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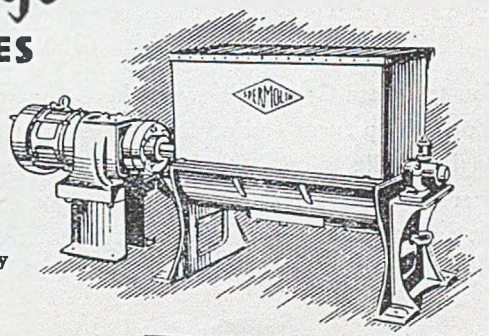
The cores shown above are used in the casting of 12 ton planing machine beds. A good green bond and dry strength are required for this type of core and it is essential that no distortion takes place. This modern foundry employs similar cores for all types of castings, from 5 to 20 tons and these are made entirely with SPERMOLIN Core Oils and Binders. The cores break down easily when castings reach the fettling shop, thereby saving time and labour costs.



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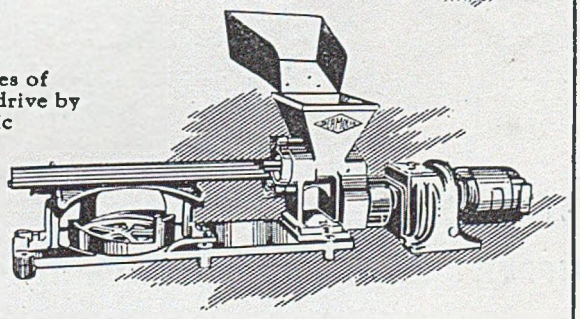

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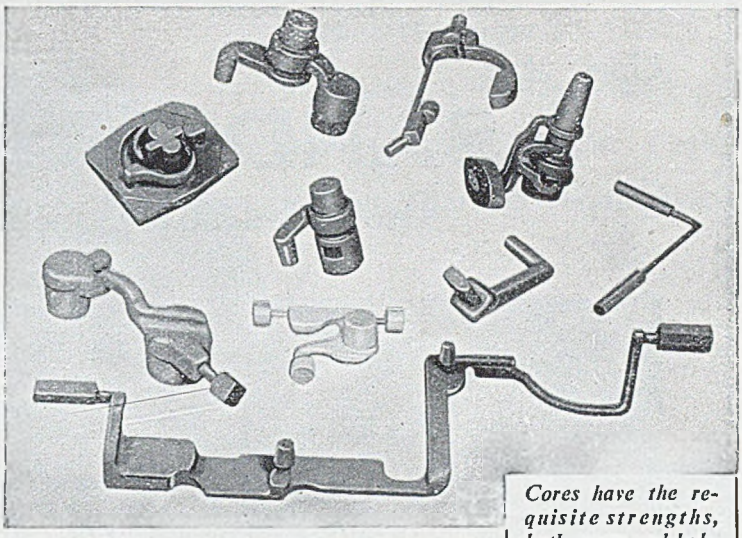

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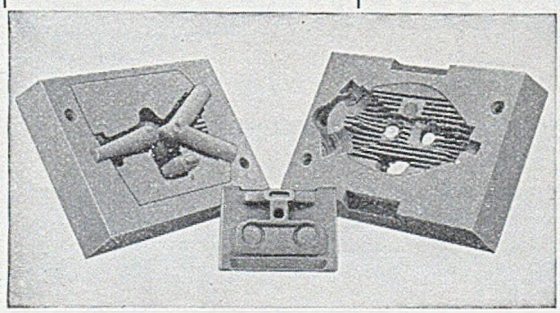

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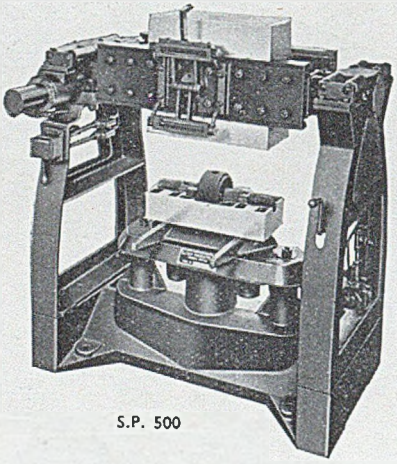

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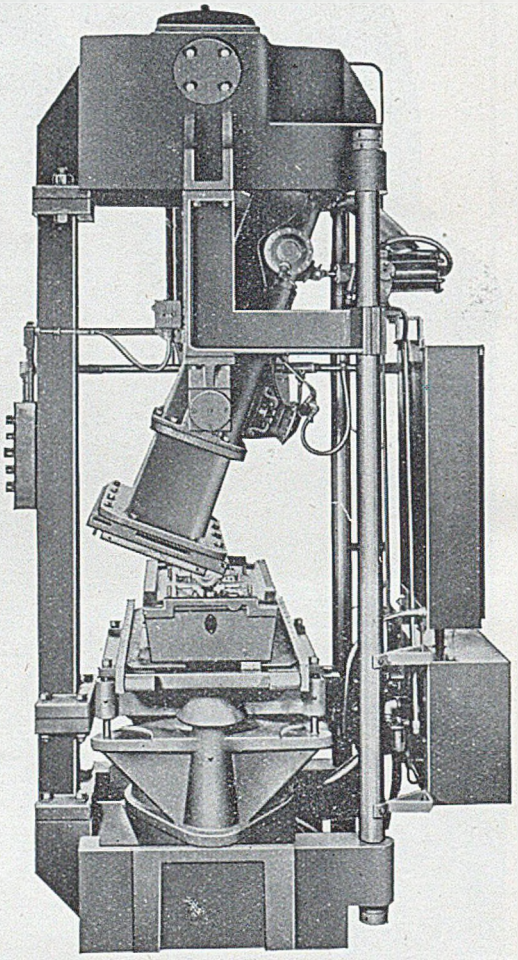

S.P. 220

The SP.220 Vertical Coreblower incorporates push button control "tilt-to-fill" sand chamber, unobstructed access to both ends of corebox, squeeze piston giving counterpressure during blowing, overhead dome air reservoir. These features ensure increased output, higher quality, easier operation. This machine has been designed to eliminate the high cost of maintenance normally experienced with coreblowers.

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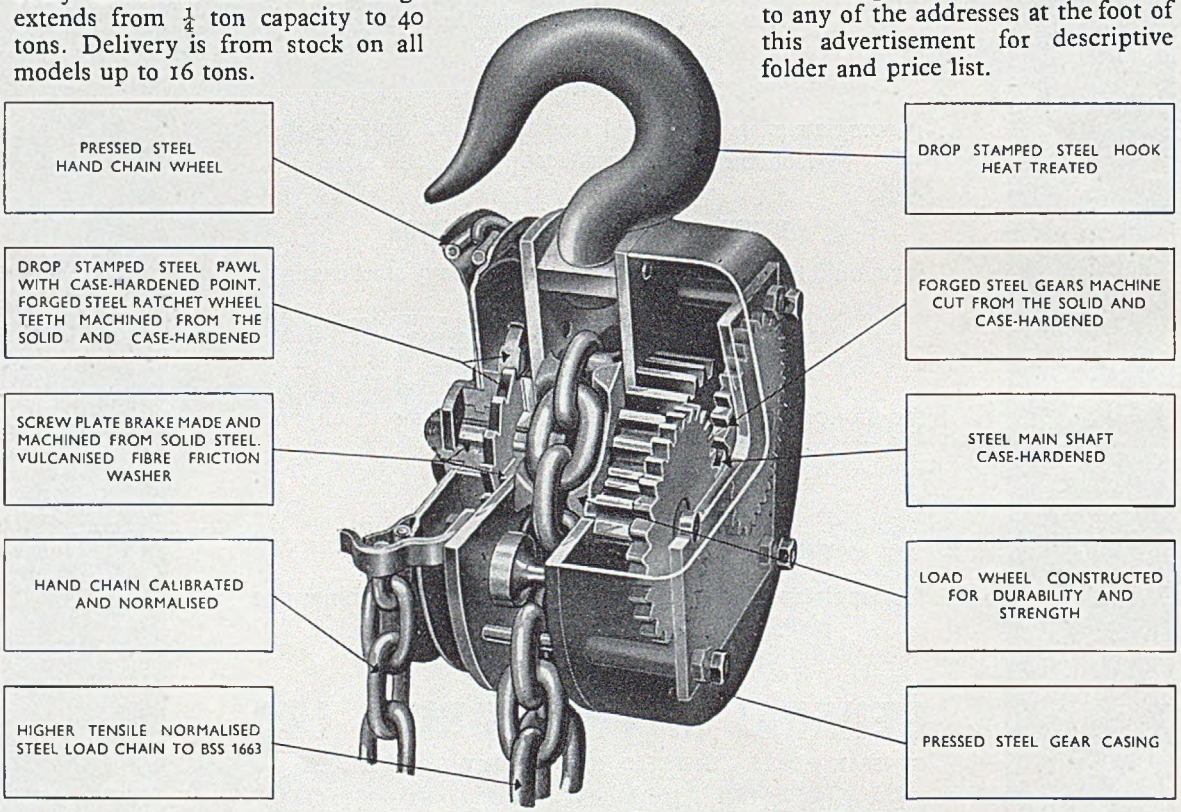

