FOUNDRY

EST. 1902 TRADE JOURNAL

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

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JULY 30, 1953
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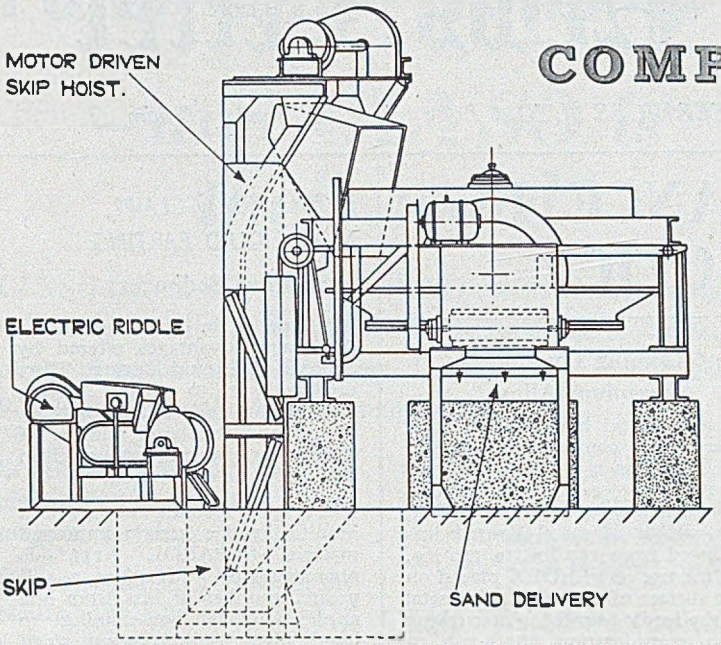
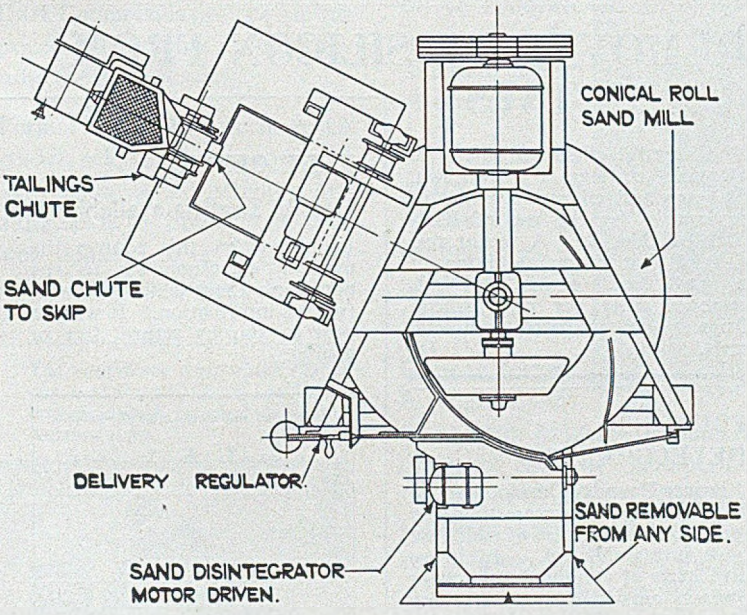
Single Copy, 9d. By Post 11d. Annual Subscription, Home 40/-, Abroad 45/- (Prepaid)

FIVE-IN-ONE

COMPLETE SAND PREPARING PLANT





★ *Sifting*

★ *Magnetic Drum*

★ *Skip Charging Hoist*

★ *Mill and Mixer*

★ *Disintegrator*

Easy Access to all Parts for Maintenance

Foseco News Letter

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

LATEST ADVANCE IN CUPOLA PRACTICE

CARBON PICK-UP INCREASED

Of great interest particularly to foundries using a high proportion of steel scrap in their cupola charges is the introduction of CARBRIX. These briquettes are added with the charge, and practical tests show that as well as increasing the carbon content by as much as 0.2 per cent., there is an increase in silicon content and a reduction in sulphur pick-up.

The fluxing ingredients of CARBRIX flush away the ash from the coke and ensure a more intimate contact between it and the iron. (1)

SPECIAL FOUNDRY GUN

Not for shooting the foreman but for making the moulder's work easier! The FOSECO Triple Action Gun can be used as an air gun for blowing out moulds, etc., as a spray gun for applying liquid dressings, and as an agitator for keeping the dressing well-suspended. It is light, and being shaped to the hand is non-tiring in use. It is fool-proof in use and is very inexpensive. (5)

STOPS BLOWING FROM CHILLS

Apart from its wide use as a mould dressing in casting iron, MOLDCOTE No. 21 is proving most useful as a dressing for metal chills. It obviates blowing and ensures an excellent strip without in any way affecting the depth of chill. (4)

Hot-Topping Compound for Aluminium Alloys

Recent tests have shown that there is a considerable use for FEEDEX as a hot-topping compound in casting aluminium. For instance, for a certain casting, the weight of metal poured was reduced from 157 lbs. to 120 lbs. by the use of FEEDEX placed on the surface of the still liquid metal in the feeding heads. After taking into consideration the cost of FEEDEX this showed a nett saving of 10s. 7d. (3)

MOULDERS ACCLAIM NEW LIQUID PARTING

Free from Sediment

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

The original formula has now been modified and a greatly improved material—SEPAROL '111'—is now available. It gives a still greater number of lifts from one application, is non-staining to hands, has no unpleasant smell and leaves no sediment. And, the price is still the same! (6)

REMOVAL OF SILICON FROM GUNMETALS

The harmful effects of silicon in gunmetal castings is well-known. An easy and efficient method of removal is by the use of ELIMINAL No. 8. A recent test showed that a total addition of 2 per cent. of ELIMINAL removed 0.45 per cent. silicon from a contaminated gunmetal melt. (2)

FOUNDRY DEVELOPMENTS

"Foseco Foundry Developments" is the name of an interesting new journal, the first issue of which we have just published. In it we give news of various development projects on which we are working as well as useful facts and figures accumulated during such research. "Foseco Foundry Developments" will be published as the need arises and is available free to anyone interested by writing to our Birmingham address. (7)

FREE OFFER

Helpful Leaflets available

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

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FOUNDRY SERVICES LTD
Long Acre, Nechells,
No. 4 Birmingham 7

L.G.B.

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.

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.

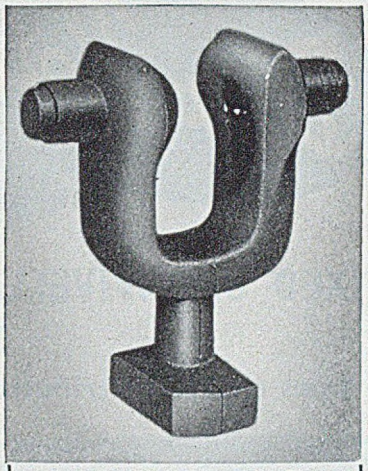
Permol Core Oils are in seven grades, selection being governed by relating dried strength requirements to binder cost. Permol bonded cores have good knock-out after casting.

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

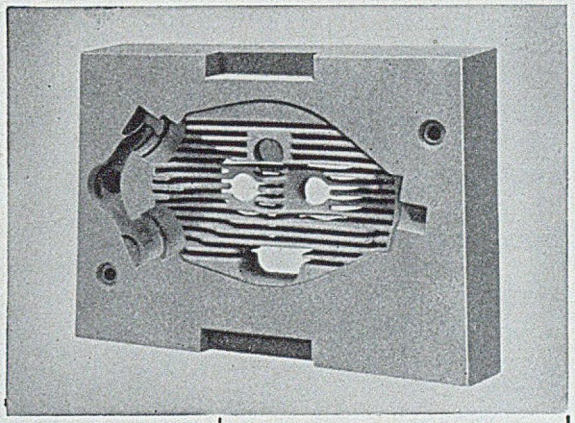
Glyso—Exol Core Powders, a range of cereal powders impregnated with core oil in accurate quantities for different classes of core work.

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.



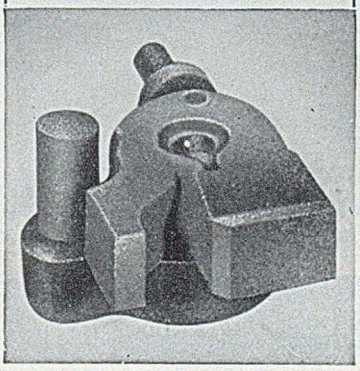
Careful selection from the Glyso range of binders provides exactly the green and baked strengths required.



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

GLYSO CORE BINDERS

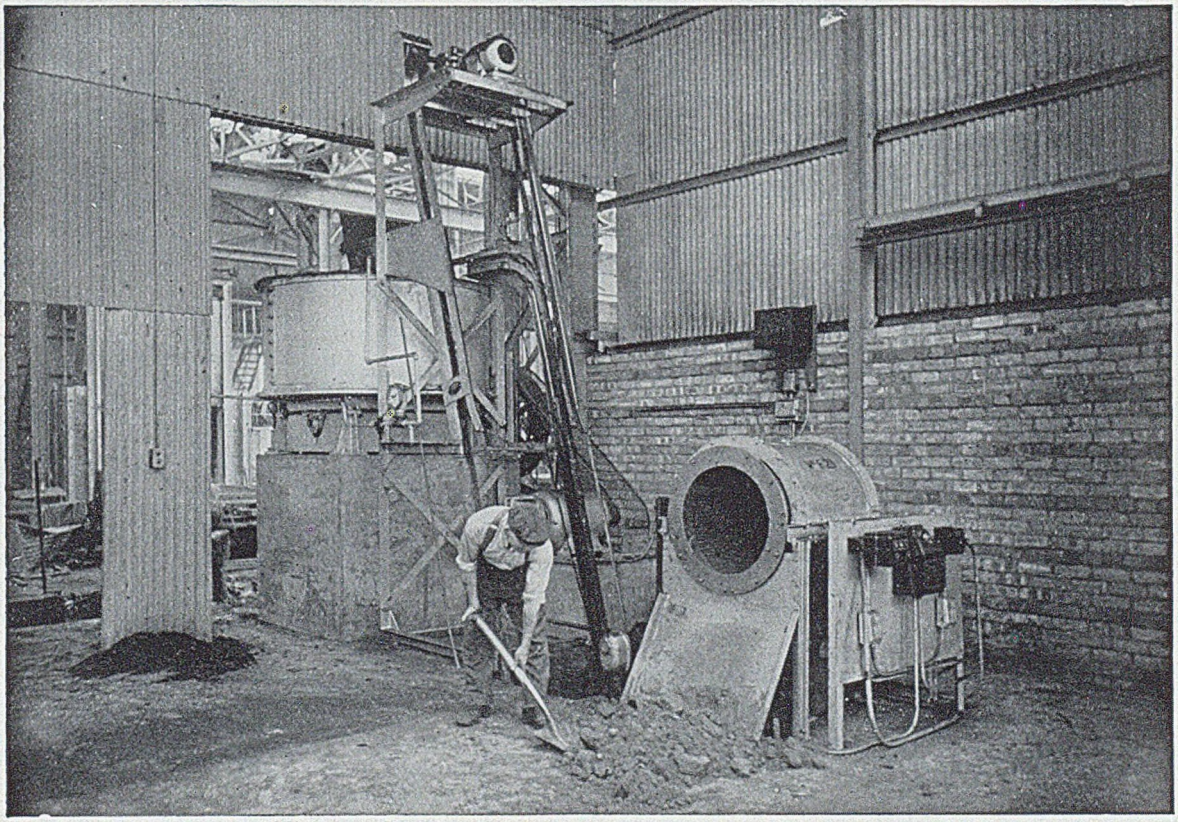
THE FORDATH ENGINEERING CO. LTD.

Hamblet Works, West Bromwich, Staffs.

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

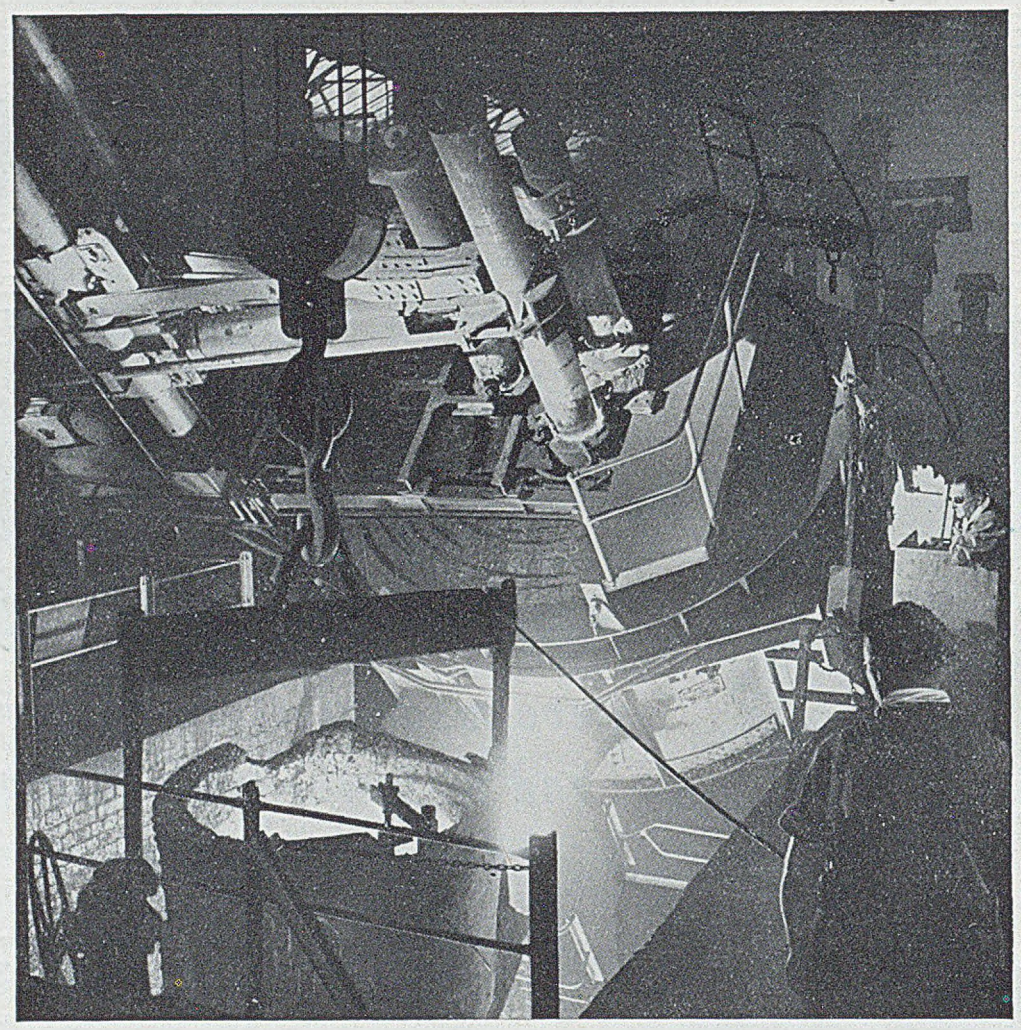
PNEULEC *facing sand plant unit*

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



Built in England by

PNEULEC LIMITED. SMETHWICK, Nr. BIRMINGHAM



Tapping steel from an electric furnace; Kayser Ellison & Co. Ltd., Sheffield

You may not be a steelmaker, but . . .

. . . . YOU PROBABLY USE STEEL. Electricity has led to the production of better quality steels, and its use for heat treatment of those same steels has led to a better product again. In almost every heating process, in fact, electricity brings better results.

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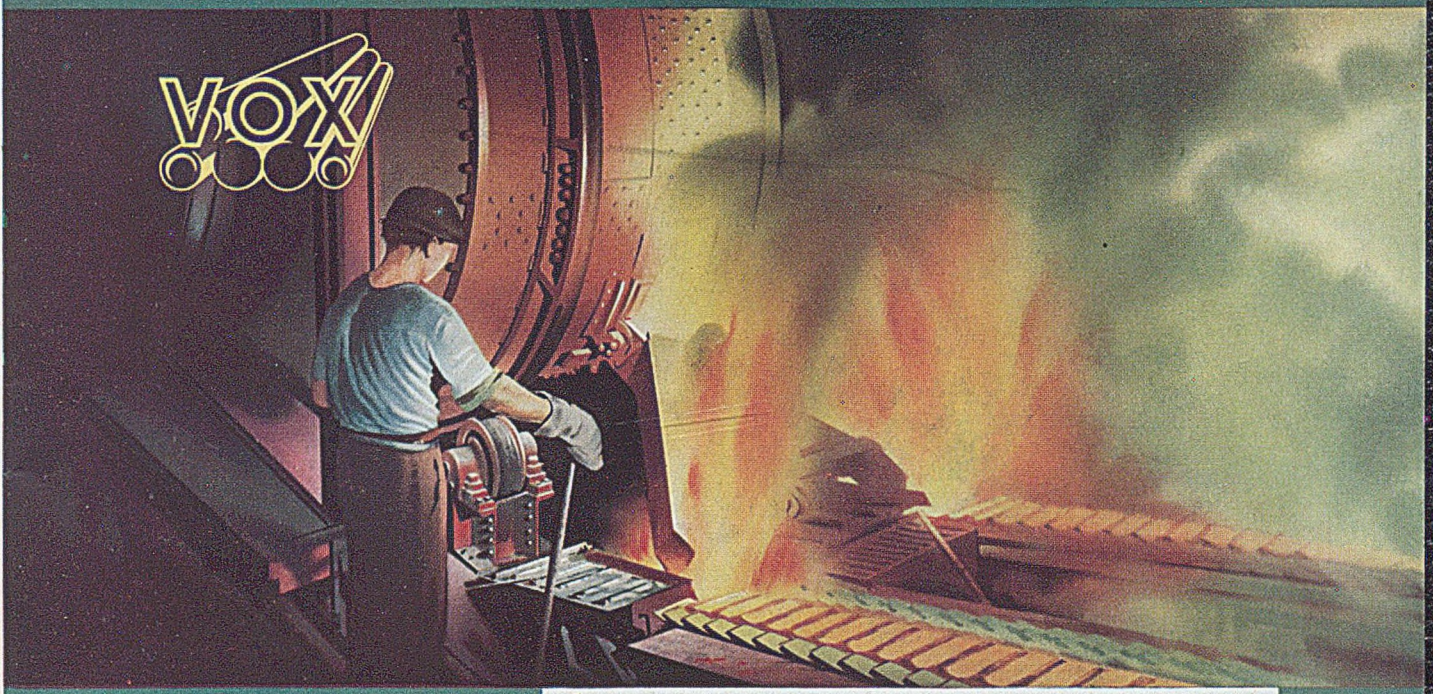
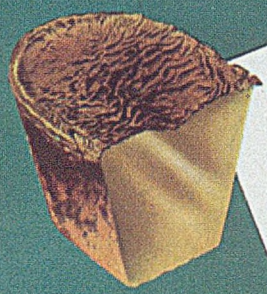




BRASS

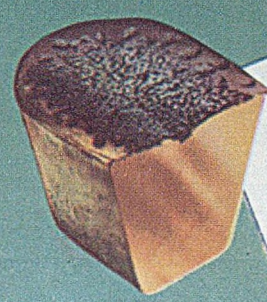
SPECIFICATION

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

ALUMINIUM BRONZE

SPECIFICATION

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



PHOSPHOR BRONZE

SPECIFICATION

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

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

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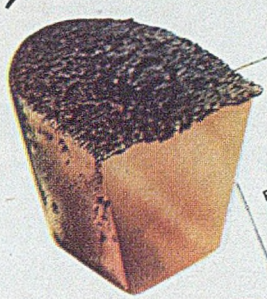

GUNMETAL

SPECIFICATION

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

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

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

Going up everywhere!

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ALL BRITISH HOISTING & HANDLING EQUIPMENT OF ENDURING QUALITY

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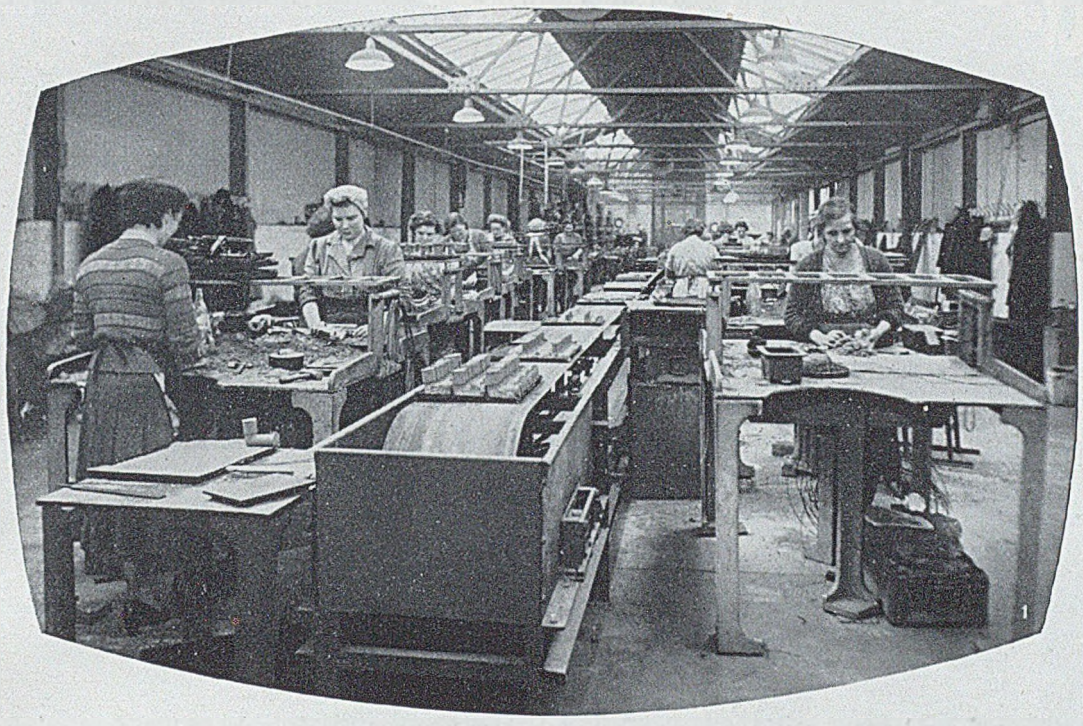
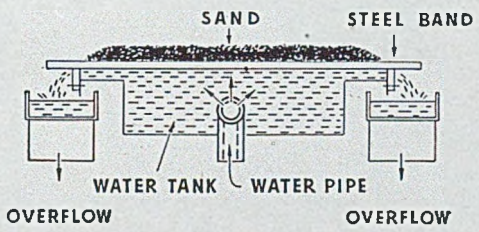
Represented in all principal countries

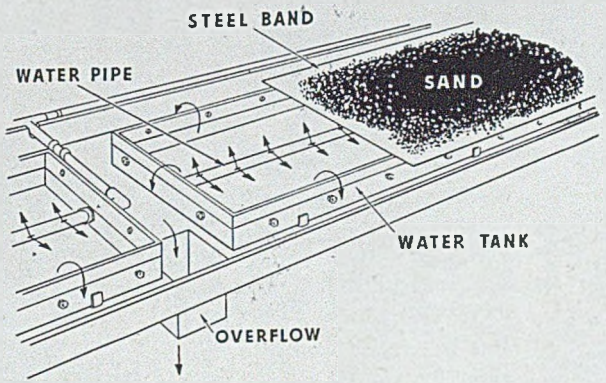
MODERNISE YOUR CORE SHOP . . .



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.

