line with those of our competitors. The re-equipment of industry and the maintenance of full efficiency is of vital importance. The policies of the Government will continue to be directed to achieving these ends.

Fuel and Steel Production

The prospects for supplies of crude steel in 1953 are good, and it should be possible considerably to reduce our dependence on imports. The industry plans to produce 17,500,000 tons of crude steel during the year, over 1,000,000 tons more than the record output of 16,290,000 tons achieved in 1950. The new blast furnaces, coke ovens, and sinter plants which were brought into service in the second half of 1952 will make their first full year's contribution; some further increases in capacity are due this year. To provide the raw materials for the planned increase in production there will have to be still larger supplies of iron ore as well as the continuance of the high yield obtained in recent years from the home scrap drive.

Raw Materials

Current stocks of most imported raw materials are fairly healthy, and rising world output should in the main be adequate to meet any likely increase in demand in this country or elsewhere. There are one or two minor materials like selenium which are still difficult to get. Natural sulphur remains scarce, but rapid progress has been made in this country with schemes for increasing production of sulphuric acid from pyrites and other alternative materials, and these schemes should show big results this year. The general improvement in raw material supplies does not in any way lessen the need for economy in use, or for the fullest possible recovery of waste and secondary materials. Any saving of expenditure on imports is worth while and will help to ensure that the means can be found to pay for overseas supplies in any future years when prices may be more unfavourable than they are now. With one of two important exceptions, such as copper, aluminium, and nickel, raw material prices are at present much lower than a year ago, but the circumstances can change very rapidly indeed if there is a sudden rise in world purchases for consumption or stock.

There is every reason to expect that the supplies of basic materials will be sufficient to support a higher level of production in 1953; in particular, the steel shortage is no longer holding back engineering output, except in one or two industries where there are still difficulties over plate or special types of steel. By the beginning of 1953 total industrial production had recovered from the sharp fall in the middle of the previous year and was back nearly to the 1951 level. There is little doubt that the necessary labour, materials, and industrial capacity will be available for further expansion in 1953.

Effectiveness of Joint Consultation

Has joint consultation proved a satisfactory means of two-way communication between worker and management? According to Mr. John Munro Fraser, senior lecturer in human relations, Department of Industrial Administration, Birmingham College of Technology, it has not. The obvious course now is to turn again to the existing chain of responsible executive control through executives and supervisors. He was giving the last lecture in a course at the College of Technology of six weekly lectures and discussions for industrial executives on the human aspect of management.

As a means of giving expression to workers' opinions in a crisis or on a particular issue, he said, representative committees had a part to play. If they could be linked with trade union means of representation at factory level their effectiveness would be increased. As a means of communicating managerial intentions to the workers they were a useful supplement to the normal management chain of communication, but no more.

As a means of enlisting the participation of the main body of workers and making them feel that they counted as individuals, representative committees were of very limited effect, he continued. If the time spent on trying to make representative committees work had been spent on making the existing chain of responsible executive control reach effectively from higher management to the worker on the job, there would have been startling results. Executives and supervisors were face to face with their subordinates on the real issues of the job.

Book Review

The Company Director—His Functions, Powers and Duties, by Alfred Read, C.B.E. Published by Jordan & Sons, Limited, Chancery Lane, London, W.C.2. Price 30s. net.

The reliability of this book is unquestioned as it has been prepared under the authority of the Council of the Institute of Directors. A foreword commending the work has been written by the Right Honourable Oliver Lyttelton, P.C. The contents of the book are indicated in the title, and though the subject is a complicated one, the author has by the use of simple language gone far towards reducing these complexities, so that they can be readily assimilated. A recent measure, which has been occupying the minds of Boards of directors is the retirement at 70 rule. From reading this book, it would seem that it is quite easy to continue in office, by submitting a special resolution at the annual general meeting of the company, or by means of an appropriate paragraph in the Articles of Association. A feature which the reviewer likes is the inclusion, by way of appendices, of all the various forms required by Somerset House for placing resolutions before the shareholders. The book is logically set out and particularly well indexed, a feature which, coupled with an extensive contents list, makes reference to the various sections quite easy. The book can be unreservedly recommended to company secretaries and directors in general.

V. C. F.

THE SUM OF £10,000 EACH, "free of all conditions," has been presented by Viscount Weir of Eastwood, chairman of G. & J. Weir, Limited, engineers and founders, of Glasgow, to the Institution of Marine Engineers, the Institution of Mechanical Engineers, the Institution of Naval Architects, the Institution of Engineers and Shipbuilders in Scotland, and the North-East Coast Institution of Engineers and Shipbuilders.

Personal

MR. FRANK FOSTER, M.SC., A.M.I.E.E., has been appointed general manager of Crompton Parkinson, Limited, "Cyc-Arc" Stud Welding Division.

MR. ALBERT PARKINSON, M.B.E., chairman of Crompton Parkinson Limited, has resigned his position as joint managing director, but will retain his chairmanship.

MR. JACK WILLIAMSON has retired as works technical officer for the Jessop-Saville group of steel companies, Sheffield, and has been appointed technical manager of Spear & Jackson, Limited, Aetna Works, Sheffield.

Mr. PERCY GODSON, foreman of the plating shop at the Falkirk works of the Carron Company, has retired after 62 years' service, 26 years as foreman, and has been presented with gifts from his fellow workers.

MR. T. A. MCKENNA, chairman and managing director of the Staveley Iron & Chemical Company, Limited, is on a business visit to New York. He sailed from Southampton on April 2, in the Queen Elizabeth.

MR. C. O. BURGESS, technical director of the Gray Iron Founders' Society of Cleveland, Ohio, together with Mrs. Burgess, flew back to the States on March 31. He has been investigating foundry research activities in Europe.

MR. J. T. HOLMAN and MR. N. P. HOLMAN, directors of Holman Brothers, Limited, have been appointed to the Board of Climax Rock Drill & Engineering Company, Limited. Mr. P. M. Holman is now managing director, whilst Mr. R. Ewing is chairman of the Board.

MR. C. H. KAIN, joint managing director of Lake & Elliot, Limited, Braintree, has returned to this country after a two months' business tour in the Caribbean area. MR. P. B. LAKE, A.C.A., a director of the company, has been sworn in as a Justice of the Peace for the County of Essex.

AT BETCHWORTH PARK GOLF COURSE, Dorking, on March 30, Mr. A. K. Kirk, liveryman of the Founders' Company and managing director of Samuel Russell & Company, Limited, ironfounders, of Walsall, won the Founders' Company Golfing Society's annual match for the second year in succession.

MR. WALTER TONKINSON, director and chief engineer of the Electric Construction Company, Limited, Wolverhampton, retired on March 31. He joined the company in October, 1898, becoming a member of the test department staff in 1901, transferring to the machine design department in 1907. He became chief engineer in 1915 and director in 1942.

MR. NORMAN READMAN has been appointed managing director of the Consolidated Pneumatic Tool Company, Limited, in succession to MR. J. A. OWEN, who has expressed the wish to resign from that position after completing fifty years of uninterrupted service with the company. Mr. Owen will continue as a director and technical consultant.

MR. BERTRAM WHITE, technical director of the Federation of British Industries, has resigned as from March 31, 1953, to take up an industrial appointment. DR. J. E. G. HARRIS, D.SC.(LOND.), B.A.(CANTAB.), will succeed him temporarily as acting technical director. Dr. Harris had a long association with Imperial Chemical Industries, Limited, from whose service he has now retired.