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"SMZ" ALLOY And Its Uses As A Ladle Addition To Cast Iron

"SMZ" alloy—specification, Silicon 60-65 per cent., Manganese 5-7 per cent., Zirconium 5-7 per cent., Iron 20 per cent., approx.—essentially a balanced alloy containing silicon, manganese, and zirconium. It exerts a particularly strong graphitizing effect when used as a ladle addition in making cast iron, and is in many cases superior to other graphitizing alloys that are commonly used.

The standard size of "SMZ" alloy is ¼ in. by 32 mesh.

"SMZ" alloy is suitable for any application wherein a strong graphitizing action is desired, but is especially recommended for the following purposes:

1. To produce a high-strength cast iron from a low carbon, low silicon iron.

Foundries regularly producing a white cast iron for the production of malleable iron sometimes wish to produce some high-strength grey iron castings. They can readily do so by making a ladle addition of "SMZ" alloy to their regular white iron composition. Other foundries wishing to make a high-test cast iron can do so by producing a low-carbon, low-silicon iron in the cupola or other melting unit, and then adding "SMZ" alloy in the ladle.

2. To produce an improved grey cast iron by means of a ladle addition.

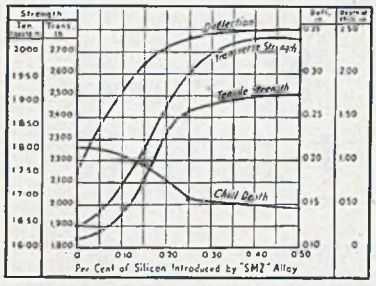


FIG. 1—These curves show how additions of "SMZ" alloy reduce depth of chill and improve mechanical properties when added to a series of irons selected to give the following final analysis: 3.10 total carbon, 0.60 combined carbon, 1.80 silicon, and 0.50 manganese.

It has long been known that the addition to the ladle of a portion of the silicon desired in the finished iron results in a cast iron of greatly improved mechanical properties. "SMZ" alloy is exceptionally well adapted for use as the source of silicon to be added to the ladle. The amount to be added again depends on the silicon content of the iron, its degree of oxidation, and the section thickness of the castings for which the iron is intended. In general the amount of "SMZ" alloy to be added will range from about 0·15 to 0·50 per cent. silicon (or 5·5 to 18·5 lb. of "SMZ" alloy per ton).

Two series of tests show clearly the benefits that are obtained by adding a part of the silicon to the ladle as "SMZ" alloy. In the first series of tests, cast irons of decreasing silicon contents were made and correspondingly increasing amounts of silicon were added as "SMZ" alloy so that the final composition of the irons was the same, i.e.:

T.C.	C.C.	Si	Mn
3·10%	0·60%	1·80%	0·50%

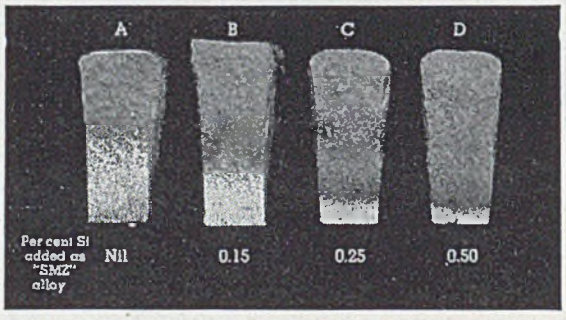
The results are given in Table I and are shown graphically in Fig. 1.

Table I

Characteristics of a 1.80 Per Cent Silicon Cast Iron made with Increasing Proportions of "SMZ" Alloy

"SMZ" Alloy Added to Ladle, lb. per ton	Silicon Introduced by "SMZ" Alloy per cent	Transverse Strength, lb.	Deflection, in.	Tensile Strength Tons per sq. in.	Brinell Hardness	Depth of Chill, in.
None	None	1,900	0.185	16.25	207	1.09
5½	0.15	2,250	0.310	17.25	207	0.94
9½	0.25	2,600	0.340	19.0	196	0.56
18½	0.50	2,750	0.350	19·25	196	0.43
27½	0.75	2,650	0.330	19.50	196	0.31

3. To reduce chilling of edges, corners, and thin sections of a casting without sacrificing mechanical properties in the heavier sections.



NOTE SIZE REDUCTION Chill block illustrations have been proportionately reduced from the actual sizes of about 1¾" high.

FIG. 2—These chill blocks show how progressive additions of "SMZ" alloy progressively reduce the depth of chill.

The effect of "SMZ" alloy in reducing the chilling of edges, corners and thin sections without sacrifice of mechanical properties in heavier sections is clearly shown in Tables I and II. It will be noted, for example in Table II, that the addition of 0·25 per cent. silicon as "SMZ" alloy (9½ lb. per ton) reduced the depth of chill from 1·09 in. to 0·31 in. and at the same time increased transverse strength from 1,900 lb. to 2,600 lb., increased the deflection from 0·185 in. to 0·315 in., and increased ultimate strength from 16·25 to 18·00 tons per sq. in. in a standard arbitration test bar. The addition of 0·50 per cent. silicon as "SMZ" alloy (18·5 lb. per ton) still further reduced the chill—to 0·19 in.—while the mechanical properties of the test bar are still superior to those of the base iron. In most soft grey irons, maximum chill reduction is brought about by the addition of less than 0·35 per cent. silicon as "SMZ" alloy. Care should be exercised when adding "SMZ" alloy to exceeding soft grey irons, for excessive amounts are apt to cause the formation of subsurface pinholes in such irons.

The effect of "SMZ" alloy on chill is also shown in Fig. 2.

4. To reduce wall sensitivity.

Wall sensitivity, or the effect of different wall thicknesses of a casting on the physical properties of the cast iron, is measured by chilling tendency. An iron with a great tendency to chill will show a much larger difference between the mechanical properties of thin and heavy sections than will an iron having but little tendency to chill. The addition of "SMZ" alloy greatly reduces the chilling tendency of cast iron as shown in Tables I and II. It follows that these alloys are correspondingly effective in reducing wall sensitivity.