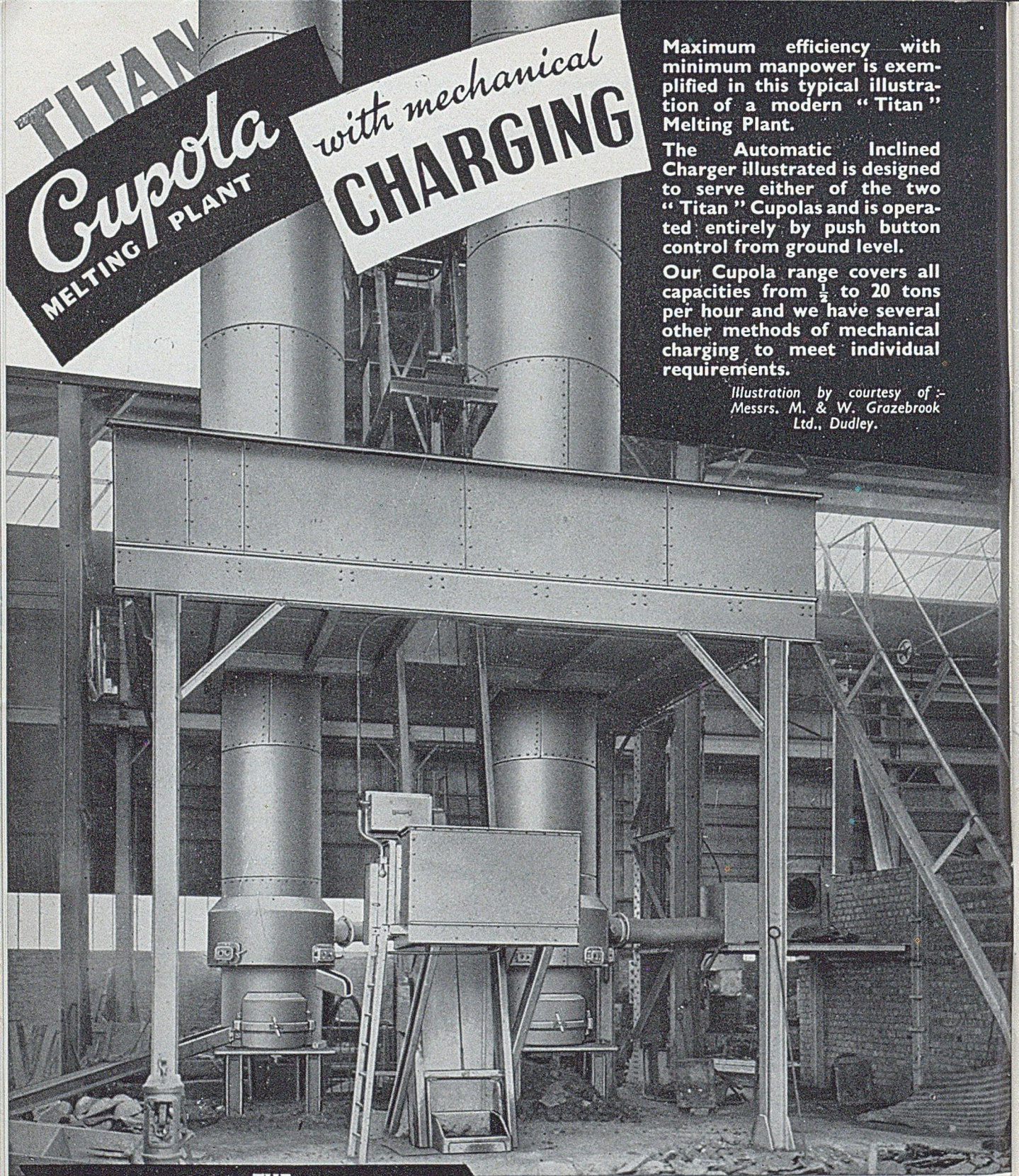
SSBC

SANDVIK STEEL BAND CONVEYORS LTD

B.F.T. Division

DAWLISH ROAD, SELLY OAK, BIRMINGHAM, 29

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



TITAN Cupola MELTING PLANT

with mechanical CHARGING

Maximum efficiency with minimum manpower is exemplified in this typical illustration of a modern "Titan" Melting Plant.

The Automatic Inclined Charger illustrated is designed to serve either of the two "Titan" Cupolas and is operated entirely by push button control from ground level.

Our Cupola range covers all capacities from ½ to 20 tons per hour and we have several other methods of mechanical charging to meet individual requirements.

Illustration by courtesy of :- Messrs. M. & W. Grazebrook Ltd., Dudley.

THE CONSTRUCTIONAL ENGINEERING Co LTD

MANUFACTURERS OF COMPLETE FOUNDRY PLANT

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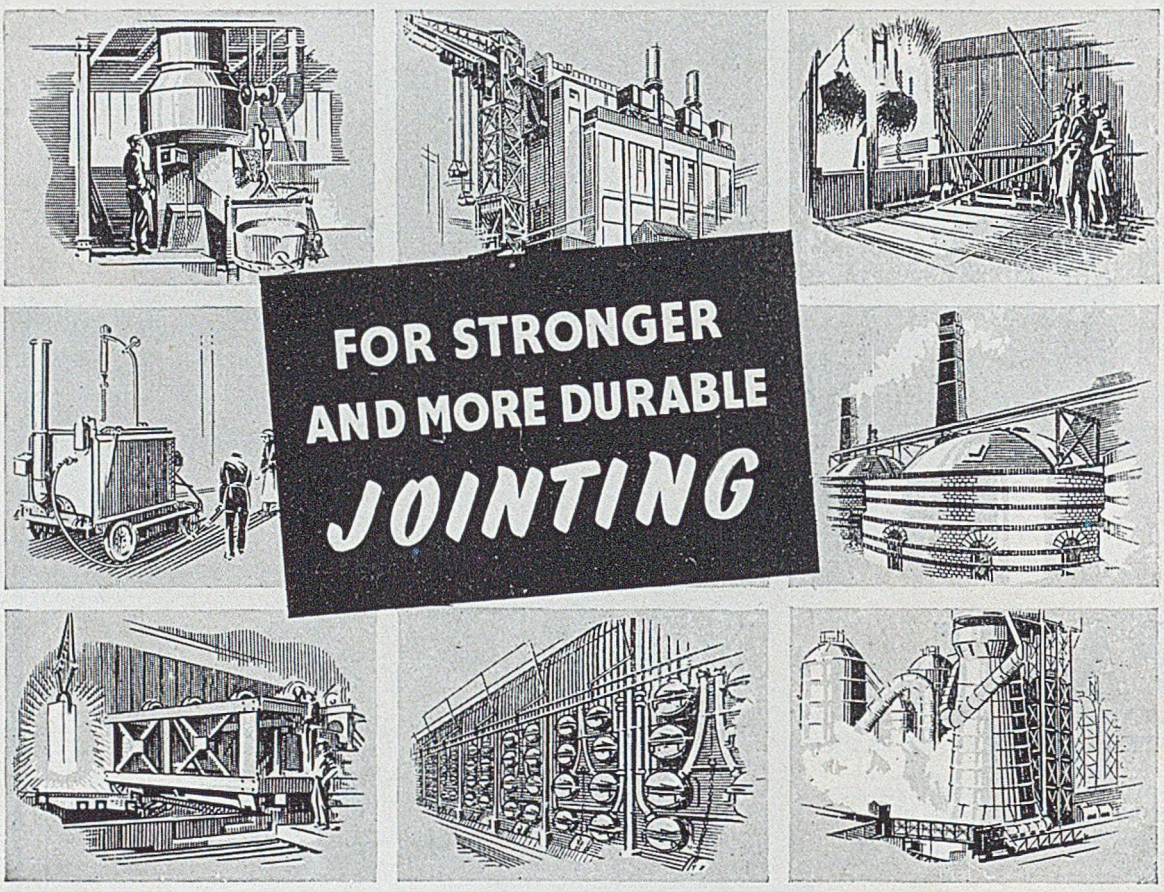

PYROLYTE

High Temperature CEMENT

Pyrolyte High Temperature Cement is made from high grade chrome ore with small additions of other compounds to promote plasticity and air-setting properties. It has a very high melting point (1730° C.) and is chemically neutral. Pyrolyte is used for jointing all types of bricks including chrome-magnesite, chrome, aluminous firebricks, etc. and for cold patching gas retorts and coke oven linings.

★ *Technical advice and assistance on the selection and application of refractories are always available on request . . .*

PROTECTIVE WASH FOR FIREBRICKS

Pyrolyte provides an excellent protective wash for firebrick work. Treated surfaces will not shrink and will resist slag-penetration to a high degree.

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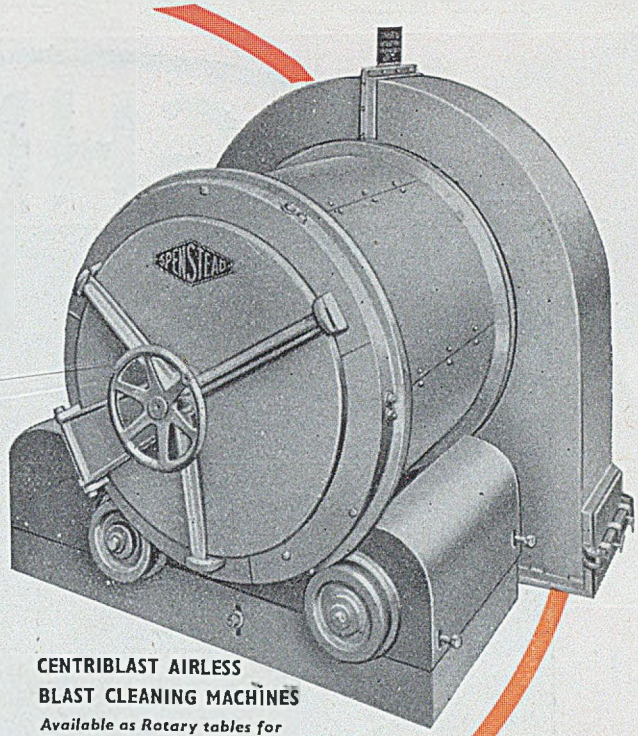
if shotblasting is needed....

there is SPENCER & HALSTEAD equipment for the job.

The standard range of pneumatic and airless shot blast plant will meet almost every need, but special equipment can be designed for particular requirements.

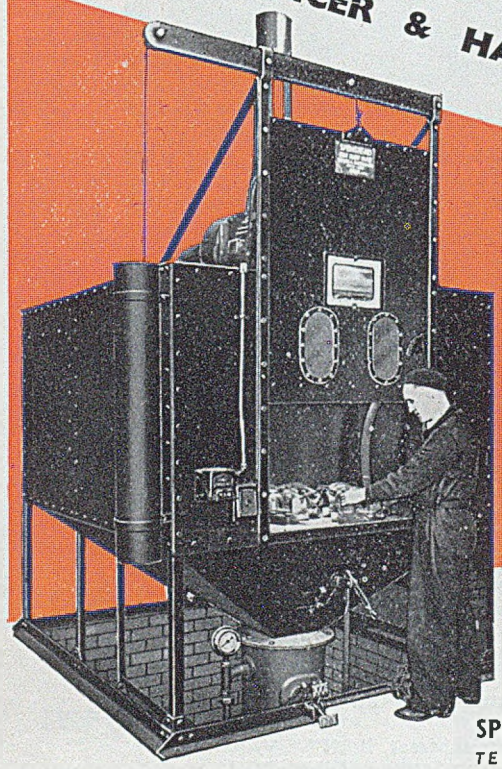


CENTRIBLAST

CENTRIBLAST AIRLESS BLAST CLEANING MACHINES

Available as Rotary tables for flat work and work too delicate for "Tumbling" or "Barrelling", also Rotary Barrel Machine. Both types give fast and thorough cleaning without the use of compressed air.

there is SPENCER & HALSTEAD equipment for the job



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There is a complete range of plant designed for dealing with the smallest up to the largest work. We can undertake complete installations and supply all ancillary equipment.

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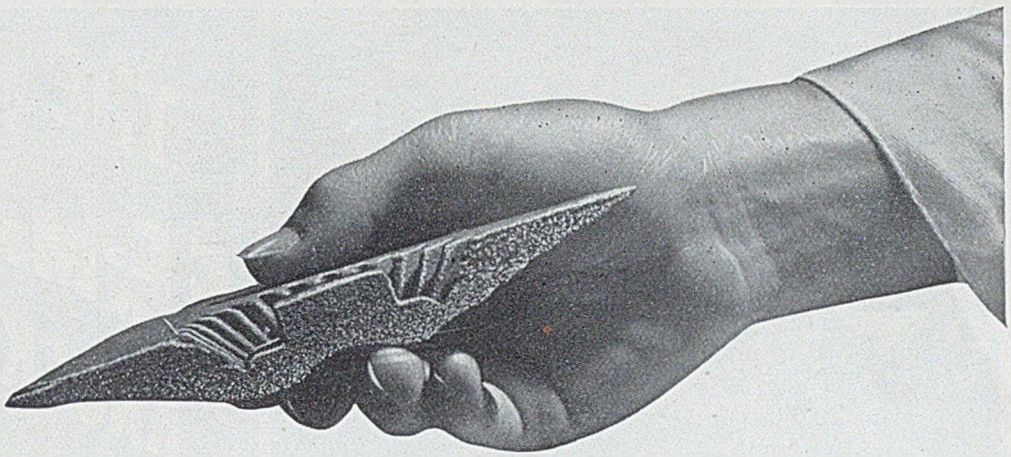

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—a complete resin service from I.C.I.

PRODUCTS 'Mouldrite' PF 422 Resin Binder, Silicone-oil mould lubricant and resin-base wetting agent.

SERVICE based on practical experience with the Sand-shell process over a wide range of metal casting at an I.C.I. foundry, which is carrying out extensive research on shell moulding.

INFORMATION on the uses of synthetic resins in the foundry from the Technical Service and Development Department of I.C.I. Plastics Division.

Send for 'Synthetic Resins for the Foundry'

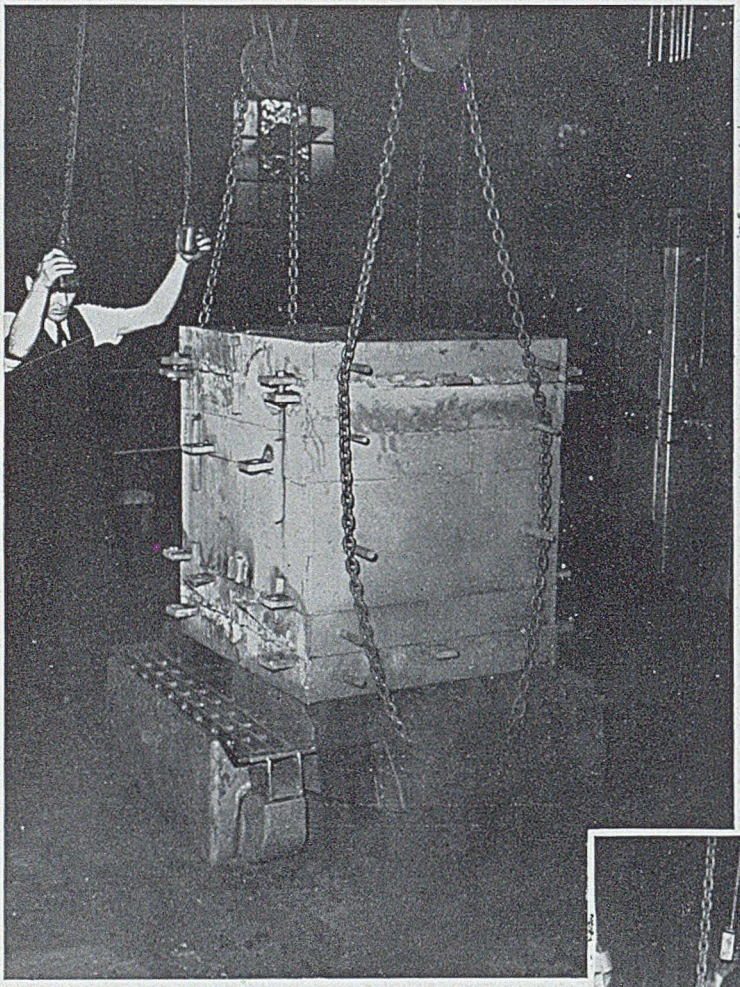
'Mouldrite' is the registered trade mark of the thermosetting resins manufactured by I.C.I.

IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON, S.W.1

ICI

P.541

E

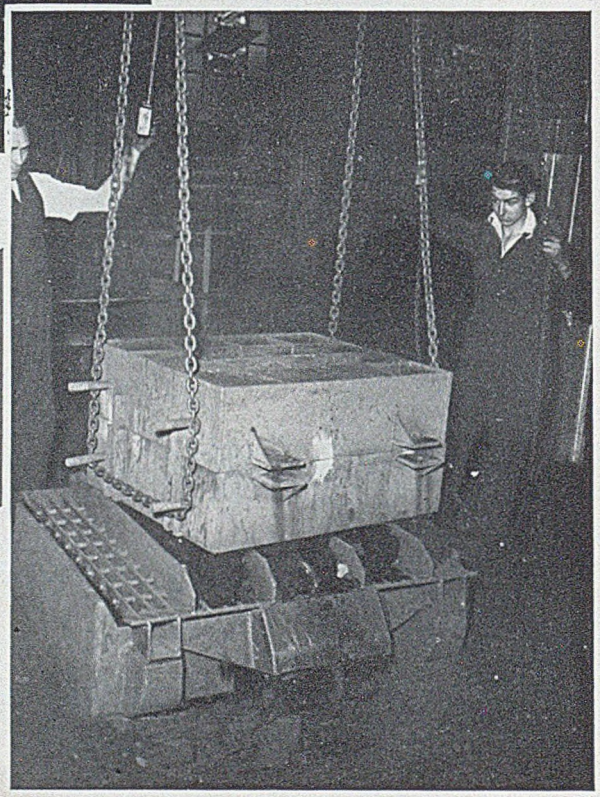


Dry Sand Mould weighing 1½ tons being rapidly knocked out on 4ft. 0in. square machine.

Heavy duty Knockout with "floating" grid and intense electro-vibration, giving powerful and positive action.

THE F.E-MATIC KNOCKOUT

FE for Foundry Efficiency TRADE MARK



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LEIGHTON BUZZARD · BEDS

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Minimum maintenance.
Available in various standard sizes.
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Established 1902
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Alvechurch, Birmingham. 'Phone and 'Grams: Redditch 716.

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

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PRINCIPAL CONTENTS

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Future for the Cupola

Because of its circular section, the intimate contact of the fuel with the metal and the superimposed mass of material above the zone of fusion, the cupola is naturally a very efficient melting unit. It was this form of furnace which was invented by Wilkinson some 150 yrs. ago and, with but a few modifications, has remained basically unchanged until quite recent times. Even now, the three fundamental conditions still persist. During its long history, however, there have been great increases in the price of the raw materials it uses—coke, pig-iron, scrap and refractory materials, whilst concurrently there has been a lowering in quality of some of them, but not all—coke being the one which has shown the worst deterioration.

The modern generation of foundrymen is thus faced with the problem of making iron to exacting specifications, using very expensive raw materials, including coke of lowered calorific value, and so economies must be sought. Obviously, the first thought is to use the combustible gases leaving the throat of the furnace for heating purposes. Because the recuperative principle has been so successful in open-hearth and glass-furnace practice, it would follow that the system should yield good economies in cupola melting. There is a difference, however, in the two propositions as, in the latter case, the gas being evolved at high speed is dusty. Moreover, the average duration of the runs of the cupola is insufficiently long to derive the best results from the recuperative system, now well known as the "hot blast." Next there is much erosion of the refractory material during the day's blow and this requires fluxing agents and many heat-units to convert it into a fusible slag.

In recent years, most of these problems have been solved, but the new plants are naturally quite expensive; somewhat complicated, and space consuming. Water-cooling, either of the walls or the tuyeres, has largely overcome the waste resulting from the wear of the linings and indeed has made possible the changeover from an acid to a basic melting plant. This can counteract the noxious effect of the sulphur contamination of current raw materials. Thus, modern developments in cupola practice are keeping step with current metallurgical requirements. Additionally, they increase the amenities of the dwelling houses in the vicinity of an iron foundry—a problem recently brought to public notice since the introduction of "nutty slack." For the small and medium-size foundry owner, the installation of a modern cupola plant represents a very large capital outlay. Still, to overcome the ever-increasing burden of the high costs of raw materials, these hot blast, water-cooled contraptions are, so far, the sole methods available for their neutralization. It is at least worth consideration that at the moment help on financial aspects is being given by the Government—as an aid to fuel economy.

A Correction. We regret that owing to misprints the word "adhesions" was twice used instead of "adhesives" in our leader last week on "Hatching Out."

F

Conference Paper Authors

MR. E. BRETT DAVIES, M.INST.F., one of the joint Authors of the paper "Pelleted Foundry Pitch" printed on page 151 of this issue, was for ten years chief chemist to a group of Durham collieries. During the War he became attached to the tar distilling industry in the capacity of a fuel technologist responsible for the development of the solid and liquid fuels derived from coal tar. Since 1945 he has been attached to a large group of tar distillers in a technical capacity, particularly with reference to the development of liquid fuels and the investigation and sales of coal-tar derivatives. In the course of this very wide industrial experience he patented and developed the use of pelleted foundry pitch.

MR. G. SMART, one of the co-Authors of the paper "Pelleted Foundry Pitch," is also a practical foundryman who has been engaged on the development of pelletted foundry pitch since its inception. He has made a study of foundry problems throughout the British Isles.

MR. T. F. N. MATTHEWS, who is also one of the joint Authors of the paper "Pelleted Foundry Pitch," is a practical foundryman who has been engaged solely in the development of this special product since its inception. He is well-known throughout the British foundry industry and has visited and studied foundry problems in many foundries in the British Isles. He has also had considerable experience in a number of Continental foundries.

MR. JOHN R. CHARLTON is the Author of the paper "Production of Diesel-engine Castings in Grey Iron" printed on the adjoining pages. He served his apprenticeship as a moulder with C. W. Taylor & Son, Limited, South Shields, during which time he was awarded the John Surtees Silver Medal as the first prize in an examination open to Tyneside and Clydeside foundry apprentices. He gained considerable moulding and coremaking experience in marine, general engineering and jobbing foundries, both ferrous and non-ferrous, with several large concerns, including Smith & Company, Limited, South Shields, Winget Limited, Rochester, and the Wallsend foundries of the North Eastern Marine Engineering Company (1938) Limited.

He was appointed foundry foreman with the Argus Foundry, Limited, Thornliebank, Glasgow, in 1943, and a year later took up the position of senior foreman with Mavor and Coulson, Limited, Glasgow. In November, 1945, he was appointed head foundry foreman with Sir W. G. Armstrong Whitworth & Company (Ironfounders), Limited, Close Works, Gateshead, later becoming assistant foundry manager and eventually foundry manager. Two years ago he became manager with the Wear Winch & Foundry Company, Limited, Sunderland, a position which he still holds. From 1947 to 1952 Mr. Charlton served on the part-time staff of Gateshead Technical College, training students for the City and Guilds examination in foundry practice.

Correspondence

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

ROBERT WELLS, BELL FOUNDER, 1764-1799

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—We were interested to see the illustration in your July 16 issue of pack-horse bells, as we have in our possession Robert Wells' complete set of patterns for these bells. They are beautifully made in metal, complete with metal coreboxes and oddsides and are as usable today as they were when first made nearly 200 yrs. ago.

Robert Wells was succeeded by his son James, and when he died in 1825 their business and much of their pattern equipment was acquired by our foundry, which has now been running continuously for 383 years.—Yours, etc.,

MEARS & STAINBANK.

Whitechapel Bell Foundry,
32 & 34, Whitechapel Road, London, E.1.
July 23, 1953.

Publications Received

Handbook, 1953. Published by The British Industrial Measuring and Control Apparatus Manufacturers' Association, 21, Tothill Street, London, S.W.1.

It would appear that the industrialists are still not aware of the great benefits to be obtained from the instrumentalization of their plants. To remedy this an exhibition has been staged and following it this handbook has been issued. It is well illustrated and contains a "Where to Buy" section and a quantity of advertising announcements by the members of the association.

Industry Enters the Atomic Age. Some practical problems in applying atomic energy. Published by the American Management Association Inc., 330 West 42nd Street, New York 36, U.S.A. Price $1.25.

In view of the interest aroused by Mr. E. W. Colbeck's lecture to the Blackpool Conference, the reviewer believes that this 32-page pamphlet will serve the purpose of stimulating that interest as it extends the subject to wider fields, such as gauging, wear tests and the dissipation of electrostatic electricity on heavy machines such as is used in the manufacture of textiles and paper.

Production of Diesel-engine Castings in Grey Iron*

By J. R. Charlton

The purpose of this Paper is to describe the methods adopted in the production of iron castings for Diesel-engines in a jobbing foundry. The firm originated in 1907 under the name of the Wear Winch & Reel Company and then employed one man and a boy on the manufacture of winches and reels. Subsequently, a small foundry was established to produce the castings used in these products. This steadily developed and is now a modern foundry with three bays occupying 24,000 sq. ft., employing well over one hundred people and producing a wide range of engineering and shipyard castings weighing individually from a few pounds up to twenty-five tons.

FRAME CASTING

The first of the castings to be described is the frame for a Diesel engine designed and produced by Harland & Wolff, Limited, Belfast and Glasgow. Although some exhaust casings for heavy turbo-generators had been made previously, this was the first casting of this nature to be made in these works. The engine frame is complicated, as it combines, in a single casting, the cylinder block and crankcase. Eighty-six cores are contained in the five-cylinder unit, and ninety in the six-cylinder line. The respective finished weights are 2 tons, 11 cwts., and 3 tons. Planning the production methods applied to the castings described in this Paper was carried out by the Author and the foundry foreman, in consultation with the moulder and coremaker at all stages. Such planning is essential especially in the case of castings of this size and complexity and indeed the casting should be carried through to completion on a theoretical basis before the pattern is even prepared. Nevertheless, it cannot be too strongly emphasized that all the planning in the world will not produce a good, sound casting without the applied skill of the individual moulder and coremaker.