DR. G. P. CONTRACTOR, who, for 3½ years has been acting director of the National Metallurgical Laboratory of India, is relinquishing his services with the Indian Council of Scientific and Industrial Research at the end of this month, followed by four months of privilege leave. Dr. Contractor has been with the Council for nearly 9 years. He is leaving India in August for Canada, *via* this country.

MR. B. H. MEARS, a director of A.B.O.E. (Export) and National Oil Engines (Export), has been appointed sales director of Mirrlees Bickerton & Day, another member of the Brush-A.B.O.E. group of companies. Mr. Mears has recently returned from a tour of Canada, and during the last four years he has travelled extensively for the group in India, Pakistan, Australia and Africa. He organized the group's agencies in East and West Africa. He has been associated with one or other of the companies which now form the Brush-A.B.O.E. group since 1924.

SIR JOHN DUNCANSON has retired from the various boards of companies in the Lithgow group. Sir John spent all his business life before the war with the Steel Company of Scotland, Limited, of which he became managing director. When that concern was acquired by Sir James Lithgow nearly 20 years ago, he became closely associated with the late Sir James. He was appointed director of heavy steel products and deputy controller of Iron and Steel in 1939 and three years later succeeded Sir Charles Wright as Controller of Iron and Steel. For three years after the war ended he served with the British Iron and Steel Federation as commercial and technical director, and in 1938 returned to Scotland to resume his association with the Lithgow group. In recent years Sir John, who was knighted in 1942, has been deputy-chairman of Lithgows, Limited, Port Glasgow, shipbuilders, and chairman and/or director of other companies in the group. He is also a director of the Commercial Bank of Scotland. He was British member of the British-American steel mission who in 1943 visited the Dominions and U.S.A., and he holds the U.S. Medal of Freedom.

Obituary

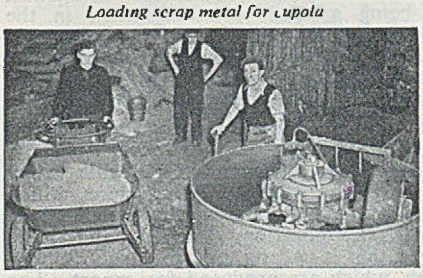
MR. EDWARD CYRIL FRITH, a director of Coleridge Engineering Company (Sheffield), Limited, which he joined 40 years ago as a draughtsman, died recently at the age of 58.

MR. HARRY MELVILLE PROUD, formerly chief commercial engineer of the Westinghouse Brake & Signal Company, Limited, colliery and electrical engineers, of London, N.1, died on March 30, at the age of 70.

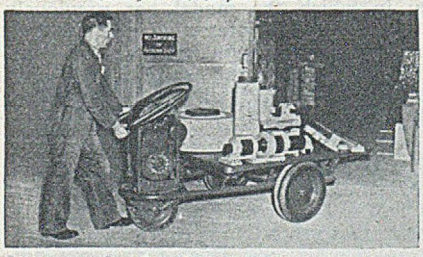
SIR ARTHUR MUNRO SUTHERLAND, the well-known Tyneside philanthropist, has died at the age of 85. He was perhaps best known as the founder, at the age of 29, of the Sutherland Steamship Company and as chairman of B. J. Sutherland & Company, Limited, shipowners. He was a director of Donkin & Company, Limited, engineers, of Newcastle-upon-Tyne. He was president of the Tyne Improvement Commission from 1935 to 1945, and was president of Newcastle and Gateshead Chamber of Commerce. He was Lord Mayor of Newcastle-upon-Tyne in 1918, and appointed High Sheriff of Northumberland in 1943. In 1940 he was elected a member of the Worshipful Company of Shipwrights. Sir Arthur was knighted in 1920 for his services in the first world war, and Knight Commander with star of the Royal Norwegian Order of St. Olav was conferred upon him in 1939 for his work in furthering Anglo-Norwegian trade. In the depth of the shipping depression in the '30's, his unbounded optimism, backed with orders totalling over £1,000,000, largely kept yards on the Tyne and Wear alive.

We've proved it pays!

Loading scrap metal for cupola



Sand from stock-pile to mixer



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We use the "Mechanical Moke" through all stages of production—carrying coke and scrap to cupola; patterns from pattern shop; sand to mixers and thence to Moulding floor; castings to Fettling Shop; and finished castings to Machine Shop. In fact, we use the "Moke" *everywhere* in Winget Works. It pays us handsomely, and we are sure it will pay *you*.

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Consider these features of the "Mechanical Moke":

Instantly interchangeable skip and platform.
Tilt the wheel—it starts. Release—it stops.
Nothing to go wrong—perfectly safe—unskilled labour can operate.
Rotates completely in a 6-ft. roadway.
Eight hours running on 1¼ gallons of petrol.
One control only for throttle, clutch, brake and steering.

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News in Brief

DURING THE WEEK April 11 to 18 Shipley Council is holding a scrap-metal drive, during which period it is hoped to collect between 20 and 30 tons from domestic sources alone.

WITH A TOTAL of 366 years' service with the firm to their credit, eleven employees of G. Waddington & Son Limited, Hull, tanners and glove manufacturers, were presented with suitably inscribed watches and clocks at a presentation concert held in the firm's canteen last week.

RILEY STOKER COMPANY, LIMITED, of 19, Woburn Place, London, W.C.1, announce that their Leeds Office has moved from London Assurance House, Bond Place, Leeds, to new premises at National Employers House, Quebec Street, Leeds, 1. The telephone number, Leeds 33274, is unchanged.

A DISPUTE arose last week at the works of Auto-Malleable (Bingley), Limited, malleable ironfounders, Phœnix Works, Crossflatts, Bingley, when on Tuesday six men employed as fettlers were asked to re-fettle about 1,700 castings without pay because the management did not consider them up to standard.

THE PRICE OF DEXTRIN having been reduced, the Fordath Engineering Company, Limited, have correspondingly lowered their sales price of goods carrying this material. As the price of other raw materials is tending in the same direction, founders can anticipate lowered costs for core-shop materials in the future.

THE CHAIRMAN of the North Thames Gas Board, Mr. Michael Milne-Watson, has stated that the board has decided not to raise the price of gas for a year at least, provided that there are no large increases in the price of coal or other basic costs. This had been possible because of increased sales and more efficient operation.

THE STAVELEY IRON & CHEMICAL COMPANY, LIMITED, of Chesterfield, have just opened modern baths for the men of the foundry department. There are over 600 lockers where the men may leave their dirty clothes, and then pass through the baths and on to other lockers where they dress into their going-home clothes.

UNITED KINGDOM MANUFACTURERS have booked 55,000 sq. ft. of space, more than double last year's bookings, at the sixth annual Canadian International Trade Fair to be held at Toronto from June 1 to June 12. The largest single section, for machinery and equipment, will occupy about half the total exhibit area.

DETAILS OF an investigation carried out by Mr. A. Butler and Mr. A. L. Godbert, of the Safety in Mines Research Establishment, into the colour measurements of mine dusts as a method of estimating their contents of inert material are given in Research Report No. 57, published by the Ministry of Fuel and Power (price 1s. 6d.).

THE UNITED KINGDOM will receive 5,526 metric tons of primary nickel and oxides in the second quarter of this year compared with 5,433 metric tons in the first quarter. Total allocations to 34 countries announced by the International Materials Conference amount to 37,799 metric tons, compared with 37,272 metric tons in the first quarter.