Table II

Effect of "SMZ" Alloy on the Characteristics of Cast Irons Containing 1.80 to 2.30 Per Cent Silicon

"SMZ" Alloy Added to Ladle lb. per ton	Silicon Introduced by "SMZ" Alloy per cent	Transverse Strength, lb.	Deflection, in.	Tensile Strength Tons per sq. in.	Brinell Hardness	Depth of Chill, in.
None	None	1,900	0.185	16.25	207	1.09
5½	0.15	2,500	0.285	17.00	196	0.69
9½	0.25	2,600	0.315	18.00	202	0.31
18½	0.50	2,550	0.355	16.50	187	0.19

5. To bring cast irons containing up to as much as 2 per cent. of chromium within the machinable range while maintaining or improving heat resistance, oxidation resistance and mechanical properties.

Irons containing from 1·50 to 2·00 per cent. of chromium have been widely recognised for their serviceability at high temperatures, as well as for improved resistance to oxidation and to corrosion in some media; but lack of machinability has hitherto restricted the extent of their application. Foundrymen can now bring these irons within the machinable range by mixing "SMZ" alloy with "BEMCO" Foundry Grade Ferrochromium, and using the mixture to introduce both chromium and silicon, in desired amounts, to iron in the ladle. There is also a general improvement in the physical properties of these irons.

Table III shows that ladle treatment with "SMZ" alloy mixed with foundry-grade ferrochromium improve the physical properties of a typical cast iron despite having also increased its resistance to chilling. Such additions produce a more corrosion-resistant iron that is also machinable and highly uniform even in section of various thicknesses.

Table III

Effects on a Typical Cast Iron* of "SMZ" Alloy Plus Foundry-Grade Ferrochromium

Iron No.	Ladle Treatment	T.C.	Composition, per cent C.C.	Si	Mn	Cr	Total Chill Depth, in.	Transverse** Strength, lb.	Deflection, in.	Tensile Strength, Tons per sq. in.	Brinell Hardness
1	FeCr,SMZ	3.23	0.63	2.17	0.89	0.28	0.19	3,700	0.360	20.00	241
2	None	3.25	0.65	2.00	0.89	0.02	0.36	2,800	0.255	17.50	235
3	FeCr,SMZ	3.21	0.74	2.01	—	0.28	0.21	3,400	0.300	19.25	241
4	None	3.23	0.68	1.84	—	0.03	0.41	3,300	0.305	17.75	235

"SMZ" ALLOY—SUMMARY

(a) From 0·50 to 0·10 per cent. of "SMZ" alloy in regular grey iron gives greater toughness to the iron, reducing breakage.

(b) The exothermic action of "SMZ" alloy additions has been utilized to assist in the introduction of chromium and nickel to iron in the ladle.

(c) More successful results are usually obtained when the "SMZ" alloy is added after the ladle is one quarter filled, than when the alloy is placed in the bottom of the ladle before filling.

(d) Additions of "SMZ" alloy to irons in the ladle improve the properties of alloy, as well as plain, cast irons.

(e) "SMZ" alloy has been successfully used for obtaining a completely grey structure in thin section, low-silicon castings for pressure-resistant service.

(f) Molten irons treated with "SMZ" alloy can be held for extended periods before pouring with excellent retention of the alloy's graphitizing power.

(g) The strengthening influence of "SMZ" alloy is most pronounced when hard and medium-hard irons of the cylinder class are treated. "SMZ" alloy helps to eliminate hardness and chilled edges on otherwise soft irons that are high in carbon and silicon.

(h) Additions of "SMZ" alloy are more effective if the ladles are of fair capacity.

(i) Small additions of ferrosilicon (up to ·04 per cent. silicon) and calcium silicon have a carbide stabilizing effect on cast iron, whereas "SMZ" alloy has a progressive graphitizing action at all additions.

(j) Figs. 3 and 4 showing comparative effects of "SMZ" alloy and 50 per cent. Ferrosilicon, when used as ladle additions to cast iron illustrate the effectiveness of "SMZ" alloy . The analysis of the base iron was 3·15 per cent. total carbon, 0·57 per cent., combined carbon, 1·80 per cent. silicon and 0·50 per cent. manganese.

FIG. 3

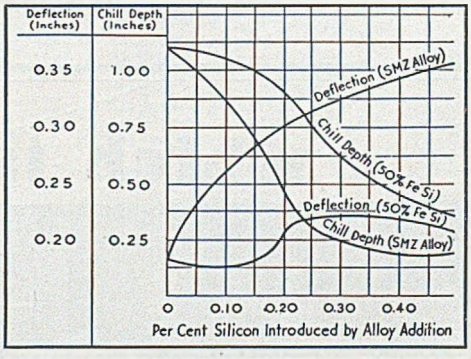
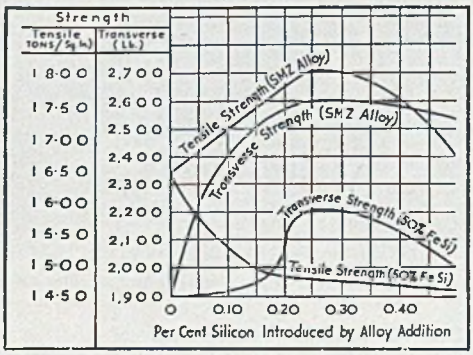


FIG. 4



"SMZ"Alloy—the name is a registered Trade Mark—is produced only by BRITISH ELECTRO METALLURGICAL COMPANY, LIMITED, Wincobank, Sheffield, who are the United Kingdom's largest distributors and manufacturers of Ferro alloys to the British Iron and Steel Industry. Technical literature and personal advice on the usage of "SMZ" alloy is available from this company.

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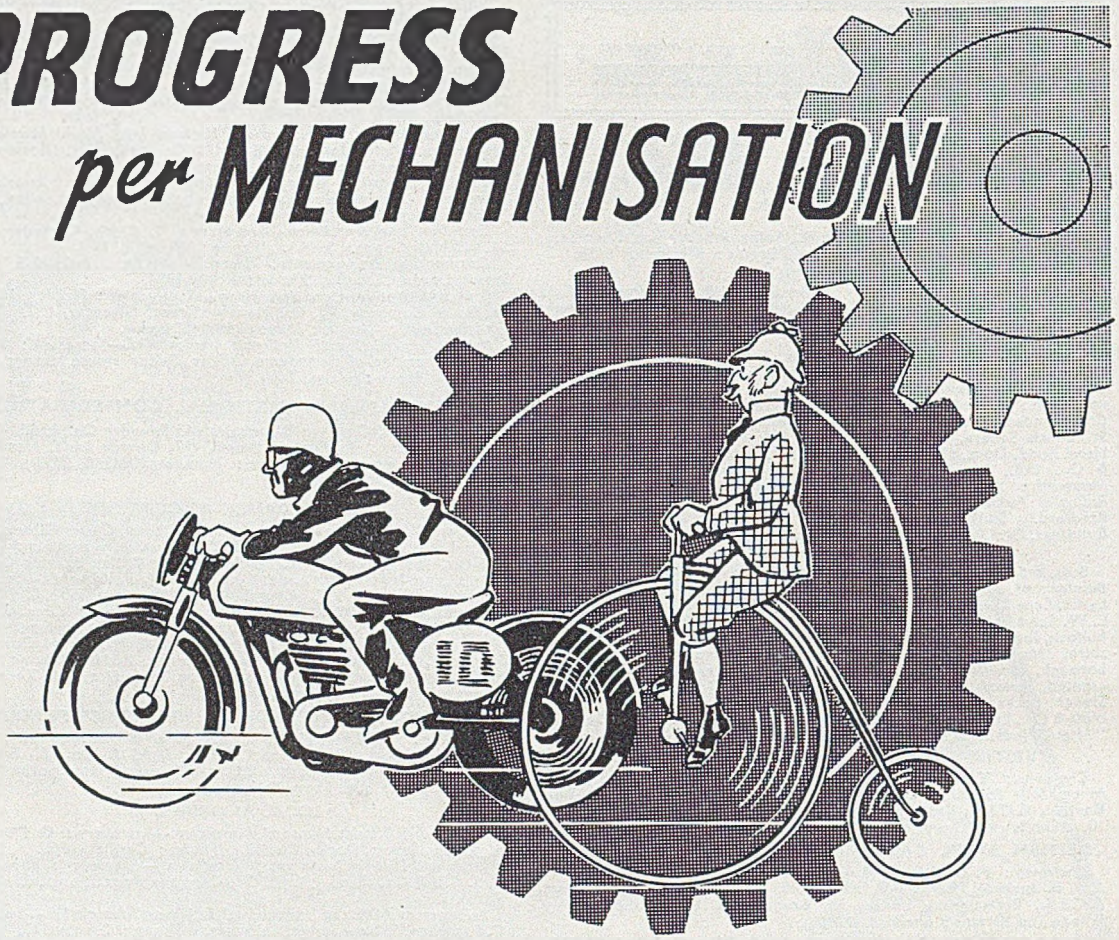