Pattern Equipment and Method

Pattern equipment for the job was made at the works, after consultation between patternshop and foundry staff, with the cylinders arranged in the vertical position, so as to minimize the possibility of defects in the bores, also, to ensure close-grained metal for the cylinder-head studs, which form the bottom face of the mould, with the crankcase moulded in the top. The equipment is shown in Figs. 1 and 2. The cylinder corebox was made in washtub fashion, with the ribs worked loose. The sides were made to strip away from the core and so eliminate much unnecessary handling. Aluminium sections were provided for the prints, and these were left in position until the core was baked, so preventing collapse of the overhanging part of the core. The other coreboxes were made in orthodox fashion, and need no mention here, with the possible exception of that for the overhead valve cores and which was made in halves for ease of stripping.

The castings have the following dimensions:—

	Five-cylinder.	Six-cylinder.
Length	8 ft. 6 in.	10 ft.
Breadth	3 ft.	3 ft.
Depth	3 ft. 9 in.	3 ft. 9 in.

The moulding boxes measured 12 by 6 by 4½ ft. overall, in order to accommodate the six-cylinder unit. To save storage space on completion of the job, the boxes were made in two sections, each 12 ft. by 6 ft. by 2 ft. 3 in. These were then bolted together and the complete box was sunk to approximately half its depth in the foundry floor. About five tons of sand was required each time one of these jobs was rammed up and this position of the box greatly eased the manual handling of the sand.

In a job of this nature, methods of venting, gating and risering are of first importance, and are related one to the other because the great amount of cores involved produces a considerable volume of gas. This is evolved rapidly and must be evacuated freely from the mould as quickly as possible. Other vital considerations relate the design of the casting to the grade of iron to be used. The metal specified was a high-duty iron with low phosphorus and silicon contents, and the section thickness averaged only 16 mm. Moreover, the outside walls were interspersed with window cores and there were several re-entrant angles. All these factors necessitated a gating system which would fill the mould rapidly enough to produce a sound casting with all sharp corners and contours clearly defined, coupled with efficient arrangements for the venting of cores and for rapid and easy egress of air and gas from the mould cavity. To help this latter function, as well as to provide feed metal, an adequate number of risers was provided and Fig. 2, which shows the mould in course of being poured, illustrates clearly the rapid escape of mould and core gases.

To minimize turbulence, the casting was run from

* Paper presented at the fiftieth annual meeting of the Institute of British Foundrymen at Blackpool.

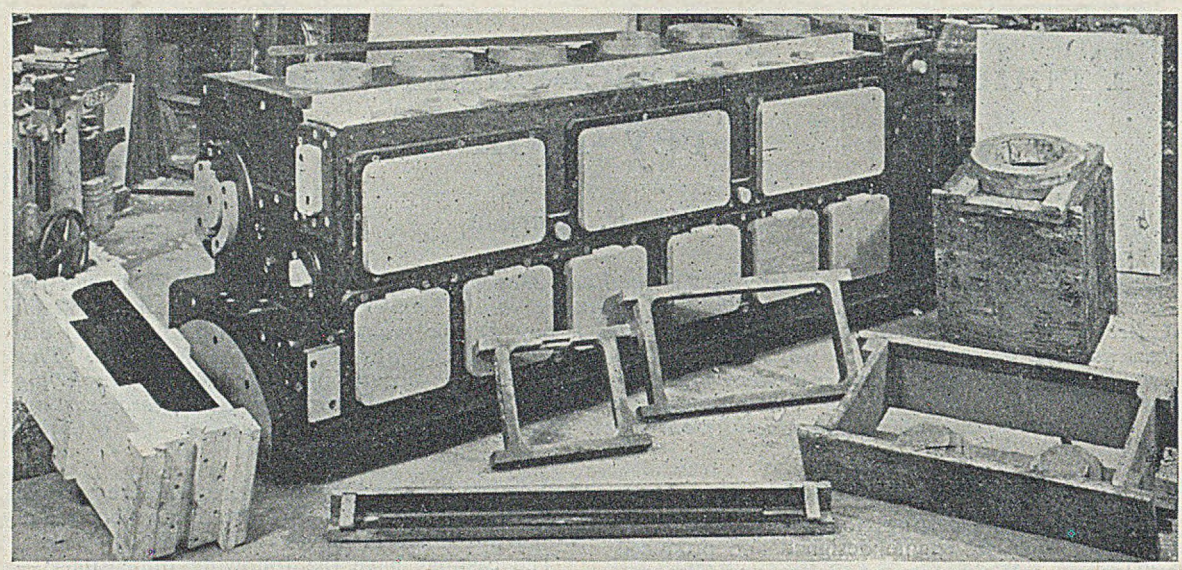


FIG. 1(*a*) *and* (*b*) *(foot of facing page).—Views of the Pattern and Corebox Equipment for producing a Diesel-engine Frame Casting, weighing* 3 *tons, as a Six-cylinder Unit.*

one end through two ingates each 2 by 1¼ in. which entered the bottom face of the mould on either side to avoid impingement of the molten metal on the main cores. The ingates were supplied from two downgates, each 2 in. square connected by sprue bars to two downgates of similar dimensions which passed through the top box. Two additional ingates at joint level provided fresh metal to the top flanges.

Moulding

Moulding operations commenced with preparation of a cinder bed on the bottom of the box to facilitate venting of the mud-hole cores, by way of the inspection-hole cores. The cinder bed was connected to two pipes set at each end up to joint level and continued through the top box to atmosphere. The next stage was the preparation of a sand bed which was rammed and then scraped perfectly level. The pattern was placed on this bed, sand was rammed underneath, and around the barrel core-prints, and the pattern was then suitably located by stakes before being lifted away. The prints were then removed from the pattern, placed back in the mould bottom and rammed firmly. The bottom face was then sprigged and made good before the pattern was returned to its location. This procedure was preferred because there was little room for movement after the mould was completely rammed and it was much easier to finish the bottom face at this stage.

The main ramming operation was now commenced, in the course of which the vents required from the cores of the camshaft bearings, the overhead valves and the mud holes, were provided. These consisted of cinder trails from the prints concerned up to joint level and from there to atmosphere through the top box or through holes in the box sides. All screws holding side prints and facings were withdrawn during ramming as this made it easier to finish the walls of the mould. Broken core grids were placed at intervals at each stage of ramming, to reinforce the mould walls and to help withstand the pressure of the molten metal. The joint was made firm and then sleeked; parting powder was added and the top box rammed up. This was then lifted, turned over, sprigged and finished. The pattern was withdrawn by means of eyebolts screwed into plates on the bottom of the main frames, and the mould finished. The blackwash used was a proprietary-bonded type requiring only the addition of water. Fig 3 shows the mould in this final stage of finishing.

When this operation was completed, the top box was inverted over the bottom box on metal bricks and the whole then connected to a portable coke-fired mould-dryer. This was placed on top of the flanged pipe, seen to the right in the background of Fig. 3, which passed through the centre bars of the top box, with the flange resting on the box bars. This pipe was of such a length as to reach to within 12 in. of the bottom of the mould and a loam-coated plate was placed on bricks immediately under the pipe. This arrangement permitted the hot air to spread over the mould without overheating any part. Drying occupied from ten to twelve hours and a suitable period was allowed for the mould to cool prior to core setting.

Coremaking

The coremaking technique required for a casting of a design such as this necessitates a considerable amount of study. At any time, the matter of contraction weighs heavily with the coremaker, and when, in a fairly large and complex casting, the wall thickness is only 16 mm. and the metal used is a high-duty grade, the risk of cracking, tearing

and stressing is very real. The sand mixtures to be used must first be decided upon and the safest method is to standardize on mixtures which have been thoroughly proved in service. On this basis, two types of core sand were used as follows:—

	Heavier cores.	Lighter cores.
Sharp sand	60 parts	70 parts
Naturally-bonded red sand ..	40 parts	30 parts
Proprietary core-cream	3 per cent.	3 per cent.

Preparation of the sand for the heavier cores was carried out in a mill with a light roller to develop the maximum bond. The sand for the lighter cores was prepared in a paddle mixer. These mixtures so prepared gave adequate green- and dry-strength, along with good collapsibility. Another important point in coremaking technique was the type of grid to be used. All the main cores had to withstand a fair amount of handling and required adequate reinforcement. Nevertheless, the grids had to be as light as possible consistent with the strength required, otherwise there would have been some risk of cracking because of restraint of the casting and also of damage to the casting during de-coring.

The heaviest core was that for the gear-case. This measured approximately 3 ft. 9 in. by 3 ft. by 10 in. The corebox was made with the face lagged on to the main frame, leaving the other face open for the placing of the grids and for the ease of ramming. Two grids were necessary and, to ensure rigidity, these were fastened together, back to back, with the prods on the outside faces. The box was laid on the floor and after it had been rammed up a plate was fastened over the open face; the job was then turned over and stripped. After baking, the core was turned on end and black-washed; this was the position in which it was placed in the mould.

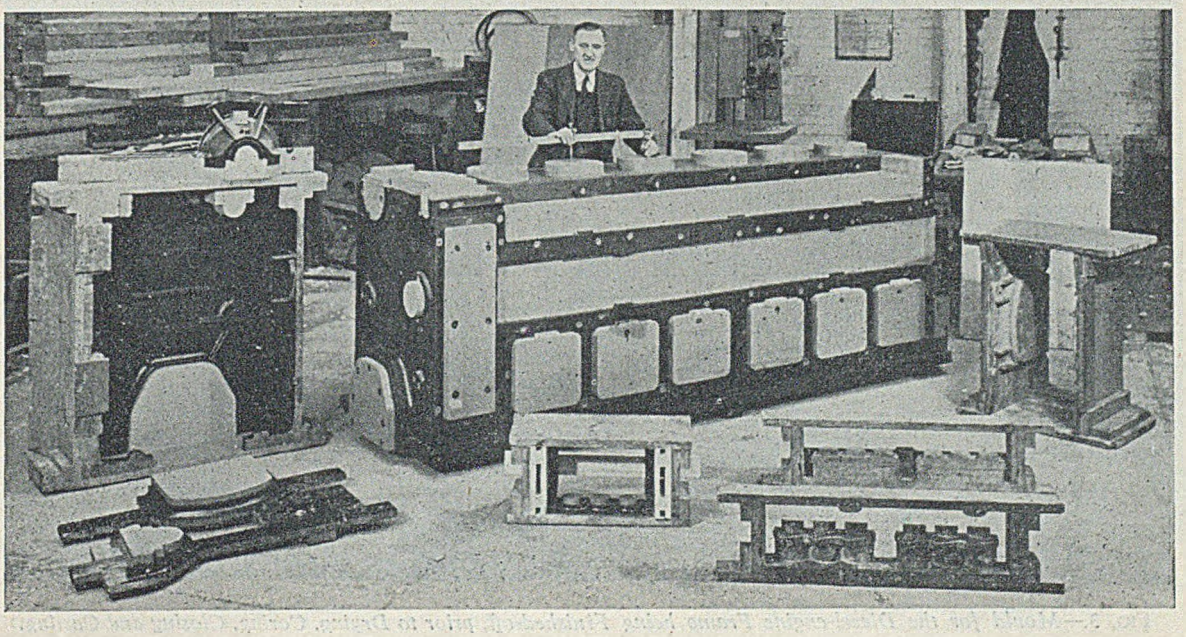
The barrel cores were rammed in the upright position with the grids placed in the print; two eyes were provided in these for lifting, and a lighter binder was made to support the section overhanging the print. The crankcase and mud-hole cores were straightforward and needed little mention and the same could be said of the camshaft-bearing cores. The cores for the overhead valves were made in halves and pasted together after baking. Perhaps the most intricate core was a triangular one measuring only 3 in. at its base and, as this extended all the way from the pump-end to the timing core, it was decided to make it in two sections, each approximately 4 ft. long. The only direct outlet for this core was a print on the pump-end, though it had two connections in the form of small valve cores which ran at right angles to it on the centre of the outside face.

All the cores were baked in a bogie-type stove, coke-fired from a forced-draught fire-box placed outside and at right angles to the stove. They were heated to 200 deg. C. over two hours, maintained at that temperature for six hours and allowed to cool in the stove for four hours before withdrawal. The finished cores for one casting are shown in Fig. 4.

Coring and Casting

The cores were set by the moulder with the assistance of the coremaker who was responsible for connecting the vents; both were aided, at suitable stages, by a patternmaker who checked the accuracy of the core positioning. This work was completed in two days and the only operations carried out on the third day were the actual closing and pouring of the mould.

The first core to be set was the gear-case core, as it was necessary to have one man in the mould to guide it into its print. Supposing this core had been



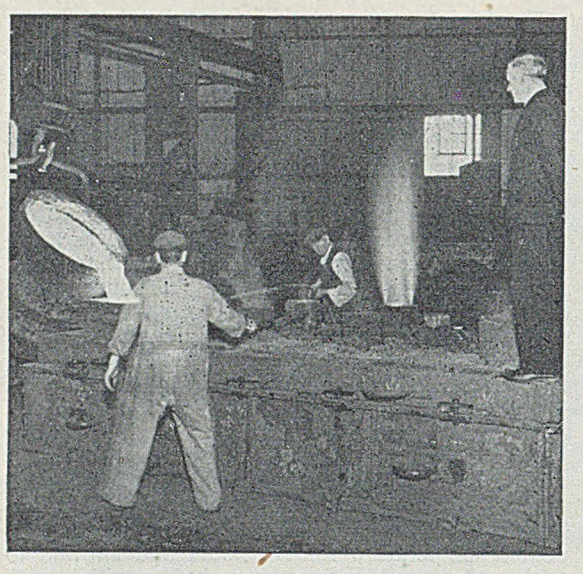


FIG. 2.—*Pouring of the Diesel-engine Frame Casting showing the Rapid Escape of Gas from the Vents provided.*

located only bearing in mind the thickness required on the adjacent outside wall, if the core had proved somewhat large, it would have been possible to find on completion of coring that there was insufficient wall-thickness at the far end of the mould. For this reason, this first core was set by template from the pump end. The window cores were fastened into their prints with ordinary sprigs and set at slightly less than the required thickness to allow sufficient clearance for the crankcase cores to pass over. The overhead valves were then set at their correct height in relation to the bottom face of the mould.

The round cores forming the boxes of the valves were set and centred, after which the camshaft bearing cores were placed in position. The vents from the valve cores were carried through into the camshaft cores, which had prints in the underside to locate the round cores and to prevent penetration of metal into the vents. Chaplets were placed between these cores to prevent flotation. The mud-hole cores were the next to be set, and rested in a 4-in. square core on the bottom face of the mould. As these cores were to be surrounded by metal on five faces, extra vents were brought off through the 4-in. square cores and also through the window cores. Fig. 5 shows the coremaker making up these vents. To ensure perfect balance, a chaplet was placed on each side of the bottom window-cores and a template was tried between these and the camshaft bearing cores. This template was constructed to reproduce the width of the barrel cores plus the metal thickness on each side. This operation completed the first day's coring up and a small basket fire was placed inside the mould to dry the vents and maintain heat within the mould.

After removal of the fire, on the second day the barrel cores were placed in position and set by a template marked with the core centres, the wall thickness and the machining allowances. It was considered of the utmost importance to ensure that these cores were set accurately and well held by chaplets to prevent any movement during pouring. The triangular cores previously mentioned were the next to be set. One vent was brought through the print on the pump-end, another between the two cores and two more were carried through the small valve cores. The crankcase cores were set on chaplets placed on the mud-hole and camshaft bearing

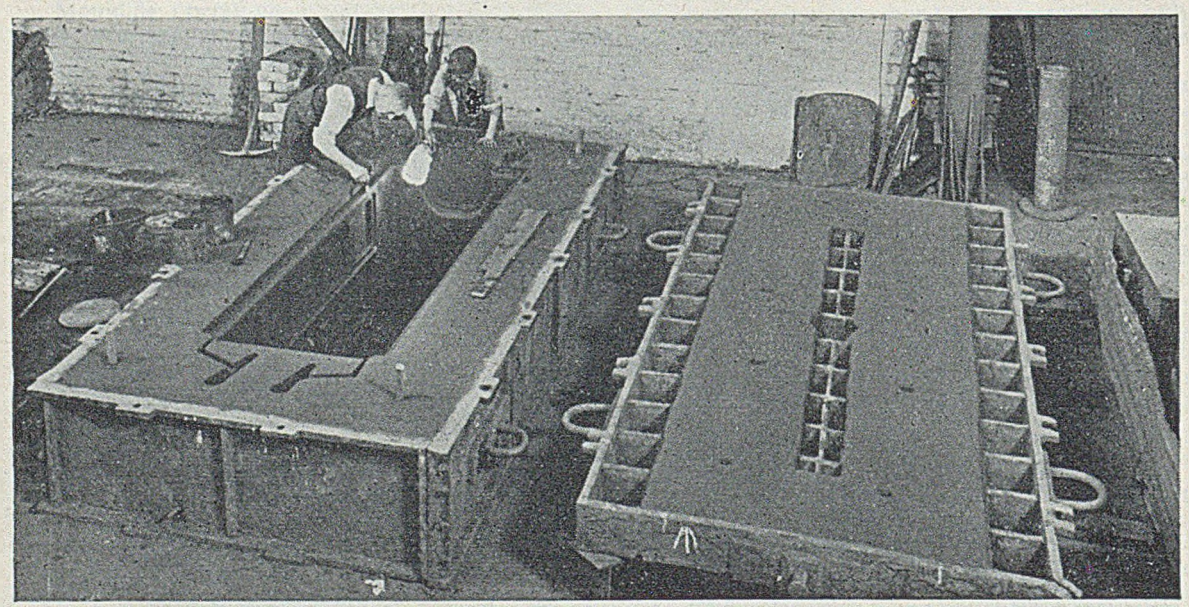


FIG. 3.—*Mould for the Diesel-engine Frame being Finished-off, prior to Drying, Coring, Closing and Casting.*

cores. Single-stud chaplets were also placed on the triangular core, care being taken to prevent them from bearing heavily, as these were delicate cores which could break under the weight of the crankcase cores. The vents from the barrel cores were taken through these which in turn were vented through the top box. Last to be placed were the bearing cores, which were set in prints in the crankcase cores and also vented through the top box. Densener nails were placed at the junction of the ribs formed by the cores to prevent the porosity which would otherwise be likely.

The third and last day was spent placing the top box and bolting up. To avoid any possibility of loose sand falling into the mould, all risers were made up before the top box was placed on for the last time. The cupola used to provide the metal has a melting rate of five tons per hour and the special charges for this job were arranged first, in order to make certain of tapping iron of the correct composition. The unit charges each weighed 12 cwt. comprising 6 cwt. of refined iron, 2 cwt. of Scotch pig-iron, 2 cwt. of bought scrap, 1 cwt. of returned special scrap and 1 cwt. of steel scrap. "F" nickel ingot was added with the third charge and the percentage composition of the tapped metal was:—C 3.2, Si 1.6, Mn 0.8, S 0.08, P 0.35, and Ni 0.6. The pouring temperature was 1,320 deg. C. approximately and filling of the mould took 95 secs. from the time the stoppers were lifted. The riser immediately above the end of the triangular core was allowed to overflow by way of a small hole in the outside of the bush. This had a light plate placed just above it and, after sufficient metal had been run through, the plate was tapped down and the risers allowed to fill up.

In the regular production of these castings, depending on local weather conditions, castings are allowed to stand from three to six days before being lifted. They are then stripped, shot-blasted and fettled preceding a visual inspection and thorough

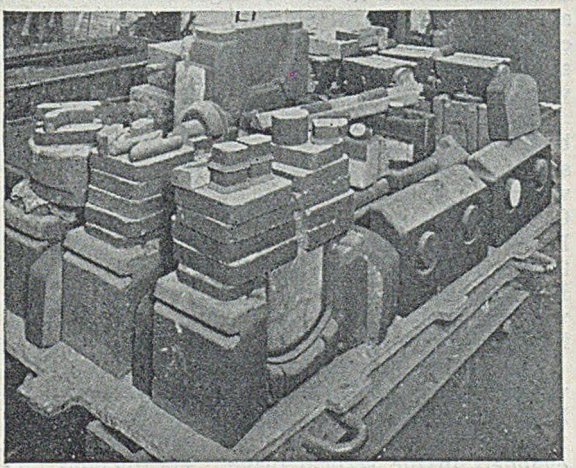


FIG. 4.—*Set of Completed Cores for the Diesel-engine Frame Casting.*

FIG. 5.—*Coremaker preparing the Vents from the Mud-hole Cores of the Frame Castings.*

check on dimensions, to ensure that contraction has been as expected—*i.e.*, 1 part in 120—and that no core has been displaced. Fig. 6 shows the finished casting with the overhead valves and camshaft bearing on the near side. This casting is now in regular production at the foundry, using the method described.

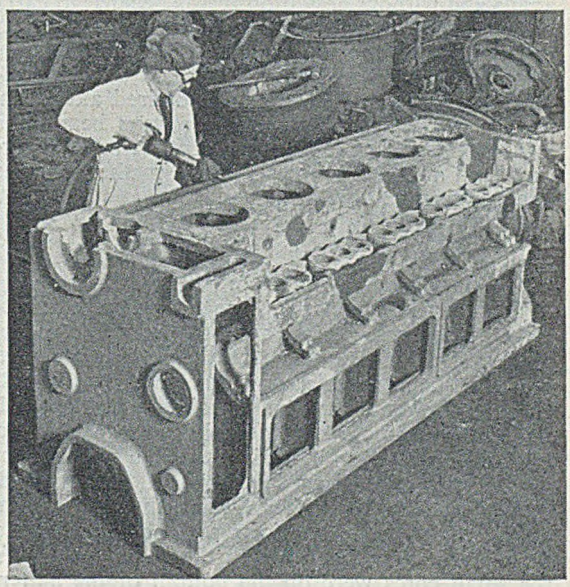


FIG. 6.—*Final Dressing of a Diesel-engine Frame Casting—in this case, a Five-cylinder Unit.*

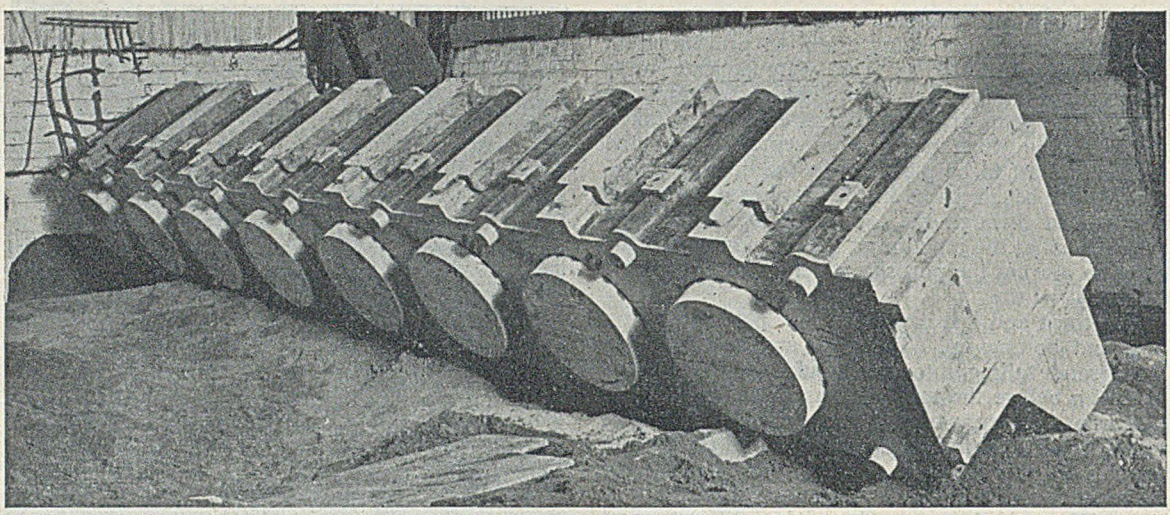


FIG. 7.—*Pattern for the Eight-cylinder Block Casting of the Mirrlees "K" Diesel Engine, as modified at the Author's Foundry.*

CYLINDER BLOCK

The second type of casting given detailed description here is a cylinder block for the Mirrlees "K" Diesel engine designed and produced by Mirrlees, Bickerton & Day, of Stockport. An interesting feature of the pattern equipment for these castings was the fact that the seven-cylinder pattern was made to be moulded in halves, with the barrels and cylinders to be cast in the horizontal position, and the mud-hole cores in the bottom half, whereas the eight-cylinder pattern was made with the cylinders in the vertical position and the mud-hole cores on the side. The seven-cylinder pattern was first to arrive and without hesitation it was decided to carry out a modification in order to pour the block with its cylinders in the vertical plane. A careful study was made of the pattern construction to determine the best method of effecting the desired alterations without mutilating the pattern, always bearing in mind the fact that it might be sent, at some future time, to another foundry whose methods would necessitate moulding in halves.