SHEEPBRIDGE ENGINEERING, LIMITED, Chesterfield, announce that following the transfer of their Group sales office from London to Chesterfield, Mr. M. M. Hallett, formerly Research and Development Manager, has been appointed Director of Sales with the object of ensuring the highest standard of technical service to customers.

A BROCHURE, descriptive of their origin and objects, has been prepared by the Scottish Engineering Employers' Association, in celebration of their diamond jubilee. It is shown that as a result of meetings in which ten west of Scotland firms were leading parties, the Glasgow district of the Engineers' & Boilermakers' Association was formed and began to function in January, 1893.

SELLING CONDITIONS in the foundry industry were discussed at a special two-day sales conference held by the Brown and Polson group of companies which includes Corn Products, Limited, in London on March 26-27. The conference, at which Mr. C. L. Clarke was chairman, was opened with an address by Mr. J. B. Beck, managing director, and Lord Rowallan, chairman of the company, was the speaker at the final session.

THE REPORT of the International Nickel Company of Canada, Limited, discloses that ore production reached a new high figure of 13,248,593 tons during 1952. This was made possible by the lifting of underground production to 10,196,068 tons, an increase of more than 30 per cent. over 1951, and 75 per cent. over 1950. During the same period rolling-mill facilities in the U.S. and the U.K. were expanded, outputs increasing by more than 15 per cent.

IN 1952, FOR THE FIRST TIME, statistics so far available indicated that the volumetric production of aluminium in the free world exceeded the combined volume of the older non-ferrous metals—copper, lead, and zinc—states the report of the directors of Aluminium, Limited, Canada, for that year. Sales of aluminium by consolidated subsidiaries of the company reached a record level of 488,300 metric tons, the U.K., the U.S., and Canada being the principal outlets.

THERE WERE SIGNS that industry was beginning to recognize the value of statistics, said Mr. T. J. Lunt, statistician to Ferranti, Limited, electrical and general engineers, of Hollinwood (Lancs), addressing the Manchester Statistical Society on March 25. Statistical methods were being applied to management in the measurement of productivity, in time study, and operational research. Much progress, however, could not be made until physics and engineering students came to regard statistics as a normal part of their studies.

AN ORDER has been placed with Geo. Salter & Company, Limited, West Bromwich, to cover what is expected to be the largest capacity portable crane weighing machine in the world. This machine, which will have a capacity of 200 tons, has been ordered by the English Steel Corporation, Limited, and it is already envisaged that it will be used to weigh castings of 168 tons each, which are produced for export. The highest capacity in which the model has previously been made is 120 tons. An interesting point is that the machine was designed by John Hughes, who commenced to work for the firm at the age of 9 and "died in harness" at the age of 91—a span of 82 working years.

THE ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS held its second exhibition at Earls Court, London, from March 25 to 28. The first was held last year in the new hall of the Royal Horticultural Society, and the response to that exhibition encouraged the association to seek larger premises. This year's show indicates that the move was welcomed by most exhibitors, who numbered over 100. Exhibits covered all aspects of electrical engineering, *i.e.*, for heat, light, electronic control, radio, and applications to industry in general. The stand of the British Iron and Steel Federation featured information on the scrap drive. The exhibition was officially opened by Sir John Hacking, deputy chairman (operations) of the British Electricity Authority.

Raw Material Markets

Iron and Steel

Most of the foundries closed for the Easter holiday from Friday evening until Wednesday morning. The volume of orders placed does not permit any improvement in outputs on recent weeks, particularly in the light-castings trade, at some of the jobbing foundries, and at the textile foundries. These establishments are the chief users of high-phosphorus iron, and although the prior claims of the steelworks have recently curtailed supplies of this grade of pig-iron, they do not appear to have suffered any adverse affect. Many foundries, already working on a reduced scale, with forward bookings low and unassured, are not taking up their full allocated tonnages, prefering to utilize the pig-iron in stock. The foundries which cater for the building trades and those supplying castings for agricultural implements are hoping to benefit from the seasonal impetus in demand at home, while there are prospects of improved trade for agricultural machinery from some oversea buyers whose financial position is brighter.

The engineering and speciality foundries vary in the amount of business on hand, those chiefly affected by the trade depression being connected with the motor, tractor, and allied trades. The supply of their requirements of pig-iron is generally fully met, the chief difficulty being in regard to hematite, although consignments of imported hematite which are being received are relieving the position.

Production of pig-iron at the furnaces is maintained at high levels. Good supplies of ore are being received on an increasing scale, although the supply of coke is not so assured and shortages are reported by some furnaces. Supplies of basic iron for the steelworks are more than double those of all other grades, and the foundry irons represent less than one-third of total outputs. This proportion is apparently sufficient to meet the present needs of the foundries, but the requirements of the steelworks are on an ever increasing scale.

Most of the allocations of finished steel for the second period have now been issued, but to secure acceptance of covering orders is a different matter. It is of no avail for makers to book orders in excess of their capacity and a policy of caution in this respect seems to be general. The heaviest demand is for flat steel products.

Non-ferrous Metals

The week preceding the Easter holiday proved to be a period of falling prices, at any rate on the Metal Exchange. The improvement in the international situation and the progress made towards a resumption of the armistice talks were bound to affect commodity prices, but it was inevitable that the non-ferrous metals, which have been the object of stockpiling plans, should react sharply to this changed atmosphere. The fall in tin was really spectacular; cash came down by £38 and three months by £52, the quotation at the close being the lowest seen for some 18 months. Most of the selling pressure appeared to be on the forward position. Further sharp falls in prices have been noted since trading was resumed on Tuesday.

In lead there was also a sharp decline, losses amounting to £6 5s. for April and £4 15s. for July. One favourable development was the narrowing of the backwardation. Zinc, although it lost ground, appeared to be the steadiest of them all, and the drop was limited to £2 for April and £1 17s. 6d. for July. With a contango of 15s. the market is much more attractive for hedging operations and it may be expected that hedge selling will be developing before long. In all three metals the turnover last week was above the average, but it would be wrong to presume that this reflects greater activity among the consumers.

Copper, of course, is not yet being traded on the London market, but there are prospects of the New York Commodity Exchange starting up again in the near future in copper futures. Last week saw a somewhat easier tone in copper in the States, for one of the big producers who had previously been holding for 32 cents came down to 30 cents and it was stated that this was, in fact, the general price among the primary producers. Custom smelters were dearer, as much as 34 cents being asked in one or two directions, but, in due course, their quotation will doubtless come more into line with the producers. Chile is still selling on the basis of 35¼ cents f.o.b., but the volume of sales has declined and is likely to shrink still more as supplies of secondary copper in the U.S.A. become more freely available and the output of the Custom smelters increases.

Aluminium was reduced by £5 to £161 on April 1, this move being in line with the recent change in the price of copper. These two metals are competitive in a fairly wide field, but of the two aluminium is actually and relatively very much the cheaper.