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FOUNDRY TRADE JOURNAL

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PRINCIPAL CONTENTS

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Unwanted Statistics

The institution of a costing system is for the purpose of yielding statistics or figures on the conduct of one's business. The larger the business the greater the amount of money which can be wasted for this purpose, because there is a level in every concern above which the value of the figures reported is less than the cost of their ascertainment. This is well illustrated by the case of a costing system introduced into an American foundry, which involved the issue of job/time cards for completion by the moulder. One received back read: "Job No. 43: 10 min.; No. 63: 55 min.; No. 96: 25 min," and so forth, but was completed by the remark: "Fillin' in de damned card: 20 min." This epitomizes the views of the Joint Iron Council, when replying to a questionnaire issued by the Committee on the Censuses of Production and Distribution, but they go further, and continuing our illustration say that the "moulder's" figures do not agree with those coming from other sources.

The Joint Iron Council point to a number of questions, which are duplicates of those demanded by the Ministry of Supply, and if the Census is to be continued suggests the two requests for figures be brought into line. Rightly, they prefer the stating of "output" rather than "sales," especially when the latter have to be broken down. Much criticism is levelled at the census of production on the grounds of unreliability and they cite cases of wide discrepancies between the Ministry of Supply figures and those printed in the Census for the number of manufacturing units employing over 10 persons (1,542 as against 870); average employment (145,800 as against 120,611) and tonnage output (3,259,089 as against 2,344,500). The same huge discrepancies occur with raw-material stocks and the employment of females. Of course, there are explanations available, as the coverage seems to be different, but the result merits the appellation "bewildering." In trying to evaluate the worth of the census of production, the J.I.C. say in diplomatic language, that they do not think much of it; they would welcome a longer period between the taking of a census and a reduction in complexity.

The final paragraph reads: "In conclusion, the Council wish to emphasize that their observations do not signify that they take a hostile attitude towards the collection and dissemination of statistics about the industry. On the contrary, as a national organization for a complex and changing industry, they are vitally in need of up-to-date, accurate, and detailed statistics in their everyday work. At the same time, collection of figures is an additional cost to the industry, as much of the information required by Government departments is additional to that needed for the efficient conduct of the individual business. . . . We appreciate that some census figures are aggregated for all industries to provide data for the whole country's economy, and we do not claim to know how far this is really essential. In addition, however, the detailed census forms demand much information which is peculiar to our industry, the most useful part of which is available elsewhere. We strongly recommend that this type of information shall be deleted from the census form, as it merely duplicates other information and is far more outdated and incomplete than the series at present collected for the Ministry of Supply."

B.C.I.R.A. Annual General Meeting

At the annual general meeting of the British Cast Iron Research Association held in the Charing Cross Hotel, London, on November 4, Mr. F. Scopes presided. After the minutes were confirmed, he moved the adoption of the Report (printed in last week's JOURNAL) and accounts, which resolution was carried. Next, on the proposition of Dr. J. E. Hurst, J.P., seconded by Mr. R. L. Handley, Mr. Scopes was re-elected president of the Association. Following the re-election of Mr. J. Arnott, Dr. C. J. Dadswell and Mr. N. P. Newman as vice-presidents, Mr. E. Longden (national president of the Institute of British Foundrymen) was also made a vice-president. Mr. Colin Gresty retired from that office. Members of Council, Mr. D. K. Barclay, Mr. E. C. Dickinson, Mr. V. Everard, Mr. C. Gresty, Mr. R. L. Handley, Dr. J. E. Hurst, Lt.-Col. H. H. Jackson, and Mr. G. R. Shotton, though retiring automatically, were re-elected *en bloc*.

On a special resolution, Mr. E. P. Major and Mr. C. C. Booth, also, were re-elected members of Council, the former as treasurer. Finally, on the proposition of Mr. F. A. Wilson, seconded by Mr. V. C. Faulkner, a vote of thanks to the auditors, the Council and committees for the work done during the year received general acclamation.

Current Programme

The following programme of work envisaged by the Association was made known to members:—

Gases in Cast Iron.—To continue work on the influence of nitrogen in cast iron and to study the influence of oxygen content on chill and annealing properties. To continue field tests on the influence of melting conditions on gas content. To study the most suitable methods for sampling and estimating hydrogen in cast iron.

Graphite Formation.—To study the mechanism of formation of under-cooled graphite and the solidification sequences in grey cast irons; to study the influence of melting temperature on thermal arrests and structure.

Spectrographic Analysis.—To apply direct-reading spectrographic methods to the estimation of carbon and phosphorus in cast iron and pig-iron and to study improvements in the spectrochemical analysis of slags.

Enamelling.—To study the evolution of gases from cast iron during the enamelling cycle, with special reference to the origin of blister defects.

Moulding and Core Sands.—To study the physical properties of sand at elevated temperatures, using apparatus specially developed for the purpose; to study developments in shell moulding and the effect of various additions on the behaviour of moulding and core sands.

Mechanical Properties.—To examine the influence of surface rolling and the effect of under- and over-stressing on the fatigue properties of grey and nodular cast iron; to study the influence of graphite size on notch sensitivity. To investigate factors influencing the temper embrittlement in ferritic nodular and blackheart malleable irons. To investigate the influence of sulphur on the transition temperature of whiteheart malleable cast iron. To study the mechanism of crack initiation and propagation in ferritic nodular irons.

Soundness of Iron Castings.—To investigate the dilation of the mould cavity during and after casting and the influence of this on soundness; to study methods of limiting mould cavity dilation; to study the influence on casting expansion of gas evolution during solidification.

White and Chilled Irons.—To study the influence of residual elements on chilling tendency; to examine the influence of melting and casting temperature on the chilling of alloy cast irons. To study the influence of composition and microstructure on the mechanical properties of white irons.

Foundry Atmospheres.—To assist in the industrial development and application of an extractor unit evolved by the Association for the control of dust from pedestal grinders; to study air flow near knock-out extraction systems in relation to side draughts and currents of hot air from castings being removed from sand, in order to establish the basic features of a satisfactory design for such systems; to study the new Regulations for foundries in respect of technical features on which the industry may require guidance; to study special features of fume removal and dust suppression in ventilation of non-mechanized foundries in conjunction with the Building Research Station.

Operational Research.—To isolate and study factors influencing foundry productivity in relation to nature and output of product, equipment, layout and planning.

Dinner

BRITISH BRONZE AND BRASS INGOT MAKERS' ASSOCIATION

Mr. G. W. Booth presided over a gathering of 200 members and guests of the British Bronze and Brass Ingot Makers' Association last Saturday for the annual dinner, dance and cabaret at the Grosvenor House Hotel, London. Among the guests at the high table were Dr. H. W. Clarke, founder and first president of the British Non-Ferrous Metals Federation; Dr. W. Berry, Ministry of Supply; Dr. G. L. Bailey, C.B.E., director, British Non-Ferrous Metals Research Association; Mr. W. R. Marsland, president of the Association of Bronze and Brass Founders; Mr. J. Chalmers, president of the National Scrap Metal Merchants' Association; Mr. Barrington Hooper, C.B.E.; Mr. E. Farenden, chairman of the Federation of Light Metal Smelters, and Mr. Eric Heathcote, secretary of the B.B.B.I.M.A. The whole proceedings were of the high standard associated with this annual function. The organization was undertaken by Mr. Stanley Black.