Pattern Alterations

The two half-patterns were bolted together by eight bolts passing through the main frames of each half, and certain portions of the lagging were removed to facilitate this arrangement. A facing, with bosses included, extended the full length of one side under the mud-holes and to avoid damaging this facing it was decided to block it out with a core, the top part of this containing the shape of the underside of the mud-hole chamber. The other side of the pattern embodied prints for a series of small bottle-neck cores which cut through the barrel cores. As the small cores were on the bottom of the pattern and could be damaged if they were set in position first and the barrel cores subsequently lowered into the mould, tail prints were provided over them so that they could be set after the barrel cores were placed.

Apart from the desire to cast the cylinders in the vertical position there were other reasons, some technical and some economic, for carrying out all these alterations. In a job of this nature the Author prefers to see all the main cores in the bottom part of the mould as this makes it much easier to check all centres and wall thicknesses. Furthermore all the vents can more readily be carried through the top box into the atmosphere. The economic aspect relates mainly to the moulding box tackle required and, in any jobbing foundry, full consideration must always be given to the design of any equipment in order to facilitate its use for possible production of other similar castings in the future. For example, entire moulding boxes made to take a pattern of these dimensions in halves might never be used again. An additional point to be borne in mind, especially in this foundry where crane time is always at a premium, is the amount of handling which would be necessary if the boxes were made in halves.

Because of these considerations, the moulding boxes were built in sections for easy dismantling and storage and made to take the eight-cylinder unit, which is 2 ft. longer than that with seven cylinders. Overall, these boxes measured 20 by 6 by 3 ft. deep. In view of their exceptional length, it was decided to make the top in two sections each measuring 10 ft. by 6 ft. by 9 in. deep, and the whole assembly was sunk in the foundry floor to half the total depth, for the reason given earlier.

The pattern equipment for the eight-cylinder block which was previously manufactured in north-eastern England, was found on receipt to have been made in the orthodox way, *i.e.*, to permit pouring with the cylinders in the vertical plane. The method previously followed, however, had involved the setting of loose cake-cores on the bottom of the mould by means of a template, and the positioning of the

barrel cores on top of these. Accordingly this pattern was modified to provide prints for the barrel cores as, apart from giving an accurate location, these also prevent any possible displacement of the cores during pouring. Fig. 7 shows the pattern after modification.

The corebox provided with this pattern was of the barrel type to form the entire core, whereas that which accompanied the pattern for the seven-cylinder block produced the cores from halves. Although the Author's preference would have been for the former, one of the seven-cylinder block castings had already been made with excellent results, using cores from the latter design. Because of this, it was decided to continue use of the same box in both units. This avoided change in the established procedure and also saved the provision of eight loose-pieces in cast iron, each weighing about ½ cwt. which would otherwise have been necessary to support the over-hanging sections of the bottom faces of the cores had they been made by the alternative method. The core-boxes used contained inserts in aluminium alloy to form the ribs and stud bosses and so prevent possible damage during ramming.

Moulding the Cylinder Block

The castings were moulded with the mud-holes on the top face, so as to make possible straightforward ramming with no drawbacks and the use of a flat top, while positioning the most important face (*i.e.*, the cylinder-head joint) on the bottom, so as to ensure particularly close-grained metal for the studs. Fig. 8 shows ramming in progress.

Although these castings were, respectively, 15 ft. 6 in. and 17 ft. 6 in. long, it was decided to pour them from one end, using one ladle only. There were several reasons for this decision:—

(1) A certain amount of highly-undesirable turbulence is produced when two streams of metal meet each other, one from each end of a mould;

(2) when two ladles are used for pouring a single casting, it is almost impossible for the molten metal to be at exactly the same temperature in each ladle;

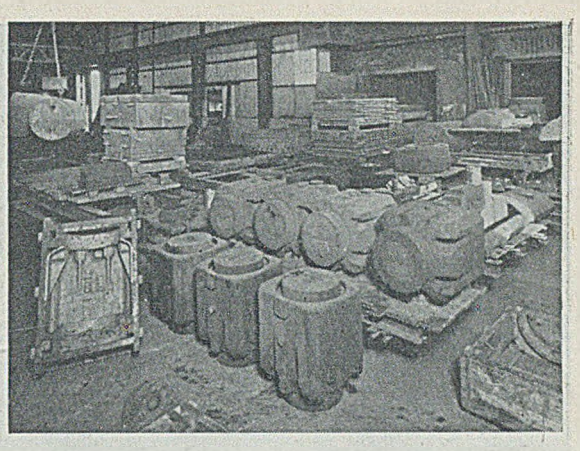


FIG. 9.—*Group of Cores for the Cylinder-block Casting, the Seven Barrel Cores are prominently displayed.*

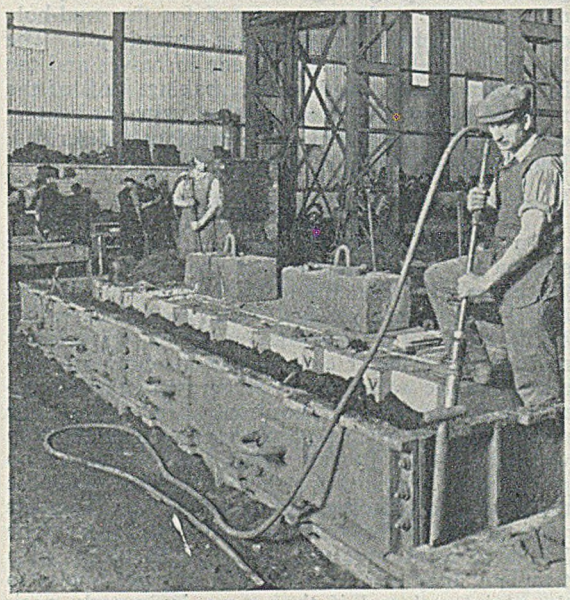


FIG. 8.—*Ramming in Progress on the Cylinder-block Mould. This job was cast with the Head Face Downwards.*

FIG. 10.—*Cylinder-block Mould, at an Advanced Stage in Assembly, showing the Plugging of Spaces with Cotton Waste to Retain any Loose Sand.*

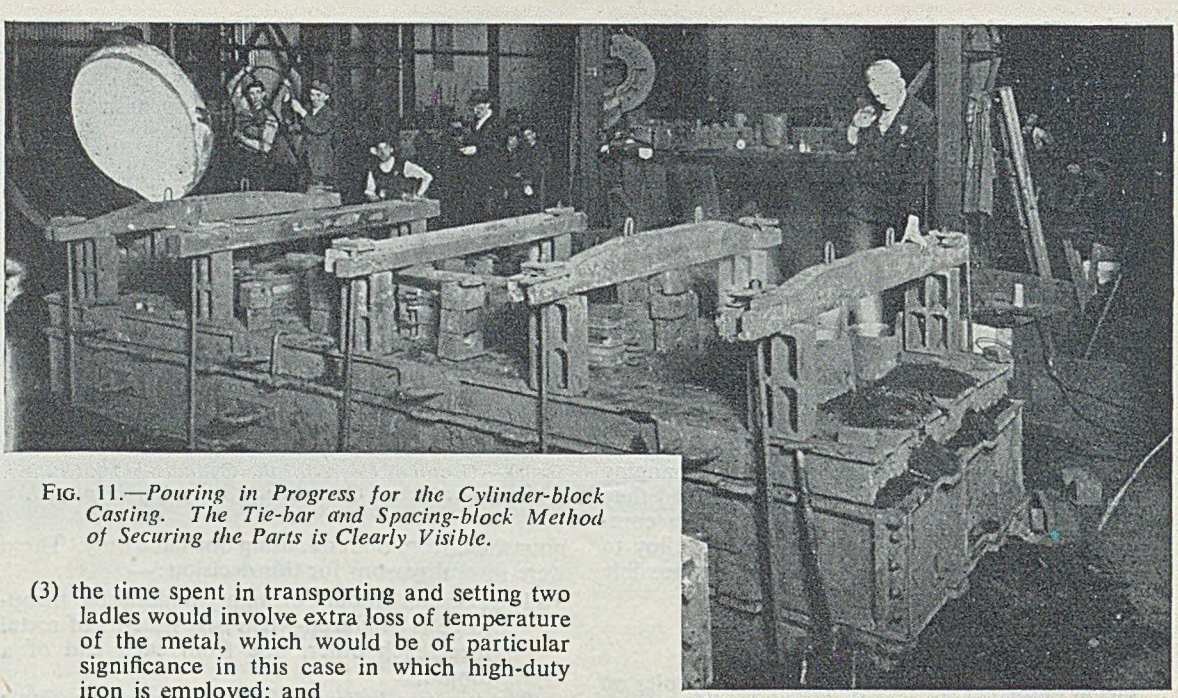


FIG. 11.—*Pouring in Progress for the Cylinder-block Casting. The Tie-bar and Spacing-block Method of Securing the Parts is Clearly Visible.*

(3) the time spent in transporting and setting two ladles would involve extra loss of temperature of the metal, which would be of particular significance in this case in which high-duty iron is employed; and

(4) there is only one crane in the bay of the foundry concerned and although a second ladle could be poured from the adjoining bay, this would involve (at considerable disadvantage) the use of a runner-box 10 ft. long.

Two ingates each 1¼ in. square were used, fed by downgates 2 in. square. These were joined through the top box by sprue-bars from two downgates of the same dimensions. Two risers were placed over the wall of metal between each barrel core for the purpose of feeding the cylinder-head stud bosses, one riser was taken off the extreme end, and a further six were brought off the mud-hole chamber. The vents from the cylinder cores were all taken through the top, while those from the mud-hole cores were carried through the inspection-hole cores on the side. The positions of all risers and vents were clearly marked on the pattern as before. The other moulding operations followed the lines detailed earlier, the pattern being again lifted away and the bottom face of the mould sprigged and made good, before returning it to its place. Drying was carried out by portable driers, in the case of the mould, while the top-part boxes were dried in the core stoves.

Cores

Although these castings are fairly long, contraction does not present a serious problem, since the minimum thickness is 1 in. and the walls are not interspersed with window cores, as in the case of the casting first described. Care was necessary, of course, and the core-grids were made as light as possible consistent with adequate strength; the same oil-sand mixtures were used for the cores. To ensure close-grained metal in their vicinity, denseners were placed round the stud bosses, and densener nails around the ribs. The positions for these were clearly marked on the coreboxes, and such procedure is necessary since verbal instructions can be easily misunderstood or forgotten, especially in a jobbing foundry, where a great variety of castings is in production. After ramming, these cores were turned over on plates and, after baking, were fastened together by clamping the grids in each half core against one another. A frame was used for the mud-hole corebox and the coremaking was a simple job. The bolt-hole corebox was also made in halves and the half-cores pasted together after baking. All of the required cores were baked together, using the heating cycle and treatment procedure previously described. Fig. 9 shows a group of these cores.

Final Operations

On the first day of coring-up, all the cores were set and the vents made up; on the second day, the top boxes were put on and the mould poured. The barrel cores were set first, with special care, use being made of a template on which was clearly marked the cylinder centres, the machining allowances and the wall thicknesses. As before, a pattern-maker checked the final positions of these cores. The mud-hole cores were then placed and their location was determined by the metal thicknesses, as no prints were provided for their reception. Because the mud-hole chamber had a sloping face, chaplets were nailed to the underparts of the cores. The bolt hole cores were next set, also by means of a template; they had to be exactly at right angles to the main wall and if they were improperly positioned much extra machining would have been necessitated.

The next step was to place chaplets along the wall thickness to ensure that there would be no displace-

ment of the cores during pouring. Subsequently, all vents and lifting eye plugs were made up, after which all spaces were lightly packed with rags to prevent anything falling into the mould while the top boxes were placed on. Fig. 10 shows the mould at this stage. On the following morning, final closing took place. Soft clay was placed on the top of the mud-hole cores to ascertain the correct thickness and the tops were again set on. On removal, they were again placed on their stands, and while the coremaker and one moulder were placing the chaplets in position, the other moulder made up all the risers before the box was finally closed. A loam runner box, 2 ft. 6 in. square, was provided and thoroughly dried. Long bolts extending from the bottom-plates of the moulding boxes through bars laid across the top sections were tightened and the job was then ready for pouring.

The metal used for these castings was as previously described except that it was unalloyed. A 7-ton ladle was employed, the casting temperature being approximately 1,320 deg. C., and the mould was filled 90 sec. after the stoppers were lifted. Fig. 11 shows pouring in progress. It is interesting to note that although runners of identical size are used for both types, the seven- and eight-cylinder units made of this design took exactly the same time to fill. After suitable cooling time the casting was lifted into the fettling bay for the de-coring, shot-blasting and fettling and rigid inspection carried out as earlier described. Fig. 12 shows finished casting.

Conclusion

In the foundry concerned, castings of the size and type described are not at all the normal line of business and their production had to be the subject of much study and planning by all concerned. The Author trusts that this record of the procedure applied will be of interest to fellow foundrymen, even those to whom such castings are the routine product and likely to be considered as only moderate in size and not especially complex.

The Author thanks his colleagues of the Wear Winch Foundry Company, Limited, for their co-operation in this work and also the Board of directors of that company for the facilities accorded and permission to present this Paper.

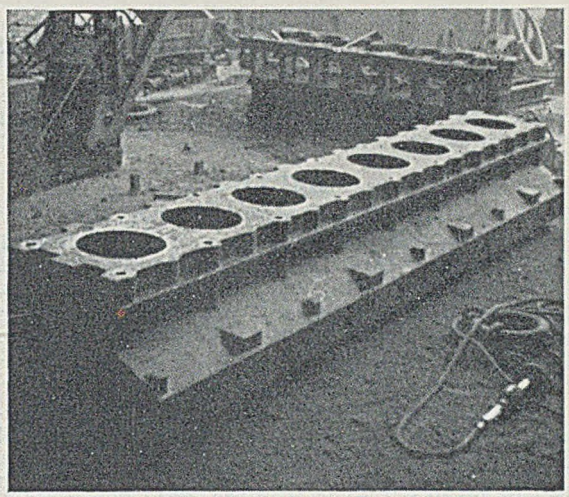


FIG. 12.—*Finished Eight-cylinder Cylinder-block Casting.*

I.B.F. Conference Fund

In addition to the subscriptions to the Blackpool Conference Fund of the Institute of British Foundrymen included in the May 28 issue of the JOURNAL, the following donations have since been received. The Council of the Institute takes the opportunity of expressing its gratitude to the many firms and individuals who have contributed so generously.

	£	s.	d.
Foundry Trade Equipment & Supplies Association, Limited	119	5	0
Staveley Coal & Iron Company, Limited	50	0	0
Joseph Stubbs, Limited	30	0	0
Vulcan Foundry, Limited	25	0	0
T. W. Ward, Limited	25	0	0
George Garner & Sons, Limited	25	0	0
William Tatham, Limited	15	0	0
Thos. Crompton & Son, Limited	10	10	0
James Durrans & Sons, Limited	10	10	0
Corn Products, Limited (Brown & Polson, Limited)	10	10	0
John Needham & Sons, Limited	7	7	0
John Maddock & Company, Limited	5	5	0
Foundry Services, Limited	5	0	0
The Moston Malleable Castings Company, Limited	5	0	0
Spencer & Halstead, Limited (Northern Area) per A. Calderbank	2	2	0
Anonymous	1	1	0
Total	346	10	0
Amount announced in May 28 JOURNAL	1,429	14	0
Grand Total	£1,776	4	0

Training of Technologists

Speaking on the training of technologists ("a name which engineers still find it hard to stomach") at the Congress of Universities of the Commonwealth in Cambridge recently, Professor J. F. Baker, professor of Mechanical Sciences at Cambridge said that the universities should have the task of producing technologists, while the technical colleges should train technicians. He defined a technician as a man who dealt with to-day's problems, a master of all accepted techniques and processes, and a technologist as the man who would deal with tomorrow's problems, and could invent new processes. The technologist, he said, must have a sound groundwork in a wide field of fundamental sciences, and he must know when his passion for results must be curbed in the interests of practicability. Engineering, he said, must be taught by engineers, and every student should be forced to "go out into the world" immediately after graduating. Firms must learn to take a young man without specialized knowledge and continue his education and training. They must later be prepared to invest the necessary time and money in him when he returns for a post-graduate course. This latter idea is new to British industry, but it is catching on.

HILLS (WEST BROMWICH), LIMITED, announce that Mr. R. S. Dyball has joined the Board and has been appointed chairman.

Institute Elects New Members

At Blackpool, recently, the following were elected to membership of the Institute of British Foundrymen:—

FIRST LIST

As Subscribing-firm Members

Crewdson Hardy, Limited, Team Valley, Gateshead, light, high-duty grey iron and non-ferrous founders. (Representative: J. Sigmund.) Hindmarsh Foundries, Limited, 15, Manton Street, Hindmarsh, Southern Australia, founders and engineers. (Representative: J. A. Baker.)

As Members

Lt.-Col. Stanley Edge, T.D., A.I.M., A.I.MECH.E., director, Alexander Metal Company, Limited, Bilston; Cecil R. Ellwood, foundry manager, Moss Gear Company, Limited, Birmingham; R. H. Francis, manager, Vulcan Pattern Making Company, Limited, Coventry; S. Frankel, president, Foundry Services Inc., New York; F. S. Gaston, managing director, Geo. Denham & Company, Limited, Darlington; T. Hammond, B.SC.(ENG.), A.I.MECH.E., technical director, Anthony Bernard Tubini & Partners, Istanbul, Turkey; R. W. Hodges, director, R.C.H. Foundry, Limited, London; A. A. Huckle, master patternmaker, Surrey Patterns, Limited, Croydon; G. H. Plummer, master patternmaker, G. H. Plummer & Company, Limited, London; G. J. Rogers, foundry manager, Admiralty, H.M. Dockyard, Portsmouth; J. Sigmund, B.SC., foundry manager, Crewdson Hardy & Company, Limited.

As Associate Members

J. A. Baker, director and works manager, Hindmarsh Foundries, Limited, Southern Australia; B. Blow, foundry foreman, Richards (Leicester), Limited; J. W. Deaton, chief castings inspector, Morris Motors, Limited, Wellingborough; I. S. Gupta, B.SC., G.I.P.E., foundry foreman, Indian Sugar & General Engineering Corporation, Limited, Punjab, India; G. Harrison, deputy chargehand, Beck & Company (Meters), Limited, London; M. J. Hartley, chief estimator, Coventry Malleable & Aluminium, Limited; E. W. Herring, master patternmaker, Skerneside Pattern Making Company, Limited, Darlington; F. W. Percival, foreman patternmaker, Wilsons Forge (1929), Limited, Bishop Auckland, Co. Durham; E. Prentice, steel foundry foreman, Wilsons Forge (1929), Limited; E. Stein, B.SC.(ENG.), metallurgist, R. H. Harry Stanger, Elstree, Herts; F. Stokes, chief chemist, John Harper & Company, Limited, Willenhall; W. H. Thacker, foundry instructor, Stanton Ironworks Company, Limited, near Nottingham; N. E. Tidswell, technical development officer, W. J. Hooker, Limited, London; H. W. Werge, master patternmaker, Skerneside Pattern Making Company, Limited, Darlington; I. L. J. Williams, patternshop and foundry foreman, Calcutta Port Commissioners; D. Forster,* assistant to foundry manager, Darlington Forge, Limited.

As Associates (over 21)

F. Akinbode, trainee, Locomotive Works Foundry, S.R. Railway, Eastleigh, Hants; F. R. Barritt, chargehand, metal patternmaker, Morris Motors, Limited, Wellingborough; D. Bryan, loose pattern moulder, Stourbridge Engineers & Ironfounders, Limited, Stourbridge; P. Chapman, patternmaker (mechanized foundry), Ashmore, Benson, Pease, Stockton-on-Tees; N. D. Gupta, foundry engineering trainee, Watford Foundry Company, Limited.

As Associates (under 21)

M. Bradley, metallurgical apprentice, John Harper & Company, Limited; P. Crossley, metallurgical apprentice, John Harper & Company, Limited; J. A. Fawcett, apprentice patternmaker, Wilsons Forge (1929), Limited; J. G. Greatrix, metallurgical apprentice, J. Harper & Company, Limited; M. A. Grew, metallurgical apprentice, John Harper & Company, Limited; J. G. Iceton, trainee, metallurgical laboratory, Wilsons Forge (1929), Limited.

SECOND LIST

As Subscribing-firm Member

Ouzledale Foundry Company, Limited, Barnoldswick, *via* Colne, ironfounders. (Representative: G. N. Ashby.)

As Members

G. N. Ashby, managing director, Ouzledale Foundry Company, Limited; P. J. Flack, director, Ian Ross (Castings), Limited, Slough; R. W. Lawrence, foreman patternmaker and technical adviser, Sykes & Harrisons, Limited, Manchester; J. Gardner,* general secretary, A.U.F.W., Manchester.

As Associate Members

T. Andrews, foreman moulder, Matthew Swain, Limited, Manchester; J. Ellis, foreman, melting department, Henry Wallwork & Company, Limited, Manchester; W. J. Finch, mechanized plant foreman, Henry Wallwork & Company, Limited; C. E. Gordon, technical representative, Leicester Lovell & Company, Limited, Southampton; L. Holt, chief foundry planner, Henry Wallwork & Company, Limited; H. Markey, coreshop foreman, Henry Wallwork & Company, Limited; W. J. Neild, machine moulder, Henry Wallwork & Company, Limited; A. Oulton, dressing-shop foreman, Henry Wallwork & Company, Limited; G. Raven, foundry foreman, Henry Wallwork & Company, Limited; J. Raven, foundry foreman, Henry Wallwork & Company, Limited.

As Associates (under 21)

M. Claridge, patternmaker, Croydon Foundry, Limited; N. E. Hayes, apprentice patternmaker, Watford Foundry Company, Limited.

THIRD AND FOURTH LISTS

As Members

N. C. Fisher, managing director, Universal Pattern Company (London), Limited; L. C. Grubb (representative, South African Railways), chief mechanical engineer, S.A. Railways, Pretoria; C. W. Fenton,* managing director, Clayville Foundry (Pty.), Limited, Johannesburg; R. B. W. Greenhorn,* foundry manager, Light Castings (Pty.), Limited, Boksburg, S.A.; J. Steele* (representative, Rely Products, Limited), foundry manager; B. V. Mahabale, B.SC.,* chief metallurgist and foundry manager, Mysore-Kirloskar, Limited, India.

As Associate Member

G. V. Francis,* technical assistant, United Engineers, Limited, Penang.

As Associate (over 21)

D. T. Greenhorn, assistant foundry manager, Light Castings (Pty.), Limited, Transvaal.

* Transferred.

Runners and Risers*

Discussion at I.B.F. London Branch Symposium

At a meeting of the London branch of the Institute of British Foundrymen, over which Mr. B. Levy (senior vice-president) presided, consideration was given to the subject of runners and risers, and three short papers on this subject were presented by representatives of the steel, cast iron and non-ferrous sections of the industry. What follows is an account of the discussion which took place subsequently.

THE CHAIRMAN, opening the meeting, first introduced the authors. Mr. E. D. Daybell, who dealt with steel castings, was chief methods engineer to K. & L. Steelfounders and Engineers, Limited, Letchworth. He had had practical experience from the drawing board to the floor, and was a member of the Steelfounders' Productivity Team which recently visited the United States and the author of several papers presented to the British Steel Founders' Association. Mr. P. A. Russell, B.SC., F.I.M., of S. Russell & Sons, Limited, Leicester, put the case for cast iron, and non-ferrous castings were dealt with by Mr. R. W. Ruddle, M.A., A.I.M., head of the castings section of the British Non-Ferrous Metals Research Association. He is an active member of the Technical Council of the I.B.F., and author of many papers, including that presented in December, 1952, to the joint meeting of the London branch of the I.B.F. and the London section of the Institution of Metals on the subject of metal/mould reaction.

MR. RHODES asked Mr. Daybell what had become of Mr. Finch's gas-pressure capsule for generating feeding pressure.

MR. DAYBELL replied that it was introduced shortly before his arrival at K. & L., but he had had some experience with it. In his opinion, the atmospheric core would do the same work as the gas-pressure capsule, and as efficiency was such that a casting could be produced more cheaply by the latter method than by using the capsule, the cheaper method prevailed.

Practical Limitations

MR. GUNN asked Mr. Daybell why the system was developed of having the ingates into the casting above the runner bar, and what were its advantages. Also, why were the ingates very often lead into the casting instead of into the side or atmospheric feeding head? The latter arrangement would give perhaps greater efficiency.

MR. DAYBELL said those questions brought him back to the point about considering all the practical problems involved. All would agree that to take the metal into the head was the correct method by which to achieve directional solidification, but if, in green-sand practice, one gated into a side head (as shown at "A," Fig. A), the metal would run in, swirl against the green-sand wall, become turbulent and wash sand inclusions into the casting. In his opinion this was not so likely to produce a sound casting as using a gate in front of the head (as shown at "B"), which allows the metal to roll into the casting with less turbulence and still take advantage of the hot spot for feeding purposes.