The British Aluminium Company, Limited, announces that it is passing on the reduction in the aluminium price generally as ½d. per lb. for basic and larger quantities, despite the fact that its present prices have not reflected the increased costs resulting from a wages award in November, 1952, and the recent increase in cost of fuel. The company announces greater reductions for basic and larger quantities of sheet and coiled strip in pure aluminium and medium-strength alloys—amounting to 1d. to 1½d. per lb. with progressively more in some cases for the thinner gauges—reflecting the advantages obtainable by bulk production in modern high-speed strip rolling mills. The differentials for small quantities of rolled materials—which have remained unaltered since 1948—have, on the other hand, been somewhat increased to compensate for the disproportionate effect of increased labour and other charges on the cost of manufacturing small items. Prices for sheet and strip for boxmaking and capping, which were substantially reduced in September, 1952, remain unaltered. Virgin aluminium rolling slabs and wire bars are reduced by £5 per ton. Prices for virgin aluminium alloy ingots, hardeners, and granulated powder have also been reduced. These reductions will be effective on all despatches made on or after April 6.

The following official tin quotations were recorded:—

Cash—April 1, £930 to £935; April 2, £900 to £905; April 7, £865 to £870; April 8, £830 to £840.

Three Months—April 1, £880 to £885; April 2, £875 to £880; April 7, £840 to £845; April 8, £802 10s. to £805.

Official zinc quotations:—

April—April 1, £76 15s. to £76 17s. 6d.; April 2, £77 to £77 5s.; April 7, £75 5s. to £75 15s.; April 8, £74 15s. to £75.

July—April 1, £77 to £77 5s.; April 2, £77 15s. to £78; April 7, £75 15s. to £76; April 8, £75 5s. to £75 10s.

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

April—April 1, £86 10s. to £87; April 2, £87 5s. to £87 10s.; April 7, £86 to £86 5s.; April 8, £85 15s. to £86.

July—April 1, £84 10s. to £85; April 2, £85 to £85 5s.; April 7, £83 5s. to £83 10s.; April 8, £83 to £83 10s.

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

(Delivered unless otherwise stated)

April 8, 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., £51 7s. 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. 10d. per basis box.

NON-FERROUS METALS

Copper.—Electrolytic, £280; high-grade fire-refined, £279 10s.; fire-refined of not less than 99.7 per cent., £279; ditto, 99.2 per cent., £278 10s.; black hot-rolled wire rods, £289 12s. 6d.

Tin.—Cash, £830 to £840; three months, £802 10s. to £805; settlement, £835.

Zinc.—April, £74 15s. to £75; July, £75 5s. to £75 10s.

Refined Pig-lead—April, £85 15s. to £86; July, £83 to £83 10s.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £104 2s. 6d.; rolled zinc (boiler plates), all English destinations, £102 2s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £110.

Other Metals.—Aluminium, ingots, £161; magnesium, ingots, 2s. 10½d. per lb.; antimony, English, 99 per cent., £225; quicksilver, ex warehouse, £70 10s. to £71 (nom.); nickel, £483.

Brass.—Solid-drawn tubes, 25½d. per lb.; rods, drawn, 33½d.; sheets to 10 w.g., 275s. 6d. per cwt.; wire, 31⅜d.; rolled metal, 262s. 3d. per cwt.

Copper Tubes, etc.—Solid-drawn tubes, 31⅞d. per lb.; wire, 312s. 3d. per cwt. basis; 20 s.w.g., 340s. 9d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £197 to £218; BS. 1400—LG3—1 (86/7/5/2), £210 to £238 BS. 1400—G1—1 (88/10/2), £312 to £375; Admiralty GM (88/10/2), virgin quality, £320 to £380 per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £340 to £385; L.P.Bl, £245 to £275 per ton.

Phosphor Bronze.—Strip, 405s. 3d. per cwt.; sheets to 10 w.g. 4_6s. 6d. per cwt.; wire, 49d. per lb.; rods, 44d., tubes, 42½d.; chill cast bars: solids 3s. 8d., cored 3s. 9d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 2s. 8¼d. per lb. (7 per cent.) to 3s. 10¾d. (30 per cent.); rolled metal, 3 in to 9 in. wide × .056, 3s. 2½d. (7 per cent.) to 4s. 4¾d. (30 per cent.); to 12 in. wide × .056, 3s. 2½d. to 4s. 5d.; to 25 in. wide × .056, 3s. 4½d. to 4s. 7d. Spoon and fork metal, unsheared, 2s. 11½d. to 4s. 1¾d. Wire, 10 g., in coils, 3s. 9d. (10 per cent.) to 4s. 10¾d. (30 per cent.). Special quality turning rod, 10 per cent., 3s. 8d.: 15 per cent., 4s. 1½d.; 18 per cent., 4s. 6¼d. All prices are net.

Forthcoming Events

APRIL 13

Institute of British Foundrymen

Sheffield branch :—"Internal Stress in Castings," by M. M. Hallett, followed by annual general meeting, 7.30 p.m., at the Sheffield College of Commerce and Technology, Pond Street.

Purchasing Officers' Association

London branch:—"The Merchant's Place in Business," 6.15 p.m., at the Royal Society of Arts, John Adam Street, W.C.2.

APRIL 14

Institute of British Foundrymen

Coventry and district students' section :—Annual general meeting and film evening, 7.15 p.m., at Coventry Technical College (Room A5).

Beeston Boiler Foremen's Association

"Cupola Practice," by C. A. Payne, 7.30 p.m., in the Canteen, The Beeston Boiler Company, Limited, Mona Street, Beeston.

Purchasing Officers' Association

Liverpool branch :—"The Purchase of Castings," by F. J. White, 7.30 p.m., at the Mitre Hotel, Dale Street.
Oxford and Bucks group :—"Purchasing Principles and Practice," discussion, 7.30 p.m., at the Red Lion Hotel, High Wycombe.
Sheffield branch :—"Purchasing," by D. Wragg, 7 p.m., at the Royal Victoria Hotel.

Institution of Production Engineers

Dundee section :—"National Standardization and Productivity," by Dr. E. L. Diamond, 7.30 p.m., at the Queens Hotel.

Incorporated Plant Engineers

East Lancashire branch :—"Vibration in Buildings and Structures," by Mr. De Bass, 7.15 p.m., at the Engineers' Club, Albert Square, Manchester.
London branch :—"Maintenance of Process Plants," by G. C. Allfrey, 7 p.m. (tea at 6.30 p.m.) at the Royal Society of Arts, John Adam Street, Strand, W.C.2.

APRIL 15

Institute of British Foundrymen

Birmingham and West Midlands students' section:—Annual general meeting, followed by "Core-shop Practice, with Special Reference to Corebtowing," by J. Hird, 7 p.m., at Chance Technical College, Smethwick.

British Electrical Development Association

"Materials Handling and Processing, Past and Present," by L. Landon Goodman, 2.30 p.m., at the Royal Society of Arts, John Adam Street, W.C.2.

Society of Chemical Industry

Corrosion group :—"Corrosion of Aluminium and its Alloys in Supply Waters," by F. C. Porter, 6.30 p.m., in the Chemical Society's Rooms, Burlington House, Piccadilly, London, W.1.

Institution of Production Engineers

Birmingham branch :—"Contribution of Human Skills to Increased Productivity," by W. D. Seymour, 7 p.m., at the James Watt Memorial Institute, Great Charles Street.
Cornwall branch :—"Application of Induction Heating," by S. R. Tomes, 7.15 p.m., at the Cornwall Technical College, Trevenson Park, Pool.
South Essex sub-section :—"Costing as an Aid to Management," by H. H. Norcross, 7.30 p.m., at the Mid-Essex Technical College, Chelmsford.

Incorporated Plant Engineers

Kent branch :—"Applications of Hydraulics," by D. V. Rowles, 7 p.m., at the Bull Hotel, Rochester.