Past-president Honoured

At a complimentary dinner in his honour in Birmingham on November 4, the contribution to the British non-ferrous metals industry of Mr. William H. Henman was acknowledged. A canteen of cutlery and a pair of binoculars were presented to Mr. Henman by fellow members of the British Non-Ferrous Metals Federation. Mr. Horace E. Jackson, chairman of the Federation, who presided, recalled that Mr. Henman began his career in 1900 with the firm of Henry Wiggin & Company, Limited, as a chemist. Later he became works manager, and in 1919 he was appointed managing director of Headley Birch. When this firm was merged with John Wilkinson & Company in 1920, Mr. Henman became managing director and chairman of each company. He became the second president of the Federation, holding that office from 1949 to 1951, and he was a member of the committee which prepared the Charter of the Federation. For 10 years Mr. Henman was chairman of the Nickel Silver Association. He was also a member of the council of the British Non-Ferrous Metals Research Association and, for 14 years, a member of the finance and general purposes committee of the Association.

Mechanized Shell-moulding Plant

*By Hugh K. McGavock**

Since October, 1951, the Lynchburg Foundry Company, of Lynchburg, Virginia, have been operating a shell-moulding experimental plant. Its production has been stepped up from 30 to 40 castings a day to a figure of 500. As a result of this experience, it has been decided to install a full-scale production foundry, costing $1,000,000 approximately, which it is expected, will be in operation by next summer. The "Iron Worker," the house organ of this company, carries a description of the proposed foundry and from it the following extract has been made. The foundry envisaged is to make 100 tons of finished castings every 24 hours. These castings will range between 4 and 75 lb. each.

Sand Systems

For the new shell-moulding foundry, sand will be received in railway trucks and handled pneumatically into storage silos and mixers. This operation is a logical application of modern pneumatic conveying because of the moderate tonnage and because of the fact that the sand will be dry and very fine, with a probable range from A.F.S. fineness 110 to 130. Conventional belt conveyors and elevators would present a severe dust problem and lead to an undesirable loss of fine sand. Sand will be discharged from the hopper-bottom trucks into a pneumatic blower. Here pressure will be introduced and the sand will become aerated and flow out a discharge pipe into two 100-ton storage silos. These silos will have a special discharge orifice which has been developed by the company to eliminate segregation of the different grain sizes of sand as it is withdrawn from the silo.

The required weight of sand for one batch in either the shell or core-sand mixers will be withdrawn from a silo into another pneumatic blower. This blower will have flexible connections to its inlet and outlet pipes and be scale mounted so that it will also serve as a weigh hopper. An electronic method of weighing is planned rather than conventional mechanical levers. The blower will be mounted on Baldwin load cells which are in reality electric strain gauges. The added weight of sand in the blower will produce a strain in the load cells which will be electrically transcribed as the weight of the sand. The weighed batch of sand will be blown to a receiving hopper over the desired mixer.

Sand for Shell-moulding

The exact means and method of mixing and distributing the sand and resin blend for making shells is not yet final and is subject to the findings of the programme of research and development now being carried out in the pilot unit. The architect's drawing (Fig. 1) indicates one of the conventional ways of blending the sand and resin in a dry mix by means of small units adjacent to the shell-making machines.

Shell Making

Multi-station, turntable-type shell-making machines, carrying four to six pattern plates, and featuring an indexing type of drive, so that a common sand applicator and a common shell stripping mechanism can be used, are being designed along lines similar to the pilot unit. The production machines will, however, be completely automatic. It is very probable that several types and designs of shell-making machines will be required, due to the varied nature of the work in a jobbing set-up. The shell mould size will vary as required up to the maximum of 24 by 30 ins.

The shell halves from the machine will flow directly to adjacent shell-assembly positions, where any loose cores are to be set and the completed moulds closed. The shell moulds will then be grouped into unit loads for the mould reel and attached to the trolley conveyor line for transfer to the loading station on the mould reel, or to the shell-storage area as required.

Coremaking

Initially, only equipment required for making simple shell cores will be installed, featuring hand-rollover type machines and heated coreboxes. However, space can be provided for additional and varied methods of coremaking as need and development dictates. The cores produced will be fed to the shell assembly positions or to storage as required.

Mould Reel

The mould reel will be a 460-ft. long pallet-type conveyor. The flasks, fabricated steel boxes with a hinged and latched drop bottom, will be loose on the mould car. They will be of such a size as to receive approximately five shell moulds ranging in size from 15 in. sq. to 24 in. by 30 in. The conveyor speed will average 5 ft. per min. and will be variable to suit the number of tons of metal being poured per hour.

Shell moulds will be clamped in adjustable racks at the loading station and hung in a flask on the mould reel. Then the flask will be filled with shot by a manually-operated flexible hose under the shot surge bins.

The flask will then be vibrated for one minute, thoroughly to pack the shot around the shells. An electric vibrating unit will automatically be clamped on to the flask and travel with it. During the period of vibration, the flask will ride off of the mould car top on gravity rollers while a lug on the car pushes the flask forward. This will confine the vibration to the flask alone.

* The Author is chief development and design engineer at Lynchburg Foundry.

Mechanized Shell-moulding Plant

A grating and hopper to catch spilled shot and return it to the elevator which feeds the surge bins will be provided at loading and vibrating stations.

The shot back-up will reinforce the shell against pressure from molten iron, so that close casting tolerances will be maintained and a thinner shell ($\frac{3}{16}$ in. to $\frac{1}{4}$ in.) can be used, thus saving expensive resin and sand. Shot was chosen because it flows readily to back up all surfaces of the shell, provides a heavy back-up, and being porous, allows gases to escape.

Before moulds are poured, a thin layer of sand topping will be spread over the shot around the pouring cups to prevent the spilled hot metal from adhering to the comparatively expensive shot. Foundry reclaimed sand will be used initially. However, this sand will enter into the future sand-reclamation system and shell sand will be used when this system is installed.

Both sand-topping and shot-filling operations will be manual at first. The company anticipates that both will be readily mechanized and made entirely automatic after the operations have been studied in practice. At that time, sand will be delivered to the topping station by the same pneumatic system serving the mixers.