In his experience it was better in some cases though not in all, to introduce a bottom runner locally under the head, to allow the metal to run up into the head. Also instead of dropping the metal into the mould, it was better to bring the metal upwards, thereby reducing turbulence and producing a sounder casting. In this case the runner was not necessarily run into the atmospheric head. Much depended, however, on whether one was using dry- or green-sand. Indeed, there were various aspects to be considered when designing a gating system for any particular type of casting.

With regard to having the ingates on top of the runner-bar, he said the majority of steel founders used the bottom-pouring ladle, with which they had not the control in keeping the head full of metal all the time that was afforded by shank or lip pouring, as used in the iron and non-ferrous foundries; so that they were liable to get dribbling pouring. If the ingates were placed on the top, the runner-bar was always full of metal and there was always a sump with a cushion of metal on to which the incoming metal could fall. There was no danger of the runner-bar being half full and causing scabbing, which could happen if it did not fill until the casting was run completely.

MR. A. LOGAN, who emphasized the importance of the Papers, said the problem of the feeding head could be reduced to very simple terms. Any metal, when solidifying in the mould, decreased in volume. There were two stages—the change of volume in the liquid state as the temperature was reduced from the pouring temperature to the solidification

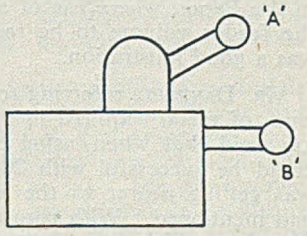


FIG. A.—*Schematic Plan View of Metal entering "A" through the Head, or "B" directly into the Casting.*

*The three papers presented in this symposium were printed in the JOURNAL, May 28 and June 11, 1953.

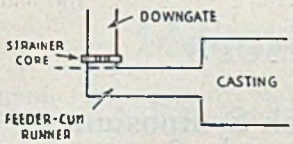


FIG. B.—*Strainer-core at the Bottom of the Downgate.*

point, and the much larger contraction which occurred on passing from the liquid to the solid state. It might not seem to be a very large effect, but it amounted to 7 or 9 per cent., or even 10 per cent. in some cases. That meant that, theoretically, one should need to supply only 10 per cent. extra metal to feed even the most difficult casting. That was not the case, however, and in the case of some of the more difficult non-ferrous alloys, the weight of the feeding heads might be 50 per cent. or more of the weight of the casting itself. Obviously, to be efficient, founders needed to cut down the feeder metal so as to approach the theoretical amount.

Plaster or Exothermic Sleeves

The necessity for using very large feeder heads was so as to provide a volume of metal which would remain liquid whilst the casting was solidifying—to provide a reservoir sufficiently large to ensure that it would remain liquid after the casting had solidified and thus ensure feeding. That could be done in several ways and the non-ferrous foundry had the choice of using either exothermic or a highly insulating plaster material. Where the metal arriving at the feeder head was likely to have lost temperature to such an extent as to make it sluggish and set too rapidly, an exothermic sleeve would be used. Where metal arrived in the feeder head with a reasonable amount of "life," then the insulating properties of a foamed plaster sleeve would prolong the feeding range considerably beyond the casting and solidification time and give a sound casting. Both methods resulted in considerable saving of feed metal. Whatever form of feeding head be used, however, it was essential to cover it immediately it was cast to prevent heat loss.

MR. RUDDLE agreed with Mr. Logan's remarks, and emphasized with him the considerable benefits which accrued from the use of the insulating and exothermic sleeves. The example he had quoted in the Paper, where use of a plaster sleeve enabled the feeder volume to be reduced by 80 per cent., was a good illustration.

MR. DAYBELL, referring to the theoretical 10 per cent. of metal required in the head to feed a casting, said that when using exothermic material he could be successful with 20 per cent. So that he was getting nearer to the ideal which Mr. Logan had mentioned. With regard to insulation, he said the slag which was formed on the exothermic material served as a very good insulating material; moreover it was homogeneous.

Non-interchangeability of Method

MR. E. C. MANTLE, commenting on the first scheme illustrated by Mr. Russell, which consisted of a runner-basin with a strainer-core situated at the top of a downgate going to the bottom of the casting, said that no doubt Mr. Russell had made many excellent castings using the method but he knew of instances in which it had produced some very bad castings in non-ferrous metals. In one case, a foundry was making some large valves in leaded-gunmetal, and there were some deep, rough patches on the top surfaces of the flanges which appeared to consist of oxide and metal shot. Part of the mould was cut away in order to see what was happening, and it was obvious that, as the streams of metal fell from the strainer-core to the bottom of the downgate, they created a tremendous turbulence, forming a mixture of oxide and metal which was carried into the mould and came to the top of the casting. The trouble was overcome by shifting the strainer-core from the top to the bottom of the downgate, where it acted as a choke and allowed the down runner to be kept full of metal throughout the pouring of the casting; the turbulence was overcome, and the casting was completely clean. The British Non-Ferrous Metals Research Association, he added, was appreciating more and more the significance of this problem of running, gating and feeding, and was initiating this year a research on running, gating and feeding of copper-alloy castings.

MR. P. A. RUSSELL endorsed Mr. Mantle's remarks and said he would not use the type of top strainer-core and runner, as illustrated, with non-ferrous metals. He was led to wonder whether some of the scrap in cast iron was due to turbulence. Founders did not worry much about turbulence in pouring cast iron, but, perhaps, they ought to pay more attention to it.

MR. RUDDLE said Mr. Mantle had confirmed what he had said about turbulence in non-ferrous metals, especially those which were liable to the formation of oxide skins. In the example referred to by Mr. Mantle the strainer-core had been shifted from the top to the bottom of the combined runner-cum-feeder, as was shown in Fig. B. He suggested, however, that that by no means represented finality in the gating of castings of that kind, and he would like to see them gated with a properly-tapered downgate, no strainer-core, but using a cross runner with a sump at the end to take any dirt and dross which entered with the first metal poured, the gate coming off as shown in Fig. 33(*b*) of his section of the symposium. He felt that on the whole, especially with non-ferrous alloys which were inclined to give trouble with oxidation, the use of strainer-cores should be avoided.

Pros and Cons of the Lip Feeder

A MEMBER made the point in favour of the Connor runner that it formed a very efficient dirt trap as well as being a feeder, and he wondered if that were sometimes the main reason why a

lipped runner was adopted, rather than a normal feeder head. Another point was that, usually, with that runner the area of the gate was probably a good deal smaller than with other types of runner, and it was necessary to use fairly fluid metal. He asked if that were partly the reason why Mr. Russell had suggested that the Connor runner was used more suitably with high-phosphorus iron. Like all runners, it did not always seem to work, and a defect which occurred when using it was a narrow line of porosity directly underneath the lip.

MR. RUSSELL agreed that it was an advantage of the Connor-block feeder or lip runner that it was a very efficient dirt trap. But it put a considerable strain on a very narrow piece of sand and there was risk of scouring in view of the very narrow entrance. In stating that it was more effective with the high-phosphorus than with the low-phosphorus irons he had in mind that fluidity was of high importance. In that respect, however, perhaps he stood to be corrected; it might not be the low-phosphorus, but the low-carbon high-duty irons which were more difficult to feed by the Connor-runner method than the commoner irons of high carbon, which latter were more fluid.

He agreed, also, that a common fault with the Connor-block feeder was the narrow area of porosity formed in the casting—one could see the dendrites in the fracture—and that had led in some cases to the abandonment of that type of feeder, but he believed the cure was to use a narrow gap. In a large number of cases the Connor-block feeder was in the top part of the mould and the casting on the bottom part, and the slightest cross-jointing of the mould would upset the $\frac{1}{16}$-in. overlap. One could make it $\frac{1}{32}$ in. with advantage, but trouble occurred if it were made $\frac{3}{32}$ in.

MR. DAY said he had obtained the best results, not by overlapping the casting, but by making the metal flow into the side of the casting. In that way the porosity on the edges was avoided. His method was to have the block runner touching the edge of the pattern, withdraw first the block runner, and then the pattern, and finally sleek down the edge of the mould where the runner and mould touched.

Anomalies and Conversions

MR. B. MALONE commented on Mr. Russell's well-chosen illustrations of types of runners, but drew attention to the fact that, in two unconnected examples—showing the running of gear-wheel blank castings—he had advocated the use of:—(*a*) The block runner, with its lip-over gate at one side of the casting and (*b*) the ring runner, surrounding the casting, with in-gates positioned between each arm. In the first instance, the effect during casting was that of directional solidification, with the low-temperature metal lying at the side furthest from the runner, with a temperature gradient rising in the locality of the runner, and the necessity of the block for final "feeding" purposes. In the second instance there was a true distribution of metal, and temperature, with a uniform solidification rate, freedom from stresses, and machining differences. The two methods of running were opposite in principle. Could Mr. Russell state his final choice between the methods? He also asked whether Mr. Russell had ever introduced in his block feeders the core required to produce the atmospheric pressure feeder, so commonly used in steelfoundry practice.

MR. RUSSELL, dealing with the first question, felt that the answer was fairly obvious. His view was that one should go to one extreme or the other, adopting either a distributed runner or a very concentrated heat-gradient. Half-and-half remedies caused trouble. He tended to use the distributed runner for pulleys and for castings where there were local hot spots due to arms, and to use the other method for heavy castings which needed feeding. He was coming to the point of using the Connor runner only when it was necessary to feed a bulk of the metal into the casting.

He had tried the use of the atmospheric feeder core with grey iron and high-duty iron, without success, and he had learned the reason in listening to Mr. Ruddle's section where two types of non-ferrous alloys, *i.e.*, the skin-freezing kind and the long freezing range alloys had been discussed. He had never succeeded in getting an atmospheric feeder to work on cast iron.

MR. MALONE asked if he would agree that where there was formed a "skin" around the riser by the loss of heat, the atmospheric pressure reaching the inside would help it to function.

MR. RUSSELL replied that with cast iron the "skin" was so weak that it would collapse, so that there was no object in doing what was suggested.

Sleeves

MR. N. B. RUTHERFORD, referring to the insulated risers which had been illustrated, asked what material was employed for the sleeve used with steel. He knew that exothermic sleeve material suitable for steel-casting temperature was available and was used, but he had not yet found an insulating sleeve which offered both good insulating properties and sufficient refractoriness.

MR. DAYBELL said the example he had illustrated had come from the Massachusetts Institute of Technology, and the insulating material used there for the calculations reported had insulating properties similar to those of gypsum (see Fig. 19 of the original Paper).

Feeding a Non-ferrous Plate Casting

MR. W. G. MOCHRIE, recalling Mr. Ruddle's reference to simple plate castings, asked how he would run, for example, a simple plate in brass (say) 12 by 8 by $\frac{1}{2}$ in.

MR. RUDDLE replied that if a really sound plate were to be made in brass, a proper feeder was necessary. He would run it through the usual downgate and cross runner and two flat gates, and would put a blind feeder on top. The plate would be slightly uprun so as to prevent turbulence during filling of the mould cavity. The system would be as shown in Fig. C.

MR. MOCHRIE said he had in mind that it was

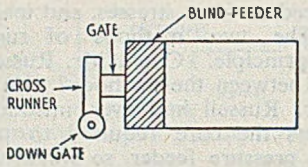


FIG. C.—*Diagram showing One Method of Running and Feeding a Plate Casting.*

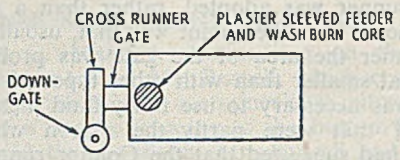


FIG. D.—*Running and Feeding a Plate using a Washburn Core.*

not always practicable to put a feeder there. Further, it might disfigure the casting.

MR. RUDDLE said that this was a case where one of the new types of feeder could be put to good use. The relatively large feeder could, for example, be easily replaced by a small circular plaster-sleeved feeder and if desired a Washburn core could be incorporated. This would greatly lower the cost of removing the feeder and would not appreciably disfigure the casting. This was shown in Fig. D.

MR. ABBOTT said that for many years he had watched moulders, using facing sand, cutting that sand away and, in effect, running metal on to the backing sand. That practice was all too common in the foundry and it had always impressed him as being ridiculous, because the whole weight of the metal going into the mould impinged on to one of its weakest spots. Such bad practice was overcome by making the running system integral with the pattern.

MR. RUDDLE agreed entirely and said that Mr. Abbott's remarks emphasized the desirability of having a proper pattern for the running system instead of cutting the runners by hand.

Vote of Thanks

MR. BARNARD, expressing the thanks of the branch to the Authors of each of the three sections, commented that there was far too little time to discuss them all in one evening; indeed, a whole evening could have been devoted to each. He himself could have discussed with Mr. Daybell all night the relative merits of bottom pouring and lip pouring. There were many differences in the methods used by foundrymen for running castings when lip pouring. Members did appreciate, however, all the information which the Authors had given, and he proposed a hearty vote of thanks to them for that information and for their excellent illustrations.

MR. D. MORRIS, who seconded, said the subject of running and risering was always of great interest to foundrymen; wherever two or more foundrymen met, whether the floor covering be carpet, sand or sawdust, they very soon got down to the discussion of runners, for the runner was more important than the mould. One could make a perfect mould and spoil it by using the wrong runner. Again, in machine moulding one saw the same results produced day in and day out with fixed runners.

Speaking of the block runner, which he had seen in use for 25 years, he said it was necessary to guard against overlapping more than $\frac{1}{16}$ in. Another serious trouble was the moulder going around the lips with the water brush. Also, confirming another speaker's remarks, to have the block-runner $\frac{1}{16}$ in. down the side was more efficient than to put it over the top.

(The vote of thanks was heartily accorded.)

MR. DAYBELL, commenting on Mr. Barnard's remarks, said he was not referring in his section to bottom or lip pouring, but to the metal entering the mould at the top of the casting or at the bottom.

MR. RUSSELL, responding to the vote of thanks on behalf of the Authors, assured the meeting that the proceedings had been an education to all; certainly he had learned much. He felt that Mr. Daybell's contribution had probably been the most original; Mr. Daybell had definitely made a new contribution on various aspects of feeding and had given information which no doubt many founders would appreciate. Mr. Russell added that he wished there was available an exothermic compound which would give cast iron instead of steel, and Mr. Ruddle wished he could get one which would give him brass or aluminium.

Iron and Steel Institute to Visit the Netherlands

Members of the Iron and Steel Institute, together with their ladies, are to visit the Netherlands from September 30 (Wednesday) to October 7. The hosts have formed a reception committee of which the chairman is Mr. A. H. Ingen Housz. The visit is divided into two sections, the first being in the Amsterdam area and the second from Monday, October 5, to October 6. There are a number of visits to works, but there is only one technical session, when a review of the national iron and steel industry will be given, together with the showing of appropriate films. The social side is well catered for. Full particulars available from the secretary of the Institute at 4, Grosvenor Gardens, London, S.W.1.

Engineers' Pay Claim

A claim for a 15 per cent. increase in the wage rates for all adult male workers in the 38 affiliated unions of the Confederation of Shipbuilding and Engineering Unions was presented by Mr. J. Tanner, president of the Amalgamated Engineering Union, to the Engineering and Allied Employers' National Federation last week.

The employers undertook to consider the claim and arrange for a further conference. Based on increased productivity in the industry, the high level of profits, and the rise in the cost of living, it is estimated that, if granted, the claim would cost the industry about £125,000,000. A similar claim was submitted to shipbuilding employers on July 24.

Pelleted Foundry Pitch*

By E. Brett Davies, M.Inst.F., T. F. N. Matthews and G. Smart

Following the termination of the second world war, various British technologists visited the United States and returned to this country with reports on the use of pulverized coal-tar pitch as an additive to foundry sand. Investigation of American practice showed that considerable benefits were being obtained, for the most part in stove-dried and skin-dried work, by incorporating some one to three per cent. of finely-ground coal-tar pitch with the foundry sand. The use of this ground pitch was claimed to have a double purpose in that it replaced coal-dust and by virtue of its volatile content gave an excellent surface finish to castings, while the agglutinating property of the pitch bound together the sand particles during stoving and gave a greatly enhanced dry-strength to the moulds. The following account deals with British applications of pitch for foundry purposes.

Examination of samples of the pitch in use in foundries in America showed it to be a coal-tar pitch of high melting point, 130 to 140 deg. C. or thereabouts, similar to that which had been produced in this country to a limited extent for application as a pulverized fuel. The use of pitches and tars in foundries is by no means novel but never gained great favour in Great Britain because, on the one hand, pulverized solid pitch is very dusty and an unpleasant material to handle, while softer pitches of the sticky-tar type could never be popular with moulders because they are very dirty to handle. There seemed, therefore, to be little prospect of developing foundry pitches in this country unless some clean and convenient form could be found which would offer the British foundryman equal or, preferably, improved ease of handling as compared with coal-dust.

After considerable experimental work, it was found possible to produce high-melting-point pitches in the form of small pellets. The pellets so produced appear, under the microscope, to be in the main spherical and as such are free flowing and clean to handle. (Fig. 1.) It was felt that this form of pitch would offer considerable attractions for foundry use over the American pulverized type of material and would be much superior in both handling and performance to pulverized coal, which it could replace with added advantages.

In 1947, an application for a British Patent was made and substantially granted† for the use of pelleted pitch in moulding. The production of this material which was initially developed on a small unit has increased and there is every reason to believe that the demand, now several thousand tons a year, will continue to expand as knowledge of the product becomes more widespread.

Origin

Coal-tar pitch as its name implies is a by-product of coal and should be available as long as gas works and coke works continue to function in this country and to produce crude tar. In the carbonization of coal for the production of gas or coke, an average of 1 cwt. of crude tar is produced per ton of coal carbonized, and the current annual production of crude tar in the U.K. thus amounts to some two-and-a-half to three million tons. The practice of carbonization is steadily increasing as a means of making better use of the country's natural resources and the total quantity of coal-tar available for distillation will obviously follow the same trend.

Crude tar is distilled either by independent tar-distilling organizations or by distilleries attached to the tar-producing concerns. From the distillation, a great variety of raw materials for other industries is produced, together with some 40 to 50 per cent. by weight of the crude tar as pitch. In the past, this pitch has been used for three main purposes, *viz.*, the production of road tar, the production of coal-tar liquid fuels and the briquetting of coal. It will be seen, therefore, that so far as availability is concerned there is a reasonable certainty that as the use of pelleted pitch develops in foundries, supplies of raw material for its manufacture should always be forthcoming.

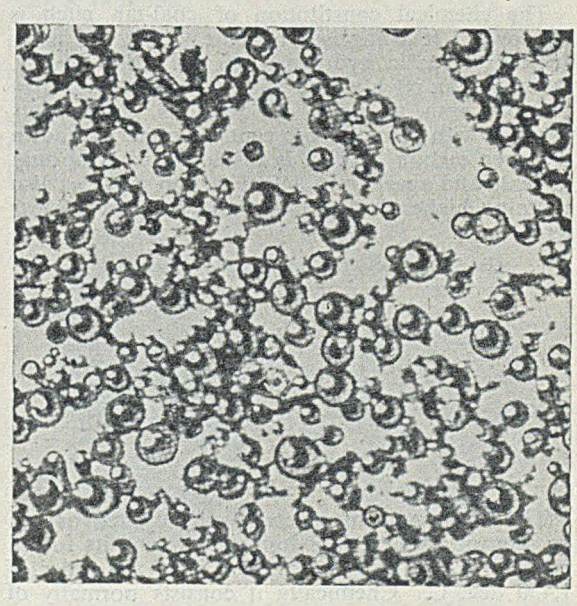


FIG. 1.—*Photomicrograph showing Spherical Particles of Pitch as used for Addition to Moulding Sand.* ×25 *mags.*

* Paper presented at the fiftieth annual meeting of the Institute of British Foundrymen at Blackpool.

† Patent No. 632,734.

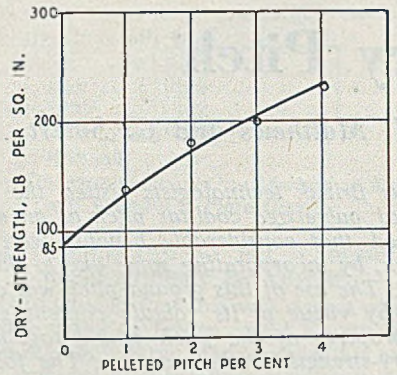


FIG. 2.—*Effect of Pelleted Pitch on the Properties of a Silica Sand bonded with Bentonite.*

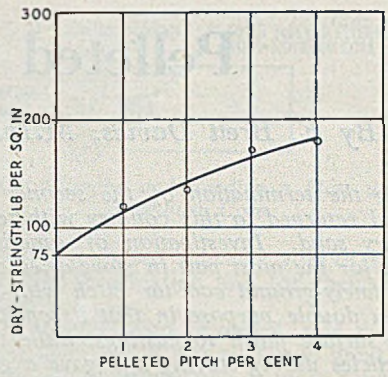


FIG. 3.—*Effect of Pelleted Pitch on the Properties of Bromsgrove Red Sand.*

Properties and Chemical Composition

Fig. 1 is a photomicrograph showing the spherical particles of the material. A typical size grading of the product gives some 10 to 20 per cent. less than 200 mesh, 40 to 60 per cent. between 100 and 200 mesh and the balance entirely passing 30 but retained on 100-mesh (British standard sieves). This grading has been found most acceptable in general foundry practice, although finer and coarser grades can be specially made if required.

Coal-tar pitch used for the manufacture of pelleted foundry pitch is a hard grade having a softening point of 120 to 135 deg. C. as determined by the standard half-inch-cube-in-air method. Normal makes of pitch, such as those used for coal briquetting and similar purposes, have a softening point of about 80 deg. C. and contain considerably more volatile matter than the high-melting-point material found most suitable for foundry purposes.

The chemical constitution of coal-tar pitch is unknown. It comprises a great variety of polynuclear aromatic hydrocarbons and other bodies. By extracting pitch with a variety of solvents it may be split into a series of resinous components together with some 20 per cent. of material known as "free carbon" which is insoluble in all normal solvents and apart from actual carbon particles also contains higher hydrocarbons of the polynuclear type.

TABLE I.—*Typical Ultimate Analysis of Pelleted Pitch.*

	Per cent.
Carbon	92.47
Hydrogen	4.32
Nitrogen	1.48
Sulphur	0.69
Ash	0.28
Oxygen (by difference)	0.76
Total volatile matter	50 to 60
Moisture	0.5

The ash content of pelleted foundry pitch, as will be seen in Table I, is extremely low and its fusion point in a reducing atmosphere is of the order of 1,450 deg. C. Chemically it consists normally of about 75 per cent. oxide of iron, the balance comprising silica, alumina, titania, magnesia and other trace elements.

General Foundry Applications

Green-sand moulding.—In this type of moulding, some 1 to 2 per cent. of pelleted foundry pitch is used in place of coal-dust, which in many instances is used to the extent of 5 per cent. or more. The pitch, by virtue of its particle shape and size, mixes readily with the sand and in general neither adds to nor detracts from the green-bond. The optimum proportion of pelleted pitch for any foundry sand depends upon the type of sand used and the size of casting for which it is predominantly needed. This optimum quantity, which is normally ascertained by trial and error to the nearest 0.2 per cent., can be readily maintained in the sand system by making supplementary daily additions of pitch to the sand in circulation (the quantity of such addition is based upon the method for determining pitch in foundry sand noted later). A general practice when first introducing pelleted pitch is to add to the sand one-fifth by weight or one-fourth by volume of the usual addition of coal-dust, and check the amount by the method quoted in the Appendix.

In green-sand moulding the main advantages of pelleted pitch as compared with coal-dust are: freedom from ash (which if excessive in coal-dust can affect the sand's permeability), cleanliness of handling, ease of control by daily determinations of pitch content, consistently good casting skins resulting in reduction of scabbing and similar faults, and finally, pitch has the property of being permanently thermoplastic and so able to accommodate volumetric changes in the sand during the pouring of the molten metal.

Dry-sand moulding.—The amount of pitch used in dry-sand mixes tends to be slightly more than in green-sand work, because the pitch in this case has the additional function of adding dry-strength to the mould. Whereas in green-sand work most foundries find a concentration of just over 1 per cent. as the optimum figure, in dry-sand work 2 per cent. or slightly more is common practice. The stoving time for moulds so made obviously varies according to the size of the mould, but it has been found that the stoving of pitch-bound moulds can be conducted at rather lower temperatures than those necessary with most other types of binder. In general, temperatures between 150 and 260 deg. C. are adequate. The effect of pitch additions to a

Congleton sand containing 4 per cent. bentonite and to a natural red sand are shown in Figs. 2 and 3.

In addition to the advantages noted for the use of pelleted pitch in green-sand, the outstanding feature of its use in dry sand is the increased dry-strength which it imparts. Considerations of cost may also be an important factor in the use of pitch in dry-sand work, depending upon the alternative materials previously employed. The use of pelleted pitch also reduces and often entirely eliminates cracking on the mould face during stoving and so reduces "mapping" on the casting.