APRIL 16

Purchasing Officers' Association

Glasgow branch :—"Mining Machinery," by David Jackson, 7.30 p.m., in the Engineering Centre.
East Midlands branch :—"Ask Your Questions," answers provided by a team from the Economic Survey Committee of the P.O.A., 7 p.m., at the Brush Electrical Engineering Company, Limited, Junior Conference Room, Loughborough.

APRIL 18

Croydon group :—Works visit to the Northern Aluminium Company, Limited, Banbury.

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 MANAGER, age 42, M.I.B.F., City and Guilds first class, at present handling foundry with capacity 50 to 75 tons weekly, desires change. Experienced in heavy and medium, jobbing, marine engineering and machine tool foundries up to 300 tons per week. Mechanised plant and sandslingers. Sand control. Furnaces and metal. Greensand, drysand and loam moulding. Quoting and costs also non-ferrous.—Box 3377, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN, 44, M.I.B.F., life experience trade, semi and full mechanisation, general jobbing to 8/10 tons, practical metallurgist, rigid sand, metal, material control, tactful labour but able to get results, wishes change small Midland Foundry, grey, high duty, malleable and non-ferrous experience, available short notice; excellent references.—Box 3379, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER, 45, M.I.B.F., A.M.I.P.E., Grey Iron, Malleable, High Duty, Non-ferrous, Commercial Sales, Costs. Practical man all departments, up to date in really modern methods economic production. Specialist repetition. Accustomed take full responsibility; desires join Midland foundry; guarantee get results, can influence business; excellent records and references; salary/results basis.—Box 3380, FOUNDRY TRADE JOURNAL.

GENTLEMAN, well educated, 45, M.I.B.F., car owner, 'phone, etc.; life experience foundry trade; Grey, Malleable, Non-ferrous; many useful high level contacts; wishes represent firm of repute in Midlands area; excellent references, proven integrity; salary/commission; expenses basis.—Box 3381, FOUNDRY TRADE JOURNAL.

EXPERIENCED DESIGNER, Development Engineer, with successful patents on Shell Moulding Machines and Equipment, desires position where initiative and inventive ability will offer future prospects.—Box 3394, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER, non-ferrous foundries, with first class record, seeks progressive situation; sound practical and technical experience of all phases of hand and mechanised production of heavy and light castings to withstand high pressures; accustomed to complete control.—Box 3398, 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.

ASSISTANT TO DIRECTOR required by large modern Iron Foundry in North-West. Must be fully experienced in Iron Foundry practice. Preferably person with metallurgical background.—Please send full particulars to Box 3370, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

RADIOGRAPHER required, preferably A.I.D. approval standard and having experience with heat resisting alloys, for Investment Casting Foundry.—Apply in writing, giving particulars of training, experience and salary required to: JOSEPH LUCAS LTD., Formans Road, Sparkhill, Birmingham, 11.

FOREMAN METAL PATTERN-MAKER; Tool Room and Shell Moulding experience; excellent prospects and salary; London area.—Box 3391, FOUNDRY TRADE JOURNAL.

EXPERIENCED man required to take charge of small non-ferrous foundry; able to introduce business an advantage. This is an excellent progressive position for a capable man. Commencing salary up to £750 p.a. with high prospects. Wolverhampton district. — Box 3390, FOUNDRY TRADE JOURNAL.

WELL-KNOWN Group of Midland Ironfounders require First-class Technical and Sales Representative for the Greater London Area. Only applications of proved experience in the sales of all types of Grey Iron Castings will be considered. The position is a permanent one and is subject to the Company's Contributory Pension Scheme.—Box 3388, FOUNDRY TRADE JOURNAL.

FOUNDRY CHEMIST required, preferably with experience of malleable iron. Please apply by letter stating age, details of past experience, and salary required to BAGSHAWE & CO., LTD., Dunstable Works, Dunstable.

DRAUGHTSMAN DESIGNER AND ESTIMATOR required to take charge of Drawing Office for Foundry and Machine Tool Makers in Wolverhampton area.—Reply giving full details of experience and salary required.—Box 3385, FOUNDRY TRADE JOURNAL.

VACANCIES exist for Production Controllers and Assistant Production Controllers in a large Steel and Engineering Firm in the North Midlands, involving the control and operation of the production planning methods in various Departments, particularly in Foundries and in medium type Engineering Shops. Applicants should have a wide practical experience of modern Production Control Methods either in the Foundry or in Engineering Industries. The various posts now vacant offer excellent prospects. Applicants should state age, training and experience, giving specific details of posts held and salaries earned, and they should reply to Box 150, DORLAND ADVERTISING, 18, Regent Street, London, S.W.1.

FOUNDRY MANAGER required for Iron foundry producing Domestic Heating Appliances and Light Castings: 50/60 tons per week. Full knowledge of Patternmaking, Metal Labour and Sand Control. Floor. Bench and small Mechanisation methods employed. Canteen, Baths and Welfare facilities. Pension Scheme. State experience and Salary required.—Box 3382, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

AN old established firm dealing in Pig Iron and Non-ferrous Metals, also Manufactured Iron and Steel, require the services of an energetic man 30/35 years of age, to represent the company in the Southern and Eastern Counties. Knowledge of the trade and districts an advantage. All information treated in strict confidence. Please give full particulars and salary expected to Box 3386, FOUNDRY TRADE JOURNAL.

METALLURGIST required for Steel Foundry and Engineering Works.—Apply, stating qualifications, experience, and salary, to the SECRETARY, Brown, Lenox & Co., Ltd., Pontypridd, Glamorgan.

METHODS ESTIMATOR RATEFIXER wanted. Wide, practical, technical and commercial experience on semi-mechanised plant—High Duty and Grey Iron. Job offers scope for man with initiative.—Write, giving full particulars of experience, and salary, to SYKES & HARRISON, LTD., Port Penrhyn Foundry, Bangor, North Wales.

WORKS CHIEF ENGINEER required to take charge of development installation and maintenance of plant and equipment of modern engineering works in Cheshire comprising heavy cast iron and steel foundry, machine shops and service department. Equipment includes furnaces, boilers, foundry plant, machine tools, overhead cranes, etc. Good mechanical and some electrical experience necessary. Age 35-45. Commencing salary about £1,000.—Apply giving full particulars, including past experience and qualifications, in confidence to Box 3395, FOUNDRY TRADE JOURNAL.

EXCEPTIONAL opportunity offered to FOREMAN in the 30's, to take charge of modern progressive, well established, Non-ferrous Foundry in Leicestershire. Only persons capable of taking full control and with thorough practical experience of running such foundry will be considered. The foundry has a reputation for good quality work in aluminium alloys, bronzes, etc. It is fully equipped and operates under ideal conditions. Applicants should state when available, and give full details of experience, age, and present position held, together with salary required, which will be treated with the strictest confidence.—Box 3368, FOUNDRY TRADE JOURNAL.

REPRESENTATIVE wanted, Lancashire area, by well-known Foundry Engineers, to sell Cupolas, Ladles, etc. Established connection preferred.—Box 3371, FOUNDRY TRADE JOURNAL.

COMMISSION SALESMAN wanted for low cost Paints, preferably already with foundry connection for other goods. Big sales possibilities.—Box 3367, FOUNDRY TRADE JOURNAL.