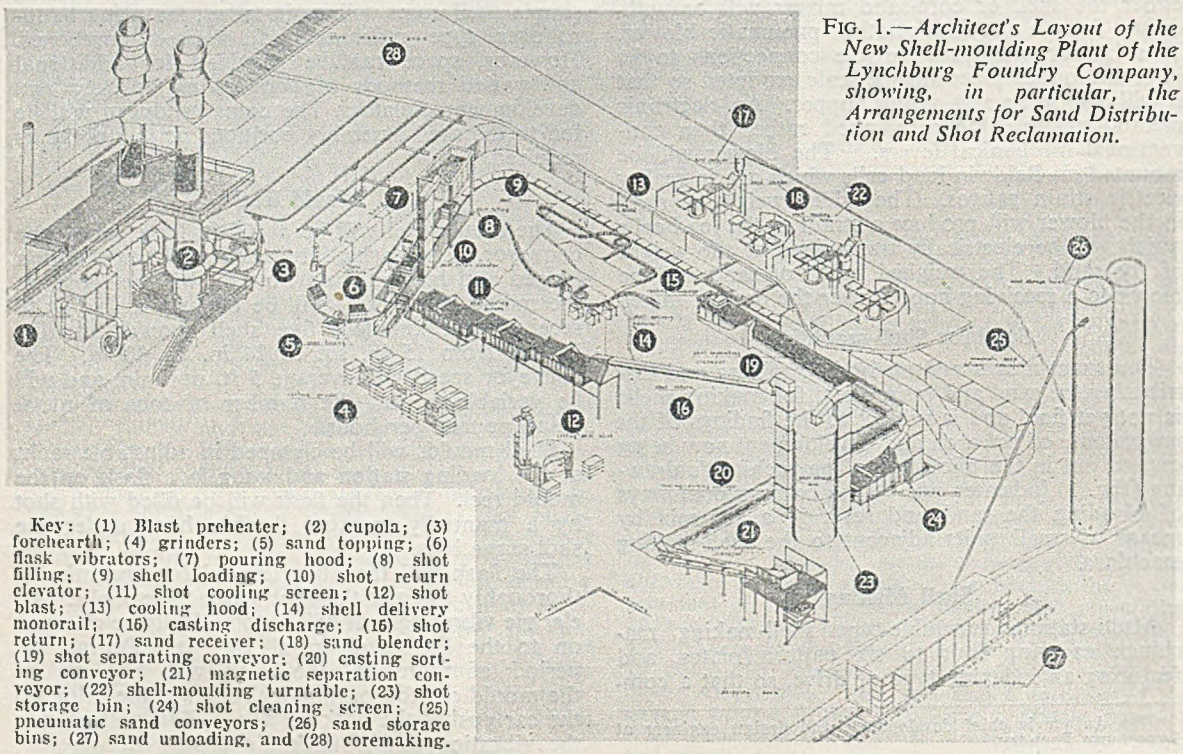
Hot Metal

Completely new hot-metal facilities will be provided for the shell-moulding foundry. These include bins for raw-materials storage, a cupola building, cupolas and charging equipment. Two cupolas, operating singly on alternate days, will serve as the melting unit. They will be lined to 48 in. i.d. normally, but this can be varied from 42 to 54 in. as required.

The blast air for the cupolas will be supplied by a centrifugal blower through air/weight controls, and will be preheated by an externally-fired heater of the Todd-Thermo type. The cupolas will be equipped with wet collectors on top, and will have protruding, water-cooled copper tuyeres.

Hot blast, with temperature up to 540 deg. C. will be used for obtaining the high metal temperatures required from the cupolas in order to inject the molten metal with calcium carbide in the first forehearth basin for desulphurizing and up-grading; then in the second basin, arranged in cascade with the first basin, the metal can be treated with calcium carbide and/or magnesium alloys and rare-earth oxides for conversion into ductile iron. Either or both stages of treatment will be done by the injection method. From the second basin of the forehearth, the metal will flow into the storage reservoir from which the transfer ladles are filled. During the process of filling the ladles, alloys or inoculating alloys may be added to the metal. The transfer ladles will then service the pour-off ladles on the mould-reel line.

Both the molten slag from the cupolas and the dry slag from the calcium-carbide injection treatment will be water-quenched and collected in a settling tank. A drag-chain conveyor will remove the slag aggregate from the settling tank and load it into dump skids for disposal by lift trucks.



Key: (1) Blast preheater; (2) cupola; (3) forehearth; (4) grinders; (5) sand topping; (6) flask vibrators; (7) pouring hood; (8) shot filling; (9) shell loading; (10) shot return elevator; (11) shot cooling screen; (12) shot blast; (13) cooling hood; (14) shell delivery monorail; (15) casting discharge; (16) shot return; (17) sand receiver; (18) sand blender; (19) shot separating conveyor; (20) casting sorting conveyor; (21) magnetic separation conveyor; (22) shell-moulding turntable; (23) shot storage bin; (24) shot cleaning screen; (25) pneumatic sand conveyors; (26) sand storage bins; (27) sand unloading, and (28) coremaking.

FIG. 1.—*Architect's Layout of the New Shell-moulding Plant of the Lynchburg Foundry Company, showing, in particular, the Arrangements for Sand Distribution and Shot Reclamation.*

Pouring and Cooling

Pouring ladles will be hung from hand-propelled bridge cranes. An automatic synchronizing conveyor for the pouring bridges can be readily installed, but is not considered necessary because of the small ladles (maximum 400 lb.) and slow conveyor speed (5 ft. per min.). At an average of nine shell moulds per min., four pouring stations will be utilized, with one additional for a spare.

A side-exhaust hood will be provided along the pouring area to remove smoke and fumes. Another continuous hood will exhaust the entire cooling run of 250 ft. This will provide over 50 min. of cooling time for the castings in the mould. For some of the heavier section castings, this is required because if they are removed from the moulds while too hot the resultant relatively high cooling rate may bring about an undesirable hardening effect.

Casting Discharge

The Lynchburg system will dispense with normal casting shake-out operation in order not to bruise the fine finish obtained with shell mouldings. Instead, the flasks, weighing 4,000 lb., will be removed from the mould car by a bridge-crane hoist and held over an oscillating conveyor 48 in. wide. Here, an operator will throw a latch of the flask, allowing the bottom door to open on to a support just over the conveyor. As the flask is raised, the bottom will open progressively, allowing first the shot and then the castings to slide gently out on to the conveyor deck. When emptied, the flask will be lowered back on to the support, the door closed, and returned to the mould reel.

The oscillating conveyor will have two decks, the upper one of perforated steel plate, designed so as to expand under the temperature introduced by hot castings. Shot and sand will pass through the perforated plate over the course of a conveying distance of 40 ft. Castings and shell-mould refuse will remain on the upper deck and shot and sand on the lower deck.

Sprues of grey-iron castings will be cracked off on the oscillating conveyor and fed to another oscillator for sorting into tote boxes. Ductile-iron castings will be sorted separately, because their sprues must be sawn off. Oscillating conveyors will be used in order to contain stray shot and sand. Refuse of shell moulds and tramp iron will be fed from the sorting conveyor on to an inclined belt conveyor and over a magnetic pulley where iron and sand will be separated into tote boxes.

Shot Handling

About 125 tons per hr. of shot will be separated from the castings, and must be cooled and cleansed from sand. The shot will be fed from an elevator on to a double-deck vibrating screen. Coarse material will be retained on the upper deck and fine sand passed through the lower deck. Air will be exhausted through the lower screen to ensure removal of all sand and to achieve partial cooling of the shot. Sand will be collected in dust collectors.

From the separating screen, shot will be stored in a 200-ton silo and drawn off as needed to fill the surge bin over the moulding line. Cooling of the shot will be accomplished while it is being conveyed to the surge bin on a series of vibrating screens. Shot will be fed from an elevator on to a series of 6 in. wide by 16 ft. long vibrating screens with heavy-duty stainless-steel screen cloth to resist the abrasion of the shot. Air will be drawn down through the bed of shot on the screen cloth and exhausted to the outside by stacks.

Shot will enter the cooling screens at about 300 deg. F. and be cooled to 150 deg. F. Preliminary experiments indicate that three cooling screens in tandem will be required with a 1 to 2 in. depth bed of shot travelling over the deck. The slope of the screens and consequently the rate of travel and depth of the shot can be readily adjusted as experience dictates. Water-cooling sprays can also be easily added if required.

Sand Reclamation

The fine, carefully graded and dried shell sand required is expensive, and a system to reclaim and permit the re-use of this sand is being actively considered. As the reclamation of resin-bonded sands is still to a considerable extent experimental, this installation has been provided for, but will be postponed.

The foundry believes a sand classification device will be needed with reclaimed sand to eliminate an undesirable accumulation of fines. A device for classifying this sand by air is being developed in their laboratory at the present time. When this air classifier is available, a less-expensive, ungraded sand may be purchased and graded to any desired classification before going into the sand-storage bins. When the sand-reclamation system is installed, both new and reclaimed sand will be run through the classifier.