Skin-dry moulding.—This application for pelleted pitch can offer considerable attractions to foundrymen formerly producing totally stove-dried moulds. It is understood that the use of pulverized pitch in America has given great impetus to skin-dried work and has greatly reduced production time and fuel consumptions normally associated with the operation of large drying ovens. Skin-drying technique is usually employed in the production of large castings and it is difficult, therefore, to generalize, but facing sand containing about 2 per cent. of pelleted pitch is a fair average for such operations. All types of drying may be used in the final preparation of the moulds, from the most modern hot-air technique to the use of the common fire-bucket placed within the mould. Advantages which accrue from the use of pelleted pitch in this way are those already noted for dry-sand moulding, plus the great feature of the reduction in time in the preparation of the mould and the elimination of total stoving.

Core production.—Particular attention is directed to this most recent development in the use of pelleted foundry pitch. Some years ago it was believed that only very heavy cores could be made by incorporating pitch, but it is now a fact that, with suitable mixes, highly satisfactory cores of all sizes can be produced, including even the intricate collection of cores used in the modern core-assembly technique (see Figs. 4 to 10).

The problem in using pelleted pitch in coremaking is to produce the necessary green-strength to make the cores handleable before stoving. A cereal binder has been found quite adequate for this purpose and at a number of foundries cores are now being hand made and "blown" most successfully using an ordinary silica sand containing 1½ per cent. of pitch and 1½ per cent. of cereal binder.

A proprietary mixture of suitable constitution to give both green- and dry-strength is now available as a single addition material. For those founders who wish to compound their own core-sand, the accepted technique is to mill the sand with 1½ per cent. of pitch and an equal amount of cereal binder in a dry state until thoroughly mixed. Depending upon the natural humidity of the sand a small additional amount of water is then added to cause the cereal to become glutinous and the milling is continued until the sand has the necessary green-bond. In general, a maximum of some 2½ per cent. of water will be found adequate. Cores made from such a mix should be stoved for an hour or more depending upon their weight, at a temperature of 135 to 150 deg. C. Gross overheating should be avoided although, as may be gathered from the following Tables, the temperature may safely be raised to some 260 deg. C. if a reduction of baking time is required.

TABLE II.—*Details of a Standard-rammed Core with 1½ per cent. Pitch and 1½ per cent. Cereal added to Congleton Sand and Baked at 230 deg. C. for 1 hr.*

Mix No.	Moisture, per cent.	Perm.	Green-comp., lb. per sq. in.	Dry-comp., lb. per sq. in.	Tensile, lb. per sq. in.	Scratch hard-ness.
1	2.05	122	2.3	450	135	80
2	2.2	125	4.7	425	125	80
3	1.9	120	3.5	385	120	75

TABLE III.—*Details of a Standard-rammed Core containing 1½ per cent. Pitch and 1½ per cent. Cereal added to Southport Sand.*

Mix No.	Moisture, per cent.	Perm.	Green-comp., lb. per sq. in.	Dry-comp., lb. per sq. in.	Tensile, lb. per sq. in.	Scratch hard-ness.
1	2.1	120	1.9	390	90	71
2	1.9	130	1.8	385	95	75

The dry-strength developed arises from the bonding property of the pitch which at the stoving temperature softens and flows around the sand particles. The cereal binder may also contribute to dry-strength and, for this reason, cores should not be overbaked to such an extent that the binding property of the cereal is destroyed.

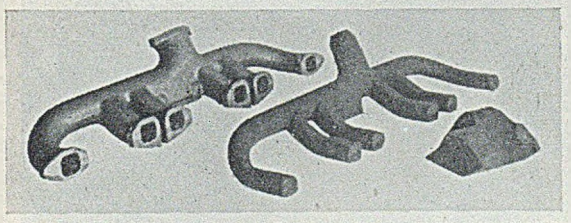


FIG. 4.—*Manifold Casting for a Six-cylinder Engine and Cores (which contain Pelleted Pitch) used for its Manufacture.*

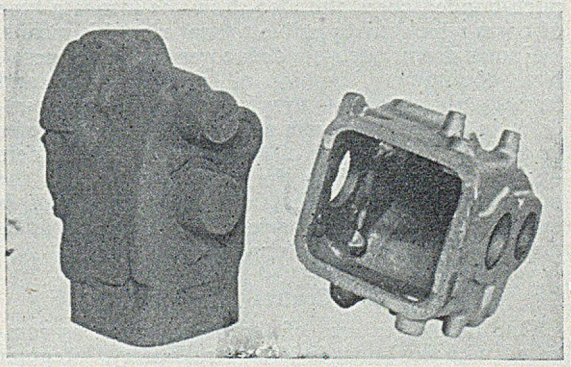


FIG. 5.—*Gear-box Casting for which Pelleted Pitch was used in the Core (shown) and in the Moulding Sand.*

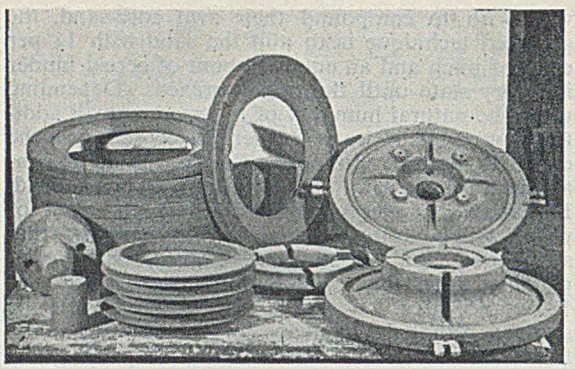


FIG. 6.—*Complete Set of Cores, made from Sand containing Pelleted Pitch, for the Grooved Barrel of a Whaling Winch.*

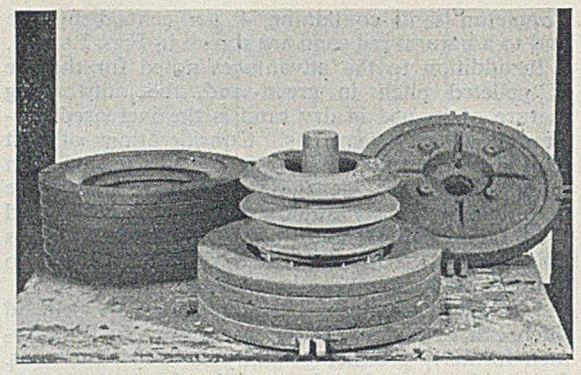


FIG. 7.—*Part-assembled Cores for the Winch Barrel Casting.*

Cores so produced present no major problem in subsequent foundry use, in fact the procedure may be described as less involved than many other core-sand practices. Sagging or slipping of the core during baking is considerably reduced, hence the need for rubbing cores in order to fit them into the mould or to conform to other requirements is minimized. Unlike oil-sand cores in the early stages of baking, pitch-bonded cores do not weaken or soften as the temperature of the "green" cores is raised. Rather, the reverse is the case with the pitch-bonded core, since it acquires a progressively hardening skin from the moment it enters the stove.

An interesting experiment carried out with Mix 1, Table I, was to make several cores 2 in. dia., 18 in. high, without rod or core-iron and to bake them on end. The baked cores stood up perfectly and showed no sign of sagging and they remained dimensionally accurate.

Breakdown of the core presents no difficulties during pouring, one function of the pitch being to soften and so offer no resistance to the solidifying metal. Ultimate complete collapse of the core follows the solidification of the metal and no premature collapse of cores has been experienced. The illustrations already referred to give some indication of the excellent skin produced when using pitch-bonded cores and also show the intricate type of cores which it is possible to make by this means.

Fumes from pitch-bonded cores are, in general, less obnoxious than in oil-sand practice and foundry atmosphere is thus improved. Some foundries, in using a core-mix as outlined earlier, prefer to add just a trace of oil, claiming that moulders like an "oily" feel to the sand and that, at the same time, parting cores from their coreboxes is facilitated. Other foundries claim that the addition of oil is completely unnecessary.

Control

One of the features of the use of pitch as compared with coal-dust is its controllability. Regular determinations of pitch content can be made and the total pitch content of the sand adjusted. The accepted method of determining pitch in foundry sand was originally developed by the British Cast Iron Research Association and is given in the Appendix to this Paper.

In many small jobbing foundries which do not have laboratory facilities, it has proved quite feasible to apply rule-of-thumb methods to the adjustment of the pelleted-pitch content of the sand. With a little practice, foundrymen can assess the need for additional pitch by the colour of castings. If the castings have a faint bluish tinge, in general, the pitch content of the sand is just right. If the castings are grey, apart from other indications, there is probably a deficiency of pitch, while if the castings are black, the sand definitely contains too much pitch.

Further Considerations

Fume.—Foundries in most countries have always been notorious for bad ventilation with little or no provision to take care of dust and smoke which are more or less continuously evolved therein. Modern foundries have, however, been designed with these points well in mind and future foundries will, no doubt, provide light, clean and dust-free working conditions. Until such conditions are universal, complaints concerning smoke and fume

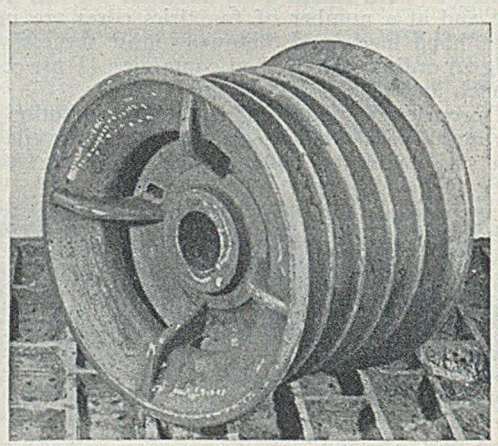


FIG. 8.—*Finished Winch Barrel Casting, weight* 10 *cwt.*

will inevitably at times be alleged to be due to the use of pitch. It must be obvious that if 2 per cent. of pitch containing 50 per cent. of volatile matter has been used to replace 5 per cent. of coal-dust containing 30 per cent. of volatile matter then the total volatile liberated is 50 per cent. greater when using coal-dust. On the other hand, the volatile content of pitch is probably more easily liberated than that of coal-dust and particular attention should be paid to knock-out conditions, in that, if moulds are knocked out while the metal is still very hot, additional fume can be produced by fresh sand, formerly remote from the metal, coming into contact with the hot casting. Apart from this possible cause of smoke, there is no other reason why the foundry atmosphere should be any worse when using pitch than when using coal-dust. In many foundries now using pitch, conditions are very much cleaner than previously.

It is to be noted that the fume from pitch moulds and cores does not cause discomfort and, indeed, many foundrymen rather like the slight tarry smell which is produced. As compared with the fumes from many other foundry sand binders, those from pitch are not lachrymatory.

Knock-out.—When the correct proportion of pitch is incorporated in the sand, complete break-down of both cores and moulds should be achieved. If, however, excessive pitch is used, coke formed by the carbonization of the pitch can produce a lattice-work which will hold the sand together and in extreme cases cause knock-out difficulties. If such are experienced they are a sure sign that the sand contains either too high a pitch content or that it is badly mixed and there are local aggregations of pitch.

Reference has already been made to the possibility of fume when castings are knocked-out hot; the complementary trouble may also be encountered if the return sand for milling is hot enough to soften the fresh pitch additions and cause local agglomeration of pitch which, if excessive, may give rise to " balling " during mixing.

Medical Aspects

After five years continuous use of pelleted foundry pitch in this country, no evidence has come to light of any trouble from a medical point of view. It is well known that, in common with many other materials used in industry, coal-tar pitch can give rise to epitheliomatous ulceration. Naturally, therefore, the point is occasionally raised with regard to the use of pelleted pitch in foundries. It is believed, however, that the rounded particles of this grade of pitch minimize any danger in this direction, since such ulceration is encouraged by the penetration of the skin by sharp angular frag-

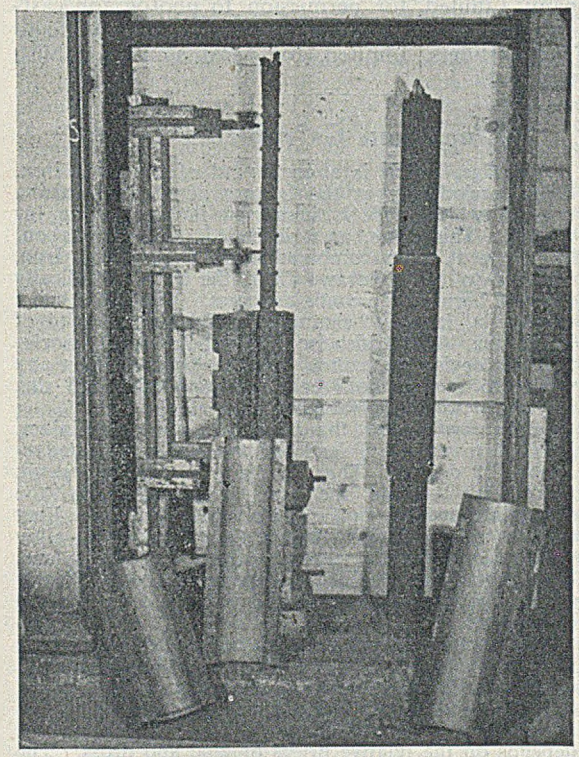


FIG. 9.—*Green-sand Core (for a Dredger Ladder Roller) incorporating Pelleted Pitch. This was made in a Sectional Corebox and on the L.H.S. is shown a Partly-made Core.*

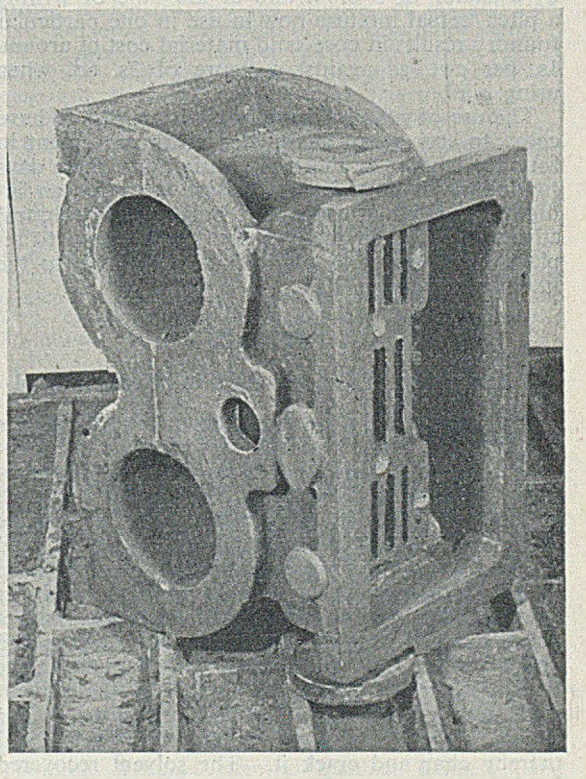


FIG. 10.—*Steam Cylinder Casting produced by the Core-assembly Technique, using Pelleted Pitch in the Cores (casting weight 5½ cwt.).*

ments of pitch more particularly in the softer parts of the body where heat and friction are present. The first evidence of any such trouble would be in the form of a wart and although five years of continuous use of pitch in British foundries may be too short a period on which to pass definite views, the producers of the pitch firmly believe that a reasonable systematic degree of cleanliness makes quite negligible any possible risk attached to the use of this product. Even in America, where some 20,000 tons a year of ground pitch are used, no published record has been seen of any detrimental effect on foundry workers, although such ground material would be expected to be much more liable to cause trouble than the pelleted variety.

Costs

In general, having in mind that 1 to 2 per cent. of pelleted pitch is used in place of 3 to 5 per cent. of coal-dust, the actual cost of the two materials is just about equal, although individual geographical conditions must be used to qualify such a statement. To the credit of pitch must also be added a reduction in scrap and fettling, together with the advantages which accrue to the use of an ashless sand additive of consistent quality.

The use of this pitch may well divide core costs by a factor of 3 or 4, and at the time of writing a pitch/cereal mixture now in use in one particular foundry results in core-sand material cost of around 1s. per cwt. as against a figure of 3s. 6d. when using oil.

The use of pelleted foundry pitch appears to have come to stay as an acknowledged improvement in foundry technique and it is gratifying in these days to find such enthusiasm amongst users for an indigenous product which not only offers technical advantages but, in many cases, can be used to replace imported materials and so contribute to the national economy.

APPENDIX

Determination of Pelleted Pitch in Moulding Sand

The basis of the method recommended by the British Cast Iron Research Association and published in their *Journal of Research and Development*, December, 1950, page 671, is that the pitch content of sand is extractable using a suitable solvent. B.C.I.R.A. recommend that 20 gm. of sand drawn from a dried representative sample be placed in a Soxhlet extraction thimble and extracted for 1½ hrs. with boiling trichlorethylene, the extract being retained in a tarred flask. An adapter and condenser are then fitted to the flask containing the trichlorethylene solution of pitch and the solvent is distilled off leaving a treacle-like residue. Care should be taken not to overheat this residue and thereby char and crack it. The solvent recovered in the process may be re-used. The flask is then placed in an air bath at 180 deg. C. and heated for 1 hr. to make sure that all traces of solvent are removed. The flask and contents are then weighed and by difference the weight of the matter extracted from the 20-gm. sample is determined.

It should be noted that the extractable matter represents only some 80 per cent. of the actual pitch content of the sand because not all the pitch is soluble in trichlorethylene. The total pitch content may be calculated from the extractable matter on the basis of blank determinations made with known amounts of pitch and sand or, alternatively, for practical purposes, the control of foundry sands may be based on the extractable matter figure. For example, in normal green-sand moulding procedure, the extractable matter may be controlled at 1 per cent. by daily additions of pitch, thereby indicating that the sand contains 1.25 per cent. of pelleted pitch.

Various simplifications of the foregoing test have been suggested and, provided these are used by the same operators within the same foundry, then they are probably quite accurate enough for daily control. Such simplifications include the placing of 5 gm. of sand in an ordinary filter paper in a funnel and washing this with hot trichlorethylene until the washings are colourless. The filtrate is then evaporated to recover the solvent and the extractable matter weighed after heating in an air oven as outlined above.

The Authors of this Paper wish gratefully to acknowledge the co-operation of R. J. Hunt & Sons, Limited (Mr. J. W. Hulme), and Tyne Metal Company, Limited, for permission to photograph castings and cores, and the directors of the Midland Tar Distillers, Limited, for permission to publish this work.

Zinc from Galvanizing Dross

A sludge, which is a compound of zinc and iron, forms periodically at the bottom of the galvanizing pots in which steel is immersed in liquid zinc for coating. This dross, as it is called, may have about 94 per cent. zinc combined with 6 per cent. iron, and has to be withdrawn from the bath periodically to avoid harm to the coating process. While it is being withdrawn, it may "entangle" a further quantity of liquid zinc. The British Iron & Steel Research Association has devised a method that can be applied in any works, to recover both combined and entangled zinc for return to the galvanizing pots.

In the new process, the dross, with some aluminium, is added to a bath of lead and the whole is heated to about 720 deg. C. Then it is a case of "pull devil, pull baker"—while the iron is attracted by the aluminium and the zinc is dissolved in the lead. First the iron and aluminium float to the surface as an alloy which can be easily separated from the heavy lead. Then the zinc-lead solution is allowed to cool. Nearly all the zinc crystallises out, and is taken from the top of the lead.

The technique is not yet perfected, but 95 lb. of pure zinc can now be recovered from each hundredweight of dross. Its low capital cost, simplicity of installation, operation and dismantling combine to make the process attractive and its usefulness at any particular time depends on the relative prices of zinc and dross. The high zinc prices of 1952 made the process economic but the comparatively low zinc prices at the present time make it uneconomic. It remains, however, a reserve factor for galvanizers, should zinc prices climb again or the metal become scarce.

Parliamentary

Measures to Stimulate Production

Concrete suggestions for stimulating productivity in industry were made by MR. RICHARD STOKES during the debate on scientific research and industrial activity in the House of Commons last week. In order to attract more skilled men into engineering he advocated the widening of the gap between the pay of the skilled and the semi-skilled worker. He maintained that the present difference did not make it worth while to young men to become skilled.

One of the most scientific, far-reaching, and effective methods whereby the Government could stimulate production, said Mr. Stokes, would be by laying it down that of all bonus issues not less than 25 per cent. should be paid to the workers in some form or other.

He urged the need for round-the-clock working of industry's most modern tools and the scrapping of the old ones, but said that it was no use expecting workers to do unusual hours on the present rates for night work. He also urged that there should be more joint consultation in factories.

Fuel Saving

The firms with which he was connected had devised a scheme by which every one shared in the increased production. Since it was introduced in 1950 the average earnings had risen from 58 per cent. to 77 per cent. above the standard rate, which worked out at an annual average of between £27 and £35 a person, tax free. Before the scheme was introduced absenteeism was about 2 per cent., now it averaged 0.1 per cent.

The Government was not doing enough to encourage fuel saving in industry. A firm with an annual fuel bill of £10,000 a year had, by insulation, reduced its bill by £3,000, or 500 tons. Proper insulation should be allowed as a full revenue charge, and failure to instal proper insulation after a time should be made a penal offence. In the industrial field alone 10,000,000 tons of coal could be saved annually.

MR. SHEPHERD urged industry to do all it could to see that technicians and scientists were engaged as company directors. Encouragement should also be given to the greater use of consultants. It was wrong to take the view that British industry was dormant or that industrial prospects were low. If scientific achievement could be advanced as much in the next five or 10 years as it had been in the past five or six years, we should probably be in a better position than any industrial community. Mr. Shepherd also maintained that Britain was falling steadily behind the U.S. in productivity because Britain had chosen an instrument of centralized research which was not really doing its job.

Winding up the debate, SIR WALTER MONCKTON, Minister of Labour, urged upon industry a greater measure of joint consultation. He also suggested that apprenticeship training should be more elastic, so that by that method, and possibly by dilution, the proportion of skilled to unskilled workers would be increased.

The Government did not underestimate the importance of applied science in industry, he concluded. He, personally, would like to see more directors with scientific qualifications on the boards of companies.

C. W. TAYLOR & SON, LIMITED, ironfounders, Templetown, South Shields, have acquired a site for extension of the foundry.

Iron-ore Imports

Iron-ore imports in June and the total for the first half of the year, with comparative figures for 1952, are shown below.

Country of origin.	Month ended June 30.		Six months ended June 30.	
	1952.	1953.	1952.	1953.
	Tons.	Tons.	Tons.	Tons.
Sierra Leone	60,700	66,110	382,042	381,787
Canada	104,940	146,280	231,595	391,489
Other Commonwealth countries and the Irish Republic ..	2,418	48,165	13,355	102,129
Sweden	295,943	335,659	1,743,862	1,717,785
Netherlands	7,022	6,248	13,962	11,810
France	30,226	55,809	216,116	259,549
Spain	58,099	28,833	305,176	229,929
Algeria	120,970	154,739	863,346	870,328
Tunis	46,140	55,105	209,251	254,058
Spanish ports in North Africa	19,000	—	164,017	—
Brazil	8,630	27,203	45,643	156,403
Other foreign countries	71,019	167,423	297,312	713,469
TOTAL	825,107	1,091,574	4,606,877	5,088,736

Air Pollution Inquiry Committee

In the House of Commons last week, Mr. Ernest Marples, Parliamentary Secretary to the Ministry of Housing and Local Government, said, in answer to a question on the progress made in setting up the committee to inquire into the problem of air pollution, that the terms of reference of the committee were :— "To examine the nature, causes, and effects of air pollution, and the efficacy of present preventive measures ; to consider what further preventive measures are practicable ; and to make recommendations."

Under the chairmanship of Sir Hugh Beaver, members of the committee include : Sir Roger Duncalfe, chairman of the Federation of British Industries technical legislation committee and vice-president of the F.B.I.; Dr. G. E. Foxwell, president of the Institute of Fuel ; Dr. R. Lessing, Fellow of the Institute of Fuel ; Mr. G. Nonhebel, Fellow of the Institute of Fuel, and a member of Imperial Chemical Industries, Ltd.; and Prof. O. G. Sutton, chairman of the Atmospheric Pollution Research Committee.

Institute of Metals, Autumn Meeting

The Institute of Metals is holding its Autumn Meeting at Southport from September 21 to 25. Apart from the usual technical sessions, a number of interesting visits have been arranged to works in the area, including the Automatic Telephone & Electric Company, Limited, British Insulated Callender's Cables, Limited; British Copper Refiners, Limited; English Electric Company, Limited; Manganese Bronze and Brass Company, Limited; Pilkington Bros., Limited; Fibreglass Limited; Lancashire Steel Corporation, Limited; Rylands Brothers; John Summers & Sons, Limited; Metropolitan Vickers Electrical Company, Limited; Magnesium Elektron Limited; Richard, Johnson & Nephew, Limited; Leyland Motors; Thornton Research Centre; Stanlow Refinery; and Williams Harvey & Company, Limited. The social events include a civic reception, a banquet and a tour of North Wales.