AGENCIES

AGENT required, preferably with engineering connection, to cover Yorkshire and Lincolnshire by well-established London firm of Aluminium Alloy Founders and Engineers.—Box 3383, FOUNDRY TRADE JOURNAL.

AGENCIES—*Contd.*

ALUMINIUM GRAVITY DIE CASTINGS. Lancashire Foundry requires agents in Scotland, Midlands, North East Coast. Every support given and good commission paid. Full particulars to Box 3387, FOUNDRY TRADE JOURNAL.

FINANCIAL

FOUNDRY in the South of England, present turnover £12,000 per month, manufacturing iron and non-ferrous castings, patternmaking (wood and metal), wishes to join up with another Company, or would consider Partnership.—Box 3352, FOUNDRY TRADE JOURNAL.

DIRECTOR in North Lincs. Engineering and Foundry Business, with over £50,000 turnover p.a., wishes to sell shares to practical Foundryman to control Foundries and to become a Director.—Apply Box 3353, FOUNDRY TRADE JOURNAL.

BUSINESSES FOR SALE

WILLIAM TAGG & COMPANY, LIMITED,
Sutton Street, Newcastle-under-Lyme,
and
BLOOR INDUSTRIES LIMITED,
Woore, near Crewe.

THE Receiver for Debenture Holders offers for sale, as going concerns, the businesses, goodwill, freehold property, plant, machinery and stock in trade of the above-named companies. Full opportunities for investigation will be given to genuinely interested parties who are invited to make bids for these businesses, either separately or as one undertaking.

William Tagg & Company, Limited, are jobbing founders, both ferrous and non-ferrous, and own the property which is freehold and free from chief rent. Equipped for a capacity of approximately 15 tons per week.

Bloor Industries Limited are Agricultural Machinery Manufacturers owning a modern workshop and offices and approximately 6½ acres of vacant land which is freehold and free from chief. The plant and machinery are adequate to meet the needs of the company in the production of its specialities.

Enquiries in the first place to the Receiver, Harry E. Evans, F.C.A., MORRIS, GREGORY & Co., 3, York Street, Manchester.

IMMEDIATE DELIVERY.

Core Making Machine, for multiple round cores; motorised, a.c., 3-phase. £55.

Coleman Core Blower, size R2; as new. £375.

Pneulec Rover; as new; a.c. £85.

Fordath Senior Sand Drier. £90.

New Cupolette, complete. £170.

Plenty of good Core Ovens in stock.

Electric Sieve. £33.

Tilting and Bale-out Furnaces; over 100 in stock; cheap.

Several good Sand Mills in stock; cheap.

Shot-blast Catalogue and full details on request.

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

MACHINERY WANTED

10/15-CWT. Geared or Ungeared Crane Ladle. Must be mounted on bogie.—HOMA FOUNDRY, LTD., Grove Street, Birmingham, 18.

CRUCIBLE FURNACE; 600 lb. Capacity; Oil Fired; Lip Axis Tilting Type. Hydraulically Operated preferred, but would accept Manually Operated. Must be in good condition. Send price and particulars to Box 3389, FOUNDRY TRADE JOURNAL.

URGENTLY required, two 1,000 cu. ft., or one 2,000 cu. ft., Electric Driven Air Compressors. 150 lbs. w.p. suitable any A.C. voltage.—Box 3324, FOUNDRY TRADE JOURNAL.

WANTED: Morgan Tilting Furnace (600 lbs. Brass) in good condition. Oil fired.—Box 3393, FOUNDRY TRADE JOURNAL.

MACHINERY FOR SALE

1—30 cwt. Roper Geared Drum Type Receiver, mounted on 4-wheel Bogey, together with Spare Body for 30 cwt. Receiver with Fibre Brick Lining.—Box 3392, FOUNDRY TRADE JOURNAL.

2 British Rema "No. 2A" Pulverizer Coal Firing Units, with spare Motor and sundry spare parts. Can be inspected in working order.—Box 3376, FOUNDRY TRADE JOURNAL.

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.

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AIR COMPRESSORS.

1,000-C.F.M., vert., 2-stage, Air Compressor, by Fullerton, Hodgart & Barclay. 100 lb. pressure; speed 290 r.p.m.; arranged belt drive. Overhauled ready for use.

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ELECTRIC FORGE BLOWERS, 125 c.f.m., 3 in. w.g., 2½ in. inlet, 2 in. outlet, 400/3/50.

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Motor driven MULTIVANE BLOWING FAN, 6 in. inlet, 4½ in. by 3½ in. outlet, with 3 h.p. motor for 400/3/50.

NEW SIZE 15 MULTIVANE STEEL PLATE FAN, cap. 2,500 c.f.m. at 10 in. w.g., direct coupled to 10 h.p. motor for 400/3/50.

SIZE 20 MULTIVANE STEELPLATE PRESSURE FAN, 2,820 c.f.m., against 22 in. w.g., 10 h.p. s.c. motor, 400/3/50.

SIZE 24 MULTIVANE STEEL PLATE PRESSURE FAN, 2,820 c.f.m., against 22 in. w.g., to 20 b.h.p. s.c. motor, 400/3/50.

BELT DRIVEN:

BELT DRIVEN FANS by KEITH BLACKMAN, size 14, Type 9, 5 in. inlet, outlet 3 in. by 3½ in., 330 c.f.m. at 8.5 w.g., 2,900 r.p.m. or 560 c.f.m. at 14 w.g.

VEE BELT DRIVEN HIGH EFFICIENCY GAS BOOSTER by Keith Blackman, size 20, 4 in. outlet, extended shaft and outer bearing. Vee pulley.

EXHAUST FANS:

SIZE 9 PADDLE BLADE FAN, 450 c.f.m., against 3 in. w.g., .75 h.p. motor, 400/3/50, inlet 5⅜ in. dia., outlet 5⅜ in. by 5¼ in.

SIZE 12 PADDLE BLADE FAN, 1,000 c.f.m. against 5 in. w.g., 2 b.h.p. s.c. motor, 400/3/50.

SIZE 15 PADDLE BLADE FAN, capacity 2,000 c.f.m., against 6 in. w.g., 5 h.p. s.c. motor, 400/3/50, outlet 9½ in. by 8 in.

Belt driven STEEL PLATE MULTIVANE FAN, with 24 in. inlet and 16 in. by 26 in. outlet, with 11 in. dia. pulley for two ⅝ in. Vee ropes.

SIZE 17 Motor-driven EXHAUST FAN, capacity 6/7,000 c.f.m. against 3 in. w.g., with 10 h.p. motor and starter, wound for 400/3/50.

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4 300-lb. Aluminium Bale Out Furnaces, gas fired. Complete with burners and blower to each pair.—ALUMINIUM DIE CASTINGS (BIRMINGHAM), LTD., Invicta Foundry, Charlotte Street, Birmingham, 3.

DISPOSAL of all Plant and Equipment from Sand Foundry, Pattern Shop and Gravity and Pressure Die Shops.—Write or 'phone for list and appointment to view to J. ROSTRON, Magnal Products, Ltd., Tower Road, Warmley, Bristol. 'Phone Kingswood 73146.

TWO B.M.M. Jolt-Squeeze Pin Lift Moulding Machines, Type HPL.1, purchased new 1949. Price: £125 each or £230 the two.—RICHARDS (LEICESTER), LTD., Phoenix Iron Works, Leicester.

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

ONE Equiblast Cupola, 23 ft. high by 4 ft. dia. Melting capacity, 3-4 tons grey iron per hour. Complete with high efficiency Blowing Fan, E.G. Patent Spark Arrester and Mild Steel Cap and Skirt.