Casting Cleaning

The entire shell-moulding installation has been designed to produce as wide a range of grey-iron and ductile-iron castings as could be obtained on one mould reel. An efficient cleaning room to match must have a variety of grinders, cut-off saws, shot-blast equipment and perhaps chippers and brushes. As much of this equipment will be specialized to some degree to suit a particular range of castings, it will not be installed until the need for it is determined.

Several double-stand grinders and a 9-ft. multi-table shot-blast will be installed at this time. An area has been set aside for future expansion of the cleaning room. Castings will be handled in the cleaning and shipping rooms entirely by tote boxes and skids, utilizing fork-lift trucks.

Shell-moulded castings will leave the sorting conveyor with practically no sand adhering. Therefore, no blasting will be required prior to cutoff and grinding. Very little grinding will be needed other than at gates and risers because of the fine finish achieved in shell moulding. Castings will be blast cleaned with a very fine shot (No. S-170) or grit (No. G-80) to preserve the natural finish. A covered despatch dock is to be provided to serve railway sidings.

Correspondence

MECHANIZED SHELL MOULDING

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—The article under the above heading which appeared in the September 17 issue of your JOURNAL was of interest inasmuch as it indicated a somewhat novel approach to the problem of mechanization.

The undersigned has had the opportunity of examining several machines in use in this country and is of the opinion that a machine embodying certain of the author's proposals would encounter some considerable troubles. With regard to the inverted dump box, this certainly leads to complications in machine design, but as all current shell-moulding machines contain this feature one surmises that the cure must be consideraby more painful that the complaint. Attempts to force the sand/resin mixture upward against the patternplate will result in pressure variations between the horizontal and vertical faces of the pattern, with the result that voids in the mould are almost certain to occur at vertical faces having appreciable depth.

Vibratory or aerating devices would render the sand/resin mixture more "fluid," but, owing to the differences in specific gravity and fineness of the constituents in the mixture, segregation would take place to a degree dependent upon the violence of agitation. Here, the engineer might enlist the aid of the chemist to produce a resin which wil adhere to the sand and will not separate out when agitated.

The proposal to cure the mould in the inverted position creates conflicting conditions. On the one hand a parting agent is used to facilitate mould removal, and on the other, a certain degree of adhesion would be necessary to maintain contact between the mould and the patternplate. It is difficult to visualize how these differences can be reconciled, particularly as it has been found in practice that on removal from the dump box immediately after investment the uncured "biscuit" tends to peel away from the pattern. Where complete breakaway of the mould could be prevented, the danger of "sagging" would always be present and constitute a fault not readily detectable before casting took place.

The writer of the article is to be congratulated on his reasoned approach and it is to be hoped that his ideas together with this criticism will stimulate thought on the intriguing problem of designing an efficient yet simple and cheap shell-moulding machine.

Yours, etc.,

P. J. BERRY.

52, Victoria Avenue, Hillingdon, Middx.
October 31, 1953.

MASTER PATTERNMAKERS' ASSOCIATION

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—I am instructed by the Management Committee of this Association which was formed in 1942, and draws its members from the area bounded by Birmingham, Wolverhampton and Stafford, to intimate to you that if, so desired, it would be willing to make arrangements for a meeting in the City of Birmingham of patternmaker employers who would wish to attend to discuss the possibility of forming a national organization such as is suggested by several correspondents in reference to your leader of October 22.

It is noted that many of them have proposed that others interested should get into touch with them and

(*Continued at foot of next column*)

my Committee feel that it would lead to an earlier meeting being held if a central focal point could be arranged. It is with this in mind that the services of the association are offered.

Yours, etc.,

G. W. FIRKINS, F.C.A., Secretary.

BWS Master Patternmakers' Association,
12, Cherry Street, Birmingham, 2.

Publications Received

Bulletin and Foundry Abstracts of the British Cast Iron Research Association, September, 1953. Published from Alvechurch, Birmingham.

It was with increased admiration that the reviewer examined these abstracts and concluded that they represented nothing less than the finest available to the foundry industry. It is unquestionably an extremely useful service, and one which, it is feared, is insufficiently appreciated by far too many executives.

Machining Notes on Hiduminium and Magnuminium Alloys. Published by High Duty Alloys, Limited, Slough, Bucks.

This must indeed be a useful booklet for machine-shop managers and foremen, as the speeds and feeds are given for both roughing and finishing of hard and soft aluminium alloys when turned, milled, drilled reamed, and so forth. In the second part of the booklet, the machining of magnesium alloys is covered, though not in such great detail, but, of course, stress is laid on the minimizing of the fire risk. The booklet is available to readers on writing to Slough.

Silester O—Commercial Ethyl Silicate. Technical Service Bulletin No. 1 S/4 with two appendices. Issued by Monsanto Chemicals, Limited, Victoria Station House, London, S.W.1.

Silester O—Silester, by the way, is a registered trade mark—is a polymerized ethyl silicate consisting of tetra ethoxy silane and higher polymers arising from partial hydrolysis and condensation. The silica content of this material is about 40 per cent. This Report deals successively with its method of use, physical properties, applications (which include *inter alia* investment moulds, mould washes, H.F.-furnace linings, permanent ceramic moulds, and destructible precision piece moulds and cores), advantages, hydrolysis of the ethyl silicate, its rate and gelation, formulation of three solutions, properties of hydrolized solutions, equipment, storage and transport, and toxicity. The Report concludes with a list of references to technical literature. The first appendix deals with investment in considerable detail and contains some quite useful suggestions. The second one, "General Foundry Applications", covers in an interesting and useful manner precision cores and piece moulds as used for larger work than is usually undertaken by the mould investment method such as the Shaw method, mould and core washes, and rammed monolithic furnace linings. Details are given of the lining of a 3½ cwt. EFCO, high frequency furnace. This very detailed Report is available to our readers on application to Victoria Station House.

WAGE INCREASES amounting to some £221,000 a week were received by about 926,000 workers during September, according to the Ministry of Labour Gazette.

"Team Work"

Mr. B. Levy's Presidential Address

At the opening meeting of the session of the London branch of the Institute of British Foundrymen, Mr. B. Levy, the new president, was formally inducted to the Chair and then delivered his presidential address, in the course of which he said:—

Having chosen "team work" as the theme for this address, it will be relevant to note how the foundry industry as a whole may be compared to a team, with particular reference to the part played by the Institute. Most industries are sub-divided into various professions and trades, and the foundry industry being no exception, leads to the posing of the question: Wnat precisely is a foundryman? Is he a metallurgist, a moulder, a patternmaker, or an engineer of some kind? Or is he all of these rolled into one, or just one alone? Needless to say, discrimination as to upbringing in a particular calling is likely to lead to quite a wrong answer, for many will know that some very good foundrymen have sprung from ancillary occupations, some rather remote from the foundry proper, yet these have brought with them fresh ideas which in themselves have been of benefit to other and more experienced foundrymen.

Melting and casting of all metals has advanced considerably as a result of the research work of the metallurgists and chemists, not to mention the part these people play in the maintenance of quality in every-day production. The making of moulds has, also, had its full quota of assistance, in the form of machines for sand supply, moulding machines, improved pattern equipment, and much other labour-saving plant. Even the fettler has received his due share of advancement by way of improved cutting-off machinery and dust-eliminating work-benches, and the like.

So, very briefly, has a survey of the making of a casting from the melting of the metal to the trimming of the cast product been made, with the object of drawing attention to the rather considerable number of different trades and professions which, collectively forming a team known in its entirely as a foundry, produce the widest possible variety of articles covered by any industry under the sun!

When difficulties arise or, better, when developments are projected, accomplishment is obviously quickest by the co-operation of a number of specialist tradesmen or professional experts. This entails team work of the highest order, and (to maintain the metaphor) "passing the ball," not "passing the buck"!