Personal

MR. F. HOLLWAY has succeeded MR. R. SIMPSON as secretary and accountant of the Workington group of the United Steel Companies, Limited.

MR. S. F. WISE has relinquished his appointment as purchasing, stores and material control manager with Baker Perkins Limited, of Peterborough.

MR. CHARLES CORPS, British Railways' district commercial superintendent at Middlesbrough, is to retire after more than 50 years' service on the railways.

MR. H. BULL, a director of Brown Bayley's Steel Works, Limited, Sheffield, has been elected chairman of the Sheffield committee of the British Productivity Council formed last week.

MR. A. FOX, canteen manager for the Staveley Iron & Chemical Company, Limited, at its Derbyshire works, has been appointed industrial canteen liaison officer for the area.

GEORGE WILLIAMSON, of Larkhall, who is employed in the winding shop of Mavor & Coulson, Limited, Glasgow engineers, has been awarded a total of £133 in the firm's Suggestions Scheme.

MAJOR GENERAL W. J. ELDRIDGE has been appointed Controller of Supplies (Munitions) by the Minister of Supply in succession to GENERAL SIR KENNETH CRAWFORD from October 1, 1953.

MR. J. A. BARKE, until recently manager of the Ford factory at Leamington, has been appointed a director of Briggs Motor Bodies, Limited, Dagenham, where he will also be acting general manager.

MR. J. T. MACLEOD, secretary and a director of H. Widdop & Company, Limited, Diesel-engine manufacturers, of Keighley, has been admitted as a Liveryman of the Worshipful Company of Shipwrights.

MR. IVAN M. WALLER has joined the Lockheed Hydraulic Brake Company, Limited, Leamington Spa, to assist, in the first instance, with the development of the Lockheed-Avery flexible pipe and self-sealing couplings division.

SIR CLAUDE D. GIBB, chairman and managing director of C. A. Parsons & Company, Limited, electrical engineers, of Newcastle-upon-Tyne, is convalescing in the Lake District after spending some weeks in hospital with a heart ailment.

SIR JOHN MORISON, chairman of the Iron and Steel Holding and Realization Agency, and SIR ARCHIBALD FORBES, chairman of the Iron and Steel Board, have, in view of these appointments, resigned from the board of the Finance Corporation for Industry.

MR. ALEX. COX, Camelon, Falkirk, who celebrated the diamond anniversary of his wedding with his wife and family last week, was for over 63 years an iron-fitter. Until his retirement Mr. Cox was employed for over 35 years at the Port Downie Iron Works, Camelon. He is 81.

MISS J. V. LOWDON, editorial assistant, FOUNDRY TRADE JOURNAL, who is well known to London members of the Institute of British Foundrymen, is shortly leaving for Peru, where she is to marry Mr. R. J. Edwards, B.SC.—a chemical engineer engaged in the Lobitos oilfields.

MR. E. W. SENIOR has been appointed chairman of Ransome & Marles Bearing Company, Limited. He was previously on the Board. The late chairman, Mr. F. W. Baker, remains a director. Mr. Senior is commercial director of the British Iron and Steel Federation and was Master Cutler of Sheffield for 1948.

MR. JOSEPH O'HAGAN, of Preston, was appointed general secretary of the National Union of Blastfurnacemen, Ore Miners, Coke Workers, and Kindred Trades at the union's conference at Morecambe last week in succession to MR. J. OWEN, who resigned on his appointment to the Iron and Steel Board. MR. T. WALCH, Grangetown, Middlesbrough, was appointed general president in place of Mr. O'Hagan.

At his request MR. W. SAVAGE, works director and chief engineer of Ruston-Bucyrus, Limited, excavating machinery makers, of Lincoln, is relinquishing his present duties and responsibilities. He has, however, agreed to defer temporarily his retirement, largely to undertake some special engineering development work, and while so doing will continue as an executive director. MR. J. H. PAGE has been elected to the board and appointed to the position of technical director, and MR. P. H. R. DURAND has been appointed chief engineer.

SIR JOHN DUNCANSON has been appointed to the Board of Fescol, Limited, electro depositors of metals. Sir John, who is vice-chairman of Lithgows, Limited, and a director of the Commercial Bank of Scotland, was Controller of Iron and Steel from 1942 to 1945 and commercial and technical director of the British Iron and Steel Federation from 1945 to 1948. He is also chairman of British Polar Engines, Limited, and North British Electric Welding Company, Limited, and is a director of the National Research Development Corporation.

New Catalogues

Corebinders. F. and M. Supplies, Limited, of 4, Broad Street Place, London, E.C.2, have sent us a leaflet with a picture carrying a print of a foundry effected by means of 3-D photography, together with tinted glasses. The result is that the picture is brilliantly stereoscopic.

Air-Hoists.—A range of two-speed "Simlift" air-hoists is described and illustrated in a leaflet received from Metalmacs, Much Park Street, Coventry. The capacity covered is from 2 to 10 cwt., and they are specially suited for overhead trolley suspension. The leaflet may be obtained by writing to the Coventry address.

Heating and Ventilating. This heading is not quite sufficient as covering the contents of a new catalogue just issued as "Sturtevant Products" by the Sturtevant Engineering Company, Limited, Southern House, Cannon Street, London, E.C.4. A feature of this catalogue is the introduction of a coloured picture—beautifully printed—as a sort of frontispiece to each section. Here and there in quite a few sections, are pictures of foundry applications, mould conveyor cooling lines and mechanical knockouts. This publication is available to our readers on writing to Southern House.

Cranes. Geo. W. King, Limited, of Hitchin and Stevenage have issued a well-presented, 112-page, nicely-illustrated catalogue. Amongst the illustrations are two pictures of foundry installations, one of which the reviewer recognized and is known to him to be giving satisfaction. The book is divided into seven sections covering double and single beam over- and under-slung types; goliath and jib cranes, and the last one on components. It is probably here where one can best gauge the quality of a firm, because it is indicative of service. In this case there are allocated to each standardized component a code word, and the dimensions of each are clearly set out. This catalogue is available to our readers on writing to Hitchin, Hertfordshire.

News in Brief

AFTER COMPETING for 30 yrs., Mr. R. C. Shepherd has this year won the Ruston Golf Cup.

SPARK ARRESTERS of a new design have just been fitted to two large cupolas at the Grahamston Iron Works, Falkirk.

IT IS REPORTED that Russia through her trade delegation in London, has offered to sell manganese and chrome ores to the UK.

FOR THE THIRD YEAR IN SUCCESSION, Qualcast, Limited, Derby, have awarded a holiday bonus to employees who have completed 12 months' continuous service.

AS A CORONATION SOUVENIR, Ruston & Hornsby, Limited, are to distribute during August £40,000 in the form of £10 bonus to each employee having 5-yrs.' service with the company.

IN THE YEAR ENDED MARCH 28 the group profits of Edgar Allen & Company, Limited, steelmakers and founders, engineers, etc., of Sheffield, amounted to £265,199, against £367,259 in the previous year.

PART OF THE CONTRACT for the completion of the new power distribution scheme in Zanzibar has been won by Enfield Cables, Limited; work and material involved are valued at £65,000. English Electric Company, Limited, is the main contractor.

ACCORDING TO FIGURES supplied by BISC (Ore), Limited, London, E.C.3, imports of iron and manganese ores during the first six months of this year totalled 5,293,000 tons, compared with 4,796,000 tons during the corresponding period of last year.

A PARTY OF 110 employees from G. E. C. Witton left Birmingham on July 24 for a 16-day trip to Austria. The party, the largest from a Birmingham factory to visit the Continent, have raised, between them, a sum of £6,000 to finance their holiday.

BRITISH MOULDING MACHINE COMPANY, LIMITED, Weston Works, Faversham, Kent, are once again exhibiting their machines at the forthcoming Trade Fair in Zagreb, Yugoslavia, and Mr. H. J. Bullock is leaving for that country on September 10.

NO MONEY SPENT in business was more wisely spent than in encouraging the work of the industry's research association, said Lord Woolton, guest of honour at the 10th anniversary luncheon of the British Internal Combustion Research Association held at Claridge's.

ALL BUT SIX of the 23 machine-moulding operatives dismissed from Carron Ironworks while on holiday have been reinstated. The men were discharged for leaving early on the Friday before the holidays although told by the management and their union not to do so.

THE WESTERN HIRE COMPANY, LIMITED, 17, Central Chambers, Ealing Broadway, London, W.5, are the distributors for the M.R. "Wheelabout" loader, which has been designed for lifting and moving weights in confined spaces. It is either manually, hydraulically, or power operated.

THE BRITISH TYRE & RUBBER COMPANY, LIMITED, have endowed scholarships at the National College of Rubber Technology in London which will be known as "B.T.R." scholarships. A scholarship will be awarded annually and each will be for three years and valued at £300 per annum.

COMPLETION OF AN ORDER for new switchgear valued at £116,000 for the Cardon refinery of the Shell Petroleum Company, Limited, in Venezuela, has been effected in just over six months, compared with the normal schedule of 18 months, by A. Reyrolle & Company, Limited, Hebburn-on-Tyne.

IN THE MAY 28 issue of the JOURNAL on page 623 it was stated that Lord Cooper had received honorary membership of the Institution of Mechanical Engineers—this should have read, Institution of Municipal Engineers. Apologies are tendered to all who may have been affected by this misstatement.

THE GROUP PROFITS of George Cohen & Company, Limited, engineers and iron, metal and machinery merchants, in the year ended March 31, 1953, was, subject to audit and after all charges, £468,604, against £714,270 in the previous year. The group is paying a final dividend of 8½ per cent., making 12 per cent., less tax, on the £1,500,000 ordinary stock.

DERITEND PRECISION CASTINGS, LIMITED, Birmingham, iron and brass founders, have been granted a licence to the extent of £33,265 by the Ministry of Works for a factory at Droitwich. Droitwich is making efforts to increase the number of factory premises in the borough in order to balance rateable concerns against the increasing number of subsidized council houses.

MIDLANDS EMPLOYMENT is now much more satisfactory, Mr. J. W. Eldridge, Regional Controller for the Ministry of Labour has reported. Unemployment now represents 1 per cent. of the working population compared with 1.4 per cent. for Great Britain as a whole. The figure of unemployed in the area fell from 23,715 to 20,429 between May 11 and June 15 and vacancies rose from 29,140 to 32,453.

A FAMOUS CLYDE-BUILT SHIP, the Canadian-Australian Line's 17,486-ton Aorangi, is due back in her native river from Sydney this week—to be broken up. Built by the Fairfield Shipbuilding & Engineering Company, Limited, Glasgow, in 1924, she was the first large passenger ship in the world to be driven by Diesel engines, and was a pioneer in the quadruple-screw arrangements for motor-ships.

A PARTY OF MEMBERS of the Derby Society of Engineers, with their president Mr. O. H. Barker, visited Ley's Malleable Castings Company, Limited, Derby. Mr. K. Roxburgh (production manager) welcomed the party, and with Mr. J. Hill (development engineer) and Mr. L. M. McDonald (works engineer) acted as guides. During the tour of the works, members saw the production of automobile castings in the mechanized foundry.

GREENOCK HARBOUR TRUST have submitted plans to the Admiralty for a big dry dock on the waterfront capable of accommodating the largest warships or merchant ships yet afloat or likely to be built for many years. The proposed dock would be 1,200 ft. long with a breadth at the entrance of 160 ft., and a depth of water of 47 ft. For comparison, the biggest ship now afloat, the Cunarder Queen Elizabeth, is just over 987 ft. long, and has a draught of 39 ft. 6½ in.

A COMPREHENSIVE PICTORIAL RECORD of all stages in the production of blackheart malleable iron castings is contained in a documentary film entitled "Modern Malleable" made at the Tipton foundries of Hale & Hale (Tipton), Limited, one of the largest producers of malleable iron castings in this country. It is a 16-mm. sound film in black and white, with a running time of 32 min. It can be borrowed by appropriate bodies on applying to the firm's headquarters at Dudley Port.

MR. BARRY KAY, Regional Controller of the Board of Trade, advised Midland manufacturers on July 21 to take advantage of first-class opportunities to sell their goods in Irak and Kuwait. He said that the two places were getting a hundred million pounds a year from oil royalties alone—more than they could spend, and were planning projects which would offer a magnificent export market. There were no currency difficulties and no serious import obstacles. He emphasized the need for directors of manufacturing companies to go and see for themselves what they could sell.

Raw Material Markets

Iron and Steel

As from July 27, price control has been removed from certain iron and steel products, namely colliery arches, pitprops, cold drawn tubes, malleable-iron pipe fittings, wire and wire products, and assembled railway wheels and axles. Supplies of these products are now generally adequate. This Order, The Iron and Steel Prices (No. 4) Order, 1953, made by the Minister of Supply, also reduces by 7s. 6d. per ton the maximum permitted price of heavy steel products delivered to South Wales.

Most foundries are closing down for a fortnight for the summer holiday. In the Birmingham and Staffordshire areas the recess started for the majority last Friday, while a few establishments begin their holiday tomorrow (Friday). Opportunity will be taken during the recess to carry out necessary major repairs to plant and cupolas so as to avoid interruption of work when plants restart. The cessation in production will not have any serious repercussion for the consumers; apart from the fact that their own closure will generally coincide with that of the foundries, they are, in the main, well provided with castings.

The outlook at the foundries is less assured than it was a year ago, when their chief concern was to secure sufficient raw materials, particularly pig-iron, to enable them to undertake work on hand. All available supplies of pig-iron and scrap were then being utilized, and the need for increased tonnages was the only drawback to higher production. Some signs were then evident, however, that the closure of markets abroad would ultimately result in a recession in trade; since that time this has had a continuous decreasing effect on outputs, particularly in the case of the textile trades and the light and jobbing foundries. There are no signs at present of any improvement in the light-castings industry, which continues to suffer from the recession, not only in the home trade, but also from a lack of export business. Consequently, for the first time for many years, supplies of high-phosphorus iron are being put into stock at the furnaces. Further furnaces may eventually be transferred from the production of this iron to basic iron for the steelworks.

Some of the engineering and speciality foundries are receiving better support from the motor-vehicle industry, and those providing castings for machine tools, as well as collieries, steelworks, and power-plant equipment, are well employed. This has resulted in an increased demand for low- and medium-phosphorus iron and hematite. The former grades are none too plentiful, while hematite, particularly where consumers require the higher silicon ranges, is scarce in home-produced brands.

Many of the re-rolling mills are now closed for the annual holiday. Order-books are not heavy and any accumulation of business is likely to be quickly liquidated on the resumption. Materials in billets, blooms, and slabs are plentiful, but business is far more difficult to secure. For small bars, sections, and strip, home trades are taking the major share of present outputs, which are on a much reduced scale, as exports are negligible. Only a revival of the latter trade will bring the desired improvement and the reduction of £5 per ton in the price of small bars, which is now £35 per ton f.o.b. U.K. port, should do something to stimulate business from abroad.

The sheet re-rollers are short of work for the narrow gauges of sheets and their output has declined considerably; in fact, some mills are not at present in operation, and a resumption is unlikely to be made until accumulated stocks are cleared.

Non-ferrous Metals

The weakness which has been so much a feature of the tin market of late was again in evidence last week when both cash and three months were marked down by £12 10s., the close on Friday afternoon being £581 15s. for both positions. In the middle of the week the price of tin dropped to £571, the lowest level reached since dealings were resumed in November, 1949. Demand in the U.K. is still poor, and in consequence stocks in Metal Exchange warehouses have increased, the tonnage for the week ending July 18 being 1,765 tons a gain of about 100 tons on the previous week.

In the States users are showing rather more interest than they are here, but nevertheless demand is not as good as it should be. Naturally the downward trend of the price has made people hesitate to buy, and the low level now reached has probably made American sentiment rather more receptive to the idea of some kind of a restriction scheme on the production side. No progress has been reported in the talks between Bolivia and the U.S. in regard to a possible long-term contract.

Other changes last week consisted of a setback in zinc to the extent of 20s. in July and 15s. in October, while in lead, which closed 30s. below the best point reached, there were net gains of 20s. and 10s., the backwardation widening somewhat to £3. In the U.S. there were two changes in the current price of lead, each a gain of ¼ cent, and at the end of the week the current quotation was 14 cents per lb. Zinc was unchanged at 11 cents.

Details relating to copper published by the Copper Institute in New York are available for the month of June. In terms of short tons of 2,000 lb. it appears that production of crude in the U.S. during June was 84,700 tons, or 8,000 tons lower than May. The output of refined copper was 124,500 tons, compared with 117,900 tons a month earlier, while deliveries to domestic consumers at 139,500 tons (excluding stock-pile tonnage) was 7,300 tons lower than in May. For the six months, the total was 803,800 tons, an average of nearly 134,000 tons per month.

The gap between production of crude copper and deliveries to consumers in the six months period was 263,000 tons, which may be taken as representing approximately the weight of copper which it was necessary to import from abroad. Outside the U.S. crude copper production in June was 133,800 tons and of refined 104,200 tons. Deliveries of refined copper were 73,100 tons.

Official tin quotations were as follows:—

Cash—July 23, £585 to £586; July 24, £583 to £584; July 27, £566 to £570; July 28, £571 to £572 10s.; July 29, £575 to £575 10s.

Three Months—July 23, £583 to £585; July 24, £582 10s. to £585; July 27, £567 10s. to £570; July 28, £570 to £572 10s.; July 29, £577 10s. to £580.

The following official zinc prices were recorded:—

July—July 23, £74 10s. to £75; July 24, £74 5s. to £74 10s.; July 27, £72 10s. to £73; July 28, £73 to £73 5s.; July 29, £73 10s. to £73 12s. 6d.

October—July 23, £75 5s. to £75 7s. 6d.; July 24, £75 to £75 2s. 6d.; July 27, £73 to £73 5s.; July 28, £73 10s. to £73 15s.; July 29, £74 to £74 5s.

Official prices of refined pig-lead:—

July—July 23, £96 10s. to £96 15s.; July 24, £96 to £96 5s.; July 27, £93 10s. to £94; July 28, £95 to £95 10s.; July 29, £96 to £96 10s.

October—July 23, £93 10s. to £94; July 24, £93 5s. to £93 10s; July 27, £90 5s. to £90 15s.; July 28, £91 7s. 6d. to £91 10s.; July 29, £92 5s. to £92 10s.

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

(Delivered unless otherwise stated)

July 29, 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 2¼ 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., £53 10s., basis 45 per cent. Si, scale 21s. 6d. per unit; 70/84 per cent., £82 10s., 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., 21s. 10d. to 22s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 24s. 8d. to 27s. 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. 2d. 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., £49 19s. 6d.

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

Tinplates.—57s. 9d. per basis box.

NON-FERROUS METALS

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

Tin.—Cash, £575 to £577 10s.; three months, £577 10s. to £580; settlement, £577 10s.

Zinc.—July, £73 10s. to £73 12s. 6d; October, £74 to £74 5s.

Refined Pig-lead—July, £96 to £96 10s.; October, £92 5s. to £92 10s.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £102 15s.; rolled zinc (boiler plates), all English destinations, £100 10s.; zinc oxide (Red Seal), d/d buyers' premises, £90.

Other Metals.—Aluminium, ingots, £150; magnesium, ingots, 2s. 10½d. per lb.; antimony, English, 99 per cent., £225; quicksilver, ex warehouse, £70 to £70 10s. (nom.); nickel, £483.

Brass.—Solid-drawn tubes, 23½d. per lb.; rods, drawn, 32⅜d.; sheets to 10 w.g., 258s. 2d. per cwt.; wire, 30½d.; rolled metal, 244s. 9d. per cwt.

Copper Tubes, etc.—Solid-drawn tubes, 28⅞d. per lb.; wire, 281s. 6d. per cwt. basis; 20 s.w.g., 310s. 6d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £160 to £170; BS. 1400—LG3—1 (86/7/5/2), £170 to £190; BS. 1400—G1—1 (88/10/2), £254 to £285; Admiralty GM (88/10/2), virgin quality, £252 to £300 per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £265 to £295; L.P.Bl, £215 to £240 per ton.

Phosphor Bronze.—Strip, 360s. 6d. per cwt.; sheets to 10 w.g., 382s. 3d. per cwt.; wire, 45½d. per lb.; rods, 39⅜d.; tubes, 38d.; chill cast bars: solids 3s. 3d., cored 3s. 4d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 2s. 5⅜d. per lb. (7 per cent.) to 3s. 8¾d. (30 per cent.); rolled metal, 3 in. to 9 in. wide × .056, 2s. 11¾d. (7 per cent.) to 4s. 2¾d. (30 per cent.); to 12 in. wide × .056, 3s. to 4s. 3d.; to 25 in. wide × .056, 3s. 2d. to 4s. 5d. Spoon and fork metal, unsheared, 2s. 8¾d. to 3s. 11¾d. Wire, 10 g., in coils, 3s. 6½d. (10 per cent.) to 4s. 8¾d. (30 per cent.). Special quality turning rod, 10 per cent., 3s. 5½d.; 15 per cent., 3s. 11½d.; 18 per cent., 4s. 4d. All prices are net.

Obituary

MR. GEORGE M. POOLE, Scottish regional sales manager for the Glacier Metal Company, Limited, London, died recently.

MR. JOHN LAWSON REID, a director and for a time managing director of Barr, Thomson & Company, Limited, engineers, Netherton Ironworks, has died at Kilmarnock Infirmary at the age of 64.

ENGINEER-CAPTAIN WILLIAM ONYON died last week at the age of 91. After serving in the Royal Navy for 28 years, in 1913 he became engineering manager of William Beardmore & Company, Limited, steel makers and founders, of Glasgow, until in 1925 he became the company's London representative. Later he occupied a consultative position with Vickers-Armstrongs, Limited. He was a past president of the Institute of Marine Engineers, and a member of the Institution of Naval Architects.

THE DEATH occurred last week of SIR JOHNSTONE WRIGHT, who had been a director of British Insulated Callender's Cables, Limited, London, W.C.2, since 1948. Since 1919 he had been connected as an electrical engineer with various electricity undertakings and in 1949 became deputy chairman of the British Insulated Callender's Construction Company. He was also a director of Thomas Bolton & Sons, Limited, copper smelters and refiners, of Widnes (Lancs), controlled by BICC, and of several other company's connected with cable construction and manufacture.

THE DEATH is announced of DR. ERICH HUGO, managing direction and Editor of *Giesserei* (the German foundry magazine) since its revival after the war. He was but 47 years of age. His organizing ability, courage and energy enabled him to rehabilitate not only *Giesserei*, but also the German foundrymen's technical institute. He was foremost in Germany in fostering international co-operation and last year attended the American Foundrymen's Society Convention in Atlantic City. The foundry industry will mourn the loss of a man who has devoted more than a decade of his life unswervingly to foundry co-operation—national and international.

Board Changes

MINIMAX, LIMITED—Mr. C. M. McGilchrist has been elected a director.

SPARK ALLOYS, LIMITED—Mr. J. G. Lawson has been appointed a director.

PORN & DUNWOODY, LIMITED—Mr. J. R. Duff has been appointed a director.

WESTINGHOUSE BRAKE & SIGNAL COMPANY, LIMITED—Mr. D. F. Brown, managing director, has relinquished his appointment and directorship.

THOMAS BOLTON & SONS, LIMITED—Mr. G. J. Poole has been appointed to the board. He was alternate director to Mr. W. C. Handley, who has resigned his directorship.

WILLIAM GOODACRE & SONS, LIMITED—Mr. Wilfred Whatmore has been appointed deputy chairman and managing director.

SANGAMO WESTON, LIMITED—Mr. H. A. Springer has been appointed an additional director. Mr. B. Epstein is appointed secretary in succession to Mr. F. R. Buthems, who remains a director.

VICKERS-ARMSTRONGS, LIMITED, announce that MR. A. O. BLUTH has been appointed to the Board of the Company. Mr. Bluth is a director of Erlangers, Limited, and vice-chairman and joint managing director of the Jack Olding Organization.

NOTICE

Replies to Box Numbers to be addressed to "Foundry Trade Journal," 49, Wellington Street, London, W.C.2.

SITUATIONS WANTED

METALLURGIST, B.Sc., 10 years' experience in Steelmaking, requires permanent position, preferably N.E. Coast. —Box 3661, FOUNDRY TRADE JOURNAL.

METALLURGICAL CHEMIST, wide experience Analysis Ferrous, Non-ferrous, Aluminium Alloys. Manufacture Ingots. Excellent knowledge Scrap Metal Trade. Desires situation with firm of repute.—Box 3656, FOUNDRY TRADE JOURNAL.

FOUNDRYMAN, (31), seeks progressive position; 17 years practical experience in loam, dry, and green sand moulding. All types of castings produced in Marine and Jobbing Foundries. Technical qualifications include City and Guilds.—Box 3657, 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.

FOUNDRY SUPERVISOR required by small grey iron foundry in East Anglia, producing loose pattern, and machine moulded castings.—Fullest particulars to Box 3668, FOUNDRY TRADE JOURNAL.