ONE Charging Platform for above.

ONE Electrically-driven patent Duplex High Speed Grinding Machine (Luke & Spencer). Complete with Electric Motor and 2 Borolite Resinoid Wheels 30 in. by 3 in. by 12 in., also 1 Dust Extraction cyclone unit.

TWO B.M.M. Moulding Machines. One to take box 5 ft. by 3 ft. by 12 in. deep, and one to take box 3 ft. by 20 in. by 9 in. deep.

SIX 2-Ton working load "Major" Electric Lifting Chain Pulley Blocks.

FOUR Wall Cranes—21 ft. span.

BOX 3375, FOUNDRY TRADE JOURNAL.

RECONDITIONED 750 lbs. Pneulec Moulding Machines for disposal. Contact Works Engineering Department for details.—K. & L. STEELFOUNDERS & ENGINEERS, LTD., Letchworth, Herts. Telephone: Letchworth 1360.

CAPACITY AVAILABLE

CAPACITY for Phosphor Bronze, Gun Metal, Leaded Bronze Castings from 1 lb. to 56 lb. Keen prices will be given against sample castings. Good deliveries. —SNEYD ENGINEERING CO., LTD., Sneyd Street, Leek, Staffs.

CAPACITY AVAILABLE—*Contd.*

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

GEORGE DENHAM, LTD., Low Mill Foundry, Darlington, have capacity available for Aluminium, Phos. Bronze and Gunmetal Castings from ¼-lb. to 3-cwts., at competitive prices, including patterns if required. 'Phone Darlington 5017.

CASTINGS.—Grey Iron Castings, up to 10 cwt. First-class products. Prompt deliveries.—ALDAM (MISTERTON), LTD., Misterton, near Doncaster.

MIDLANDS.—R. J. Harris & Son, Ltd., Rugeley, Staffs., have for many years produced First Class Grey Iron Castings for Machine Tools, Jigs and Fixtures and General Work, and have now additional capacity available for castings from ¼ lb. to 5 cwts., in small or large quantities.

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

HEAVY and Medium Grey Iron Castings, weighing from few cwts. to 20 tons, capacity available.—GLOVER & WOOD, LTD., Low Moor Foundry, near Bradford. 'Phone Low Moor 1640.

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

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

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

CAPACITY AVAILABLE—*Contd.*

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CAPACITY available for Castings up to 15-cwt., including Castings for Vitreous Enamelling.

DELIVERIES IMMEDIATE.

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

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

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

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

GREY IRON FOUNDRY, Midland district, have spare capacity for castings up to 10 tons each.—Box 3314, FOUNDRY TRADE JOURNAL.

MISCELLANEOUS

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

MISCELLANEOUS—*Contd.*

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

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

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

MISCELLANEOUS—*Contd.*

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

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

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

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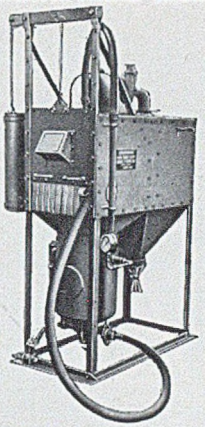

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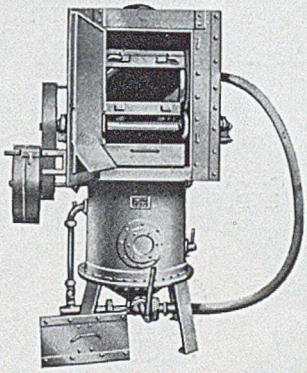

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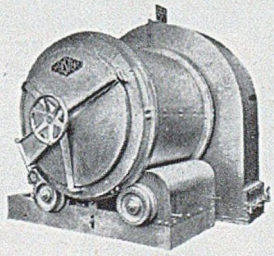
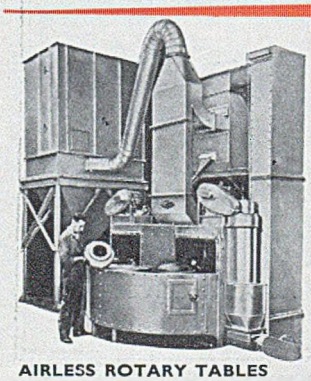
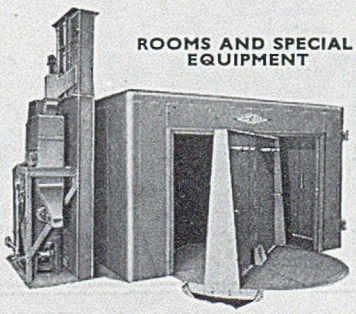




AIRLESS ROTARY TABLES



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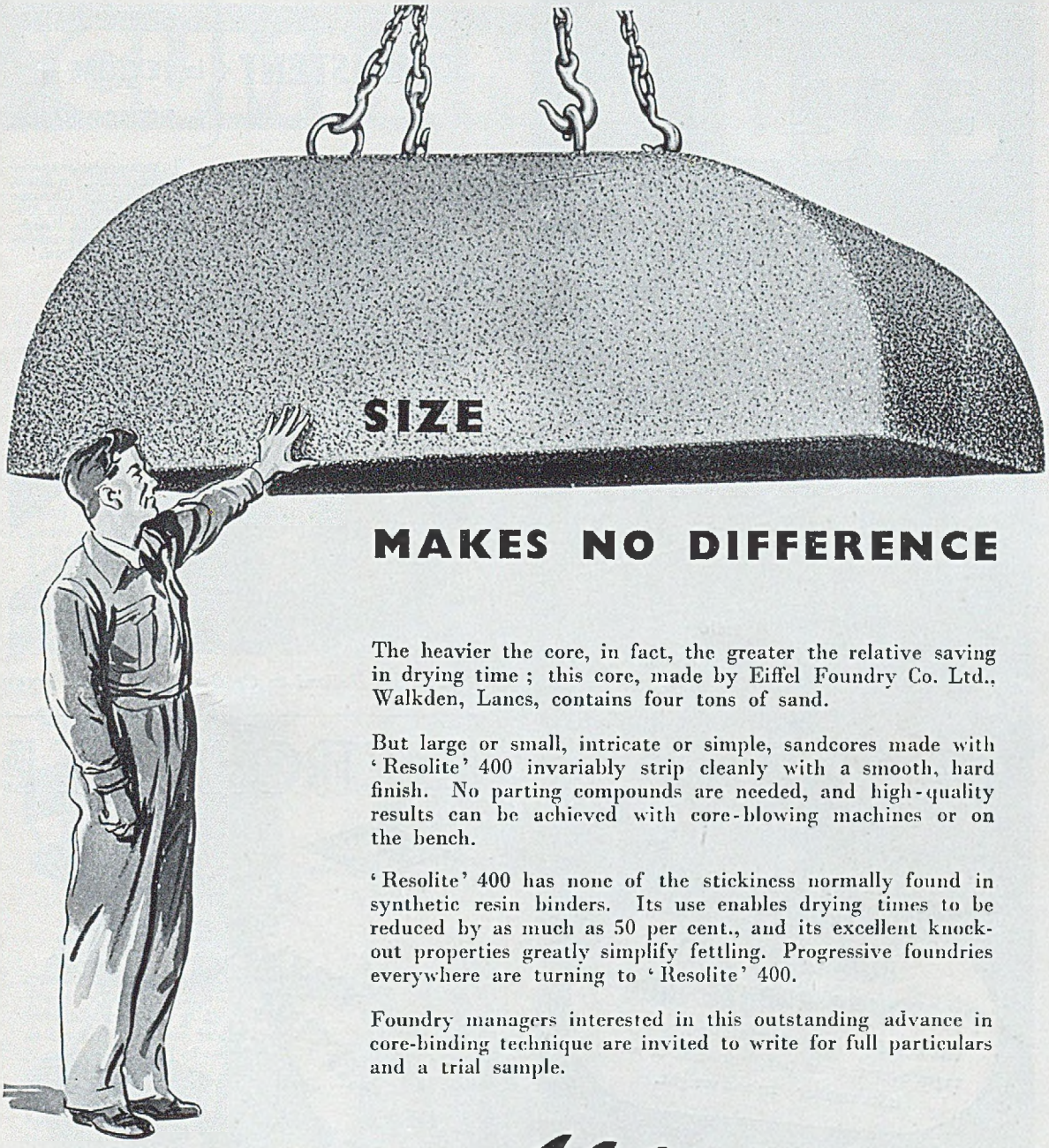
Rooster 2918