WORKS MANAGER, with foundry experience, required for important South of England foundry. Good salary and prospects for man with drive and administrative ability. Applicants should state age and salary required.—Box 3669, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required for Medium Light Alloy Foundry, Renfrewshire. Must be experienced in jobbing and have knowledge of machine moulding. State age, experience, and salary required.—Box 3653, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN, accustomed to supervising production of iron castings up to 3 tons, required by Iron Foundry in the Medway area. Applicants must have experience in the supervision of all branches of Iron manufacture, including Cupola practice. This is a permanent situation, with a Pension Scheme.—Apply Box 3654, FOUNDRY TRADE JOURNAL.

FOUNDRY SUPERINTENDENT required (maximum age 40) to control production of bench, floor and machine moulding sections in modern foundry south of London. For a vigorous experienced man who is cost conscious, production minded and has the ability to lead a team, there are excellent prospects.—Apply in confidence giving full details of experience and salary expected to Box 3620, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

METALLURGIST wanted for up-to-date Laboratory in Grey Iron Foundry. Must be used to iron and steel production up to 5 tons; able to control labour. State qualifications, age, experience, and salary required.—Box 3649, FOUNDRY TRADE JOURNAL.

FULLY experienced FOUNDRY SUPERINTENDENT required for large works in South Wales producing 600 tons grey iron castings weekly.—Write, stating age, full details of technical and practical experience, and salary required, to Ref. 113, NORCROSS & PARTNERS, Management Consultants, 111, New Street, Birmingham, 2.

WANTED.—Qualified and experienced STEEL FOUNDRY ENGINEER, for a big concern in India situated at port. Pay according to merits.—Apply G.P.O. Box No. 586, Bombay 1 (India), with copies of testimonials, and stating minimum terms and joining time.

WORKS MANAGER / METALLURGIST, preferably with experience of Non-Ferrous Valve Trade, required for Company near Glasgow. Good education and some knowledge of administration essential, as post eventually leads to top executive position. Age 30 to 40. Fullest particulars with references and commencing salary expected should be given.—Box 3608, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required for general jobbing Iron Foundry in East Anglia. Experience in controlling the production of castings of a very varied nature by sound practical methods. Capable of demonsrating, if necessary, the best methods of production under a collective piecework system. Good disciplinarian and ability to control men essential.—Full details of experience and posts held to Box 3652, FOUNDRY TRADE JOURNAL.

BRITISH STEEL CASTINGS RESEARCH ASSOCIATION.

THE Association invites applications for the following appointments:—

(1) RESEARCH METALLURGIST or PHYSICIST. To be engaged upon fundamental studies of the mechanism of freezing of steel in refractory moulds, in particular the translation of basic data into terms of steel foundry practice, *i.e.*, of feeder head dimensions and geometry.

The appointment, which will carry either scientific officer or senior scientific officer status, according to qualifications, is superannuable.

(2) FOUNDRY PROCESS ENGINEER. To be engaged upon work related to the development and application of:—

(*a*) Foundry plant for mould and core manufacture, and

(*b*) new moulding and casting techniques.

Applicants must have direct foundry experience (steel not essential), and must have a good general education. The appointment, which will involve liaison with industry and with the Association's appropriate technical committees and scientific panels, is superannuable, with salary according to qualifications.

(3) ASSISTANT TECHNICAL SECRETARY. To assist in the provision of secretarial services to the Association's committees and panels, and with the production of its internal publications. Applicants should be educated to degree standard, and experience in the field indicated will clearly be an advantage.

Applications, which in the first instance will be treated as confidential, should be addressed to: THE DIRECTOR, British Steel Castings Research Association, Broomgrove Road, Sheffield, 10.

SITUATIONS VACANT—*contd.*

CHEMISTS required for Steel Foundry control analysis on shift work. Leeds area. Detail training given to suitable applicants if necessary. State age and experience.—Box 3670, FOUNDRY TRADE JOURNAL.

GENERAL MANAGER required for well-known Modern Medium-Heavy Non-ferrous Founders and Chill Casters. Wide experience, estimating, costing, sales, market research, buying, etc. First-class man at top grade level, with energy and personality to pursue policy of vigorous expansion. — Write in first instance, giving fullest details, to Box 3599, FOUNDRY TRADE JOURNAL.

CRANE, LTD., Nacton Road, Ipswich, have a vacancy for ASSISTANT METALLURGIST in their modern mechanised non-ferrous foundry producing mainly copper base alloys. The duties will include supervision of melting units and control of metal analyses.—Applications, giving details of age, education, experience, and salary required, should be addressed to the EMPLOYMENT WELFARE MANAGER.

CHARGEHAND for Foundry and Core Shop required by Light-grey Iron Founders (West Midlands). Must have first-class practical knowledge of producing cores and castings from 1 lb.-3 cwts. in high and low phos. and high duty irons. Age under 40. This is a permanent, well paid position. Applicants, please give age, experience, and any other relevant details. —Box 3650, FOUNDRY TRADE JOURNAL.

APPLICATIONS are desired from junior foundry personnel who would be prepared to undergo a long term training programme for a supervisory position on the production staff of a steelfoundry. It is essential that the applicant has a high standard of education, preferably with some basic training in foundry or engineering practice. This position is progressive and is particularly attractive to University Graduates who are interested in making a career on the production side of steelfounding. Full details of education, career and experience together with age should be given.—Box 3660, FOUNDRY TRADE JOURNAL.

A PRODUCTION EXECUTIVE (28-33) is required for a steel and iron foundry in East Anglia employing 750. A university degree or equivalent qualification, preferably in engineering, metallurgy or science, and a high standard of general education, are essential. An attractive salary will be paid to a man of suitable personality and ability, and prospects for advancement are unusually good.—Applications, giving full personal and educational particulars, and details of industrial experience, should be addressed, in confidence, to JBP/1093,, URWICK, ORR & PARTNERS, LTD., 29, Hertford Street, London, W.1.

FOREMAN PATTERNMAKER required by Newton, Chambers & Co., Ltd., Thorncliffe, Sheffield, to take charge of Patternshop in their Light Castings Department. Applications are invited from time served Engineering Patternmakers, with first-class experience in the production and control of wood and precision. Metal pattern equipment for use in mechanised foundry and floor moulding. Applicants, 30/40 years of age, must be men with definite initiative, leadership, and interest for the job. (Assistance with housing could be given to suitable applicant.)—Write, stating age, full details of experience and salary required, to PERSONAL OFFICER, Thorncliffe, near Sheffield.

SITUATIONS VACANT—*contd.*

DRAUGHTSMEN required, preferably with experience of Gravity Dies, Pressure Dies or Plastic Moulds.—Apply JOHN DALE LTD., London Colney, Herts.

METALLURGIST required for Midland Foundry producing High Duty Cast Iron and Aluminium Castings; experience of Cupola Control essential. Please write giving full details of experience, etc., to Box 3666, FOUNDRY TRADE JOURNAL.

A FIRM, manufacturing Precision Aircraft Instruments in South Wales, requires young ASSISTANT METALLURGIST, Degree, L.I.M. or H.N.C. standard, preferably with some experience of physical testing, heat treatment, and metallographic examination of ferrous and non-ferrous alloys. Recent graduates with no experience considered; excellent prospects.—Apply Box 3655, FOUNDRY TRADE JOURNAL.

A WORTHWHILE opening for live and enthusiastic Technical Representative to develop existing connections amongst users of Engineering Materials in East London and Eastern Counties. Unlimited scope. Car owner. Salary, Commission and expenses. Replies in confidence.—Box 3662, FOUNDRY TRADE JOURNAL.

OLD-ESTABLISHED Ferrous Jobbing Foundry requires Representative on Commission basis. Person who already calls on industrial concerns would be suitable to introduce, as an additional line, high-quality castings.—Box 3664, FOUNDRY TRADE JOURNAL.

PRODUCTION CONTROLLER required by reputable firm of Malleable Iron Founders. Must be capable of estimating, fixing Piece-work Prices and planning and progressing Foundry Production. Applicants should state age, training, experience and salary.—Box 3665, FOUNDRY TRADE JOURNAL.

MAGNESIUM ELEKTRON LIMITED invite applications for the position of Head of X-Ray Section of Metallurgical Research Laboratory. Applicants should be qualified in Physics or Metallurgy or possess A.I.D. approval and should be anxious to specialise in radiography and X-ray diffraction. Applications in writing with details of qualifications and experience to Secretary, MAGNESIUM ELEKTRON LIMITED, Clifton Junction, Nr. Manchester.

REPRESENTATIVE on commission to handle sales of Nickel and Nickel base alloy ingots amongst Non-ferrous Foundries from southern borders of Yorkshire and Westmorland to the border. —Apply to Box 292, DORLAND ADVERTISING, 18-20, Regent Street, London, S.W.1.

INSPECTOR: A Steelfoundry has a vacancy for an inspector to act as liaison officer between customer and production personnel. The applicant must have a sound knowledge of foundry methods preferably with a background of general engineering practice. Full details of experience and career to date, together with age should be given, quoting Ref. L.I.C.—Box 3658, FOUNDRY TRADE JOURNAL.

A FOUNDRY manufacturing carbon and alloy steel castings has a vacancy for a foreman to supervise machine moulding operations. Complete details of experience with age should be given. Housing accommodation will be provided if necessary to the successful applicant. The position is progressive and the salary offered is £700 per annum.—Box 3659, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

SUPERINTENDENT required for large Core Shop in the East Midlands. Applicants should be not more than 40 years of age and have a wide experience of core production by modern methods. Housing accommodation will be available for suitable applicant.—Box 3645, FOUNDRY TRADE JOURNAL.

AGENCIES

FOUNDRY SUPPLIES.—AGENTS or REPRESENTATIVES wanted for: (1) West Riding; (2) Birmingham district; (3) Scotland.—Write box 3641, FOUNDRY TRADE JOURNAL.

MANUFACTURER'S AGENT, University degrees engineering, wide technical, commercial and export experience, seeks first-class agency for London and Home Counties.—Box 3574, FOUNDRY TRADE JOURNAL.

WELL-ESTABLISHED London company, with West End office and sales staff, sole Representatives for well-known provincial ferrous foundry, will consider similar appointment for Die Casting Foundry with machine shop having London and Home Counties connections.—Box 3667, FOUNDRY TRADE JOURNAL.

AGENTS WANTED in London, Midlands, South Wales and Newcastle-on-Tyne Areas. — PRESSURECAST PATTERN PLATE CO., LTD., 12, Higher Sheffield Street, Manchester, 12.

PROPERTY WANTED

WANTED: Steel Foundry, situate Sheffield, North of England or Scotland. Area 10,000 sq. ft. equipped high frequency melting furnaces 10 cwts. capacity; willing consider purchase capital or controlling interest in established business.—Write giving details to Box 3621, FOUNDRY TRADE JOURNAL.

PROPERTY FOR SALE

FURNESS DISTRICT, small well built, two storey building for sale, suitable for small workshop or warehouse, at present small foundry.—Box 3622, FOUNDRY TRADE JOURNAL.

FOR SALE

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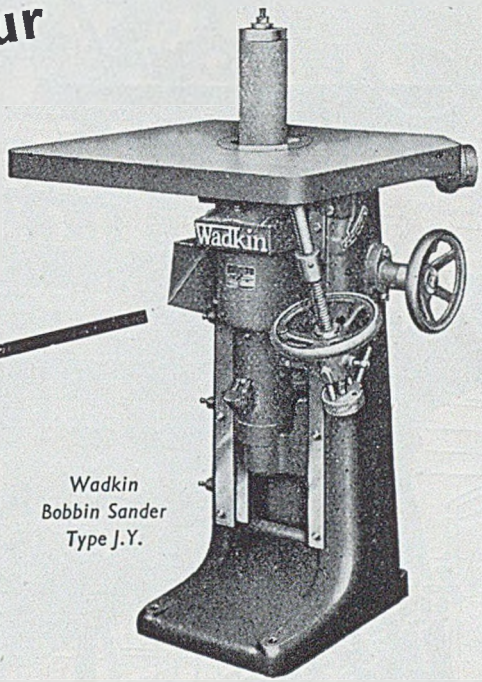
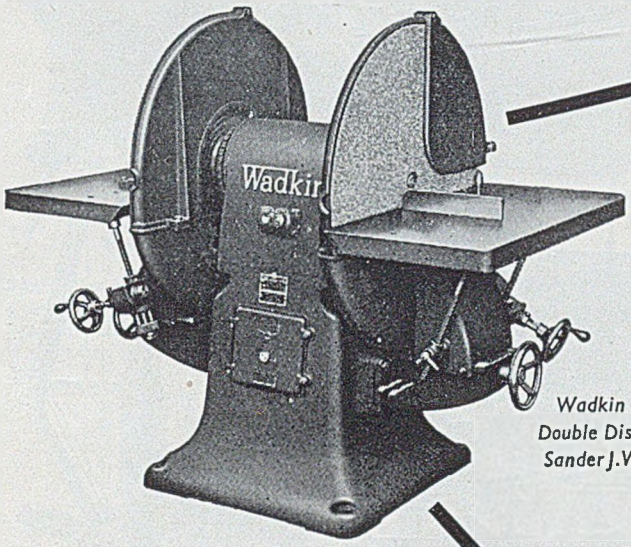


Wadkin Bobbin Sander Type J.Y.



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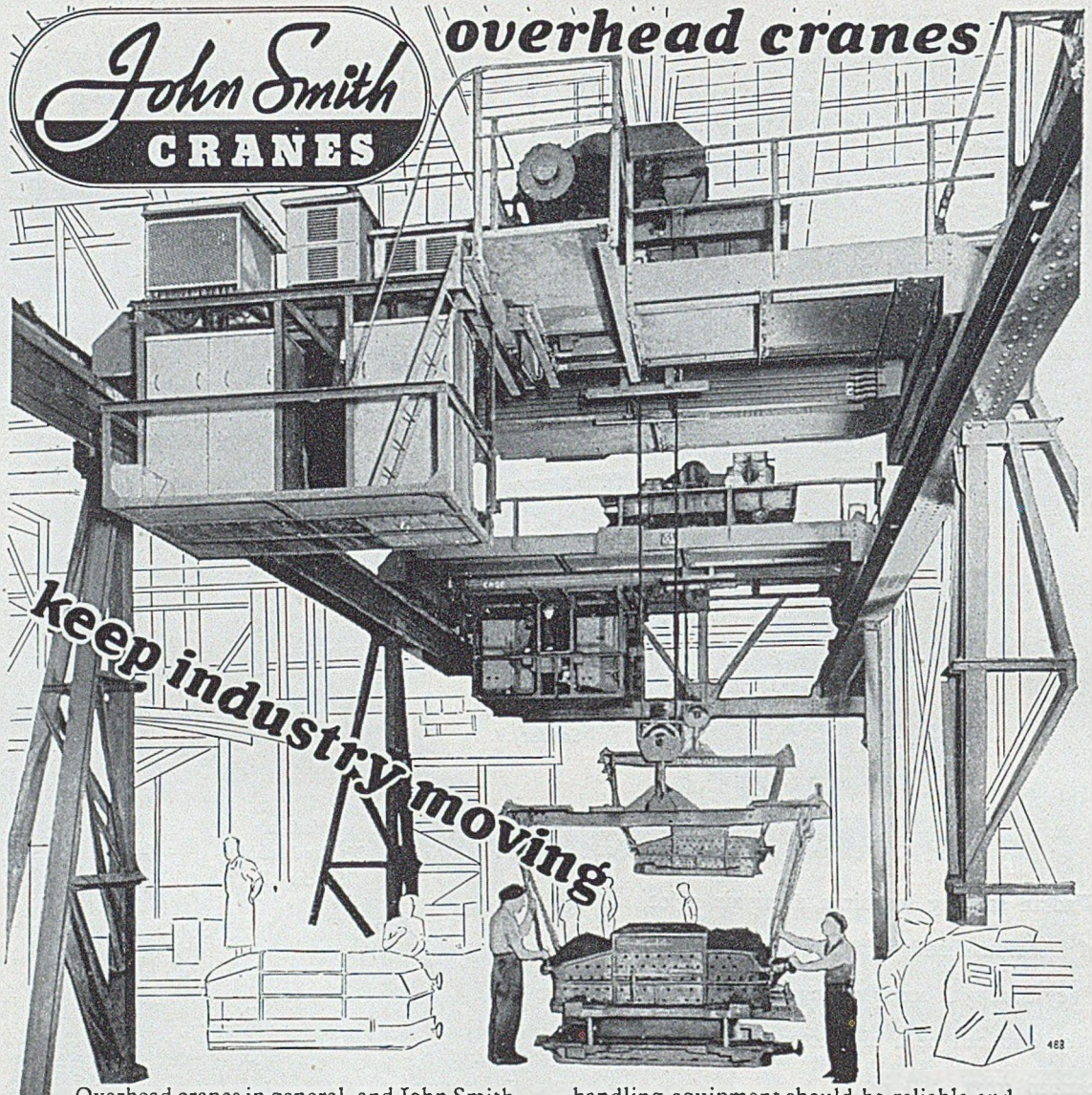

Overhead cranes in general, and John Smith Cranes in particular, play an important part in industry today. In many cases production would be slowed almost to a standstill without the help of these mechanical aids to handling problems. In the illustration shown above two John Smith 7½-ton Overhead Cranes are handling moulding boxes for bath castings at a large engineering works in Yorkshire. Where workers are engaged on piece work such as this, it is essential that the mechanical handling equipment should be reliable and able to withstand continuous duty without the risk of breakdowns. The skill and experience gained over many years of crane design and manufacture is reflected in these qualities, which are attributes of every John Smith Crane.

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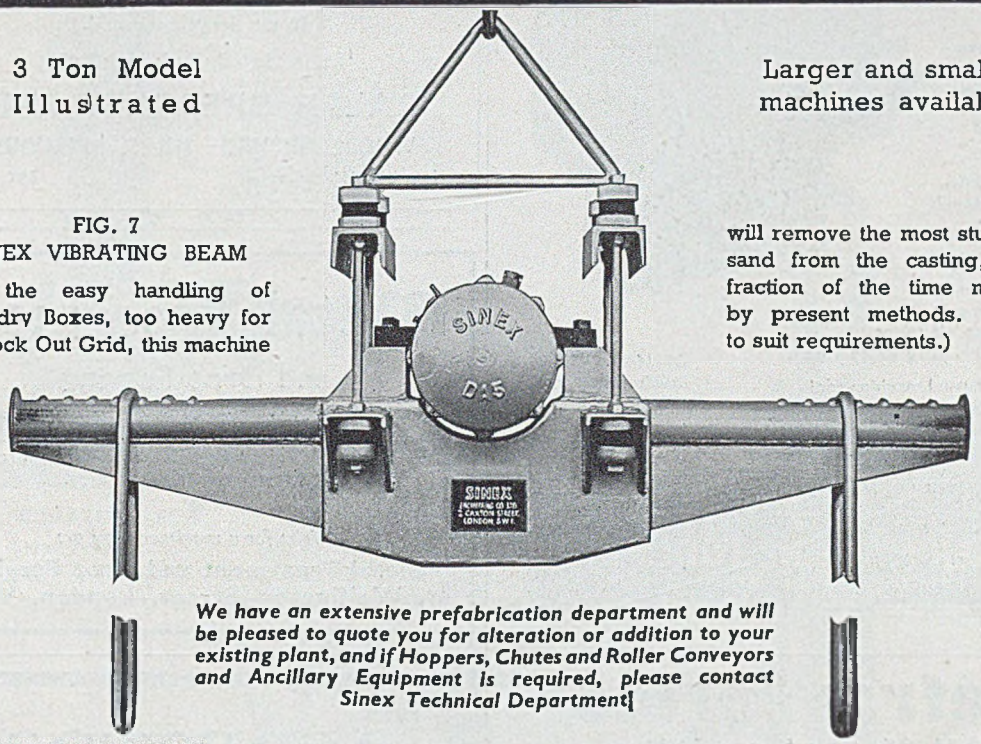

FIG. 7
SINEX VIBRATING BEAM

For the easy handling of Foundry Boxes, too heavy for a Knock Out Grid, this machine will remove the most stubborn sand from the casting, in a fraction of the time needed by present methods. (Links to suit requirements.)

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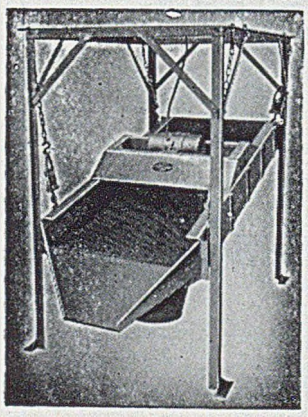


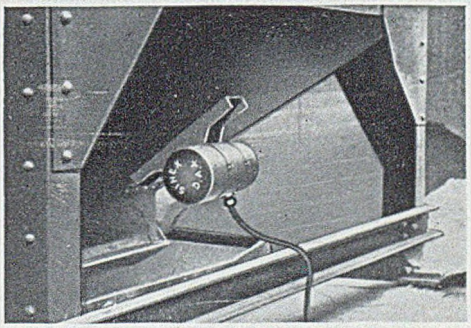
FIG. 10 (on left)

Sinex Vibrating Screen 6ft. × 3ft. Single Deck. Hourly output—15 tons of sand through ¾in. mesh.

This screen is also manufactured in sizes to suit requirements.

FIG. 8 (illustrated below)

An important function of Sinex High Frequency Vibrators is the application to Sand and Storage Hoppers. To facilitate the rapid discharge of the material, long experience has shown that the fitting of a Sinex Vibrator to a Hopper containing the most stubborn material will avoid "arching" or "funnelling" of the material in the neck of the Hopper and assure a regular flow. Fig. 8 shows a Sand Hopper fitted with Sinex Vibrator. Manufactured in various sizes suitable to the capacity of the Hopper, and wound suitable for any electric supply, single or 3-phase A.C.



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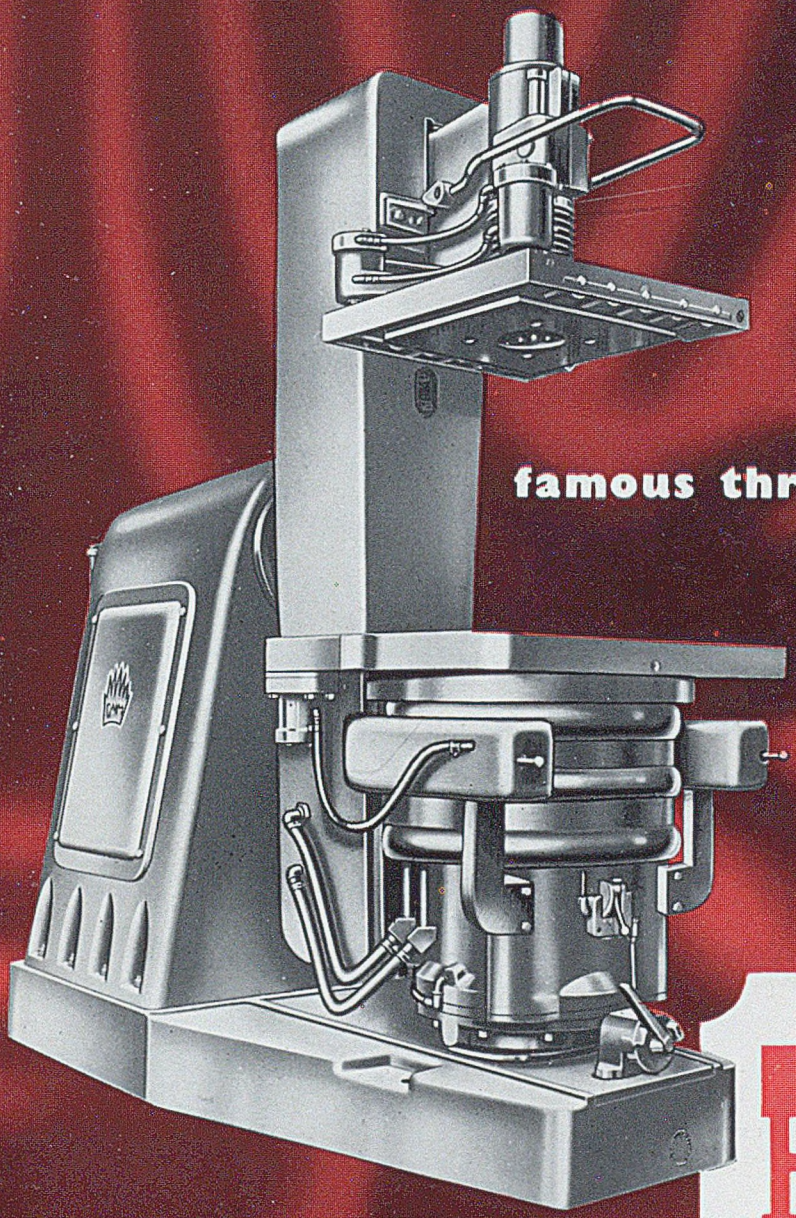

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