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

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Higher Industrial Production

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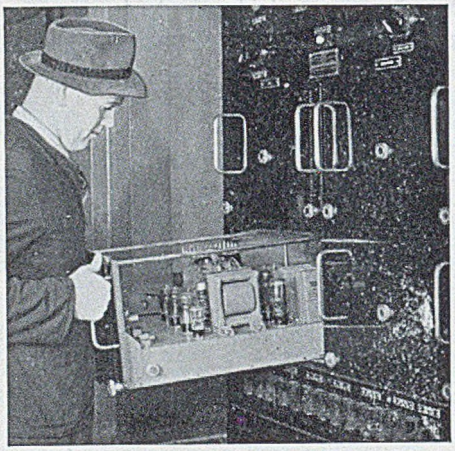
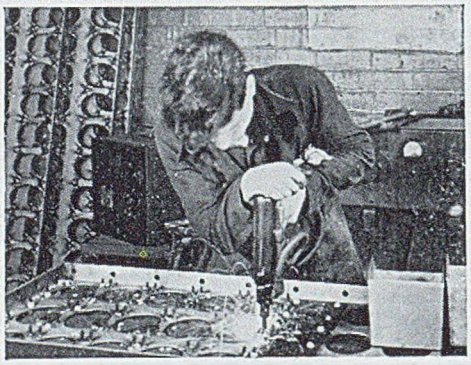
The British Electrical Development Association has published "Higher Industrial Production with Electricity" to help in this vital task. The book is written for management, and for all who are concerned with industrial planning and processes.

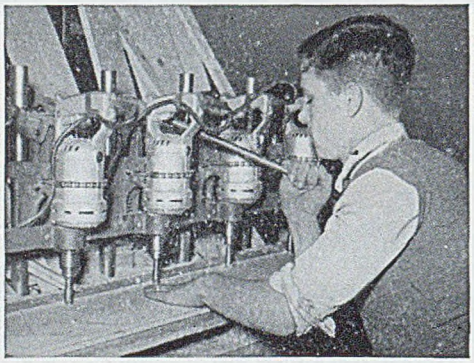
There are chapters on Lighting, Motors and Control Gear, Furnaces and Heat Treatment, Welding, Handling, and Inspection. Make a note to get a copy.



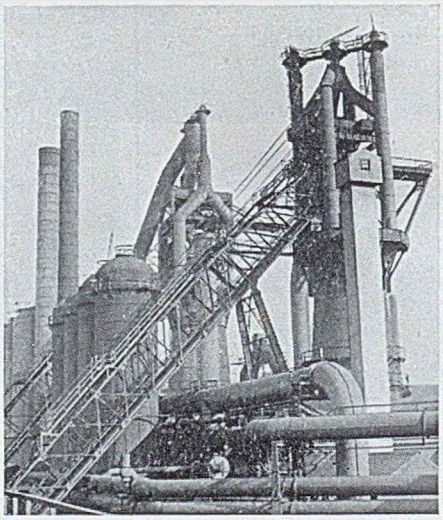
An electronic control cubicle with one unit withdrawn.



An electric stud-welding gun in operation on a dust collector component.



Portable electric drills mounted on stands and ganged for simultaneous operation in a Midlands joinery shop.



An electric skip hoist charger for a new blast furnace in South Wales, where the entire hoisting and charging process is automatic—initiated by the pressing of a single button.

Now ready

"Higher Industrial Production with Electricity", some illustrations from which are shown, is available at 8/6 (9/- post free) from E.D.A., 2 Savoy Hill, London, W.C.2 or from your Electricity Board.

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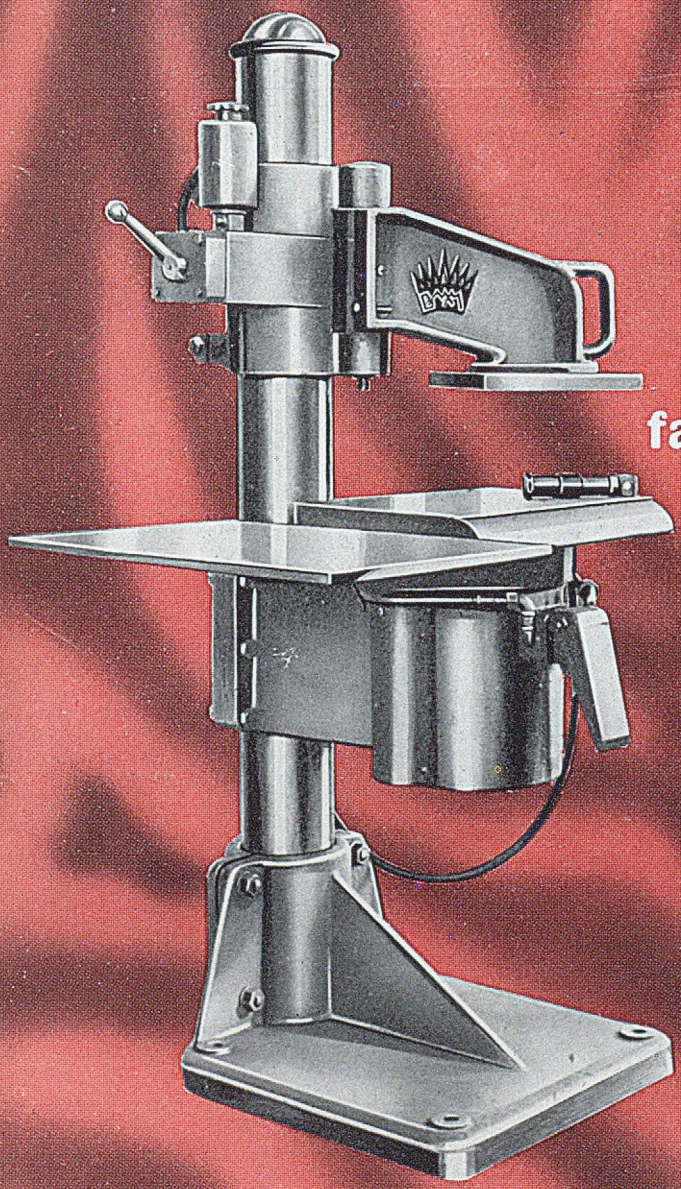

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