How Projects Develop

Dealing with some later developments in this industry, it is probably true to state that shell moulding is a subject presently giving rise to as much discussion in foundry circles as any other topic. Just think for a moment of the important factors outside the foundry which have a marked influence on the success or failure of this method of making moulds. The speaker being a patternmaker, it is proposed to put the pattern equipment first! Next there is the resin manufacturer or chemist (whichever he happens to be), and then the correct kind of sand and the form of heating arrangements for plates and shells. The moulder finally comes into his own when running and risering difficulties are met. But what a strong team do the combined efforts of these people form! It is believed that the future is very bright for foundrymen who will get together in this way and make commercial development a reality in addition to technical practicability.

This Institute is in itself a forum where advances are discussed in all matters germane to the foundry, and it is a personal opinion that every individual in this industry should make it his business to learn as much as possible about the other fellow's job, in order to incorporate into his own work a broader picture with an effort which takes recognition of the other man's difficulties. Nowhere is this more important than in the patternshop, yet at the same time there is room for plenty of such understanding and co-operation in the moulding shop, and particularly in the planning department.

In recent years a wonderful accumulation of new ideas has been introduced into foundry practice, by which term is included everything leading towards the production of a casting. Several new processes of moulding have appeared, in addition to shell moulding, although little has been heard of their development. There is, for example, high-pressure sand moulding, utilizing a pressure as great as 500 lb. per sq. in., which alone calls for greater thought on the part of people making both moulding machines and pattern equipment. Then there are new methods of de-gassing metals, including the use of nitrogen gas and ultrasonics. For final inspection, radioactive isotopes and X-ray apparatus are proving valuable, and it is evident that thoughtful and co-operative application of many of these additions to the foundrymen's armoury can reduce the imponderables, lighten the task of the operators, and produce better products, faster and cheaper.

Elaboration of Small Ideas

Leaving aside these somewhat academic developments for a moment, it is important to stress the value of development of seemingly small ideas. In the patternshop, for example, it is found that, quite apart from all the elaborate and clever machinery employed to-day, the use by the individual of portable electric tools and various little gadgets of a home-made type, forms a very valuable contribution to efficiency. When visiting one of the smartest and cleanest foundries in France a year or two ago, the speaker was impressed by the employment of simple little trip devices and chutes for turning box-parts over, thus reducing moulding machine operators' fatigue, yet making for faster output. These examples

Mr. B. Levy's Presidential Address

are mentioned as indicative of the kind of thing which the not-so-scientific member of this branch can write about, with confidence, in the knowledge that he is making a practical contribution to the great team of foundrymen represented by the Institute.

Present and Future

Industry is at the present time rather less flourishing than in recent years, but this need be no cause for alarm or despondency. On the contrary, it should be the opportunity for enterprising individuals to clean up and reorganize, to rearrange a layout or system hitherto tolerated because there was no time to do otherwise. Now, in fact, is the time for each foundryman to put his house in order, applying in a practical way the newest and most appropriate of the ideas forming the subjects of the Institute's proceedings in recent years, always of course with an eye on general economics.

Looking forward, I foresee foundries of the future serving an ever-increasing section of the whole community—that they will be spotlessly clean places, scientifically planned, well laid out, and operated (possibly) by " white-coated " workers. This dream may not be so fantastic as it sounds, because even though the material used, meaning sand, of course, may in itself be dirty, there is no reason why this dirt should not be under complete control, that is, conveyed in ducting in much the same way as excessive sawdust or chips are taken away from machines in a saw mill; in fact, this could be taken very much further by having the distribution in the first place arranged through piping, so that only the material required for a specific job was drawn off, thus leaving little excess to be cleared by the cleansing plant. This is merely a personal conception of the manner in which a foundry could be made as clean a place as any other factory, always bearing in mind that the busier foundries are the more untidy they tend to grow.

To sum up, it is a personal belief that practical application of the various developments that have arisen in this industry in recent times, plus those which are still undeveloped, will, by good team-work on the part of all concerned, lead the foundry industry towards the peak of good conditions and prosperity.

New Standards Issued

The Monthly Information Sheet issued by the British Standards Institution, British Standards House, 2, Park Street, London, W.1, for October, lists under *New Standards*—1121 B. 1953. Recommended method for the spectrographic analysis of low alloy steels, 5s.; 1728 Pt. 5: 1953 Methods for the analysis of aluminium and aluminium alloys. Part 5. Determination of copper (absorptiometric method), 2s.; 2035:1953 Cast iron flanged pipes and flanged fittings, 6s.; *Revised Standards*—1133 Section 4; 1953 Packaging code. Mechanical aids in package handling, 6s., and 1224; 1953 Electroplated coatings of nickel and chromium, 2s. 6d.

Australian Foundry Convention and Exhibition

The first foundry exhibition ever organized in Australia was opened on September 3 in the lower Ground Hall, Town Hall, Sydney. It was sponsored by the New South Wales Division of the Institute of Australian Foundrymen, and in connection with it, a four-day convention was held and an interesting programme was provided. There were visits to the Foundry Department of Sydney Technical College, McLean Castings, Limited, and Bradfield Kendall, Limited. Six technical papers were presented covering cupola malleable iron; radio-activity in the foundry; spheroidal-graphite cast iron; cupola control instruments; high-duty irons by Mr. Frederick C. Eager—an exchange paper from the Institute of British Foundrymen—Australia Branch, Victoria Division, and shell moulding. This latter was the American Foundrymen's Society Exchange paper. It was written by Mr. J. B. Stazinski, of the [American] General Electric Company and read by Mr. W. A. Gibson, M.I.B.F.

Organization

The exhibition included foundry plant and supplies. At the conclusion of the conference, visitors were given a well-produced souvenir brochure. From it, it is difficult to know just how many exhibitors there were—but the highest stand number noted is 28. In the brochure is a history of the New South Wales Division of the Institute of Australian Foundrymen. Due no doubt to its formation during the war (1942) some four years after the inauguration of what is now the Australia-Melbourne Division of the Institute of British Foundrymen, but little is known in Europe of this body. It appears that during the early years of the last war, the Department of War Organization of Industry set up a special committee to survey the capacity of the foundry industry of New South Wales. Mr. C. E. McLean and Mr. A. Rhydderch—the latter an old (1923) and valued member of the Institute of British Foundrymen—were co-opted. Thereafter steps were taken with the object of forming a technical institute. Thus, on September 2, 1942, a meeting was held at the Chamber of Manufacturers following up an invitation sent to some 31 foundry concerns. Mr. McLean presided and a provisional committee was appointed consisting of Mr. H. S. Cerrutty; Mr. A. Herne; Mr. J. Hyndes; Mr. A. Rhydderch; Mr. A. T. Roberts; Mr. E. N. Squires, with Mr. McLean as honorary secretary. Very quickly a conference was held in Melbourne with the sister organization for the purpose of " developing a constitution covering a federal body." Though the aims and objects were similar and some progress was made, complete agreement could not be reached. It was decided, however, to recommend adoption of the title " Institute of Australian Foundrymen, New South Wales Division, and to model the constitution substantially on the lines of Victorian organization." At the first formal meeting Mr. G. C. Hill was appointed secretary. He still retains that post and operates from Endeavour House, 33, Martin Place, Sydney. Mr. Rhydderch became the first president and Mr. McLean in 1953 was elected the first Fellow of the Association. At its formation there were 37 members of all classes, whilst to-day there are 270, who are presided over by Mr. A. T. Batty. The Association is to be congratulated on its progress and the enlightened direction it has obviously enjoyed since its inception has insured for itself a particularly bright future.

J.I.C. Convention and Banquet

Pig-iron and Foundry Associations' London Meetings

Last Tuesday week, the annual convention of the Joint Iron Council, which comprises the Council of Iron Producers and the Council of Ironfoundry Associations, and their constituent bodies, was held in London at the Café Royal. The morning was chiefly devoted to matters of a general character, but the afternoon session included a most topical discussion on employers' liability assurance, prefaced by a paper on this subject by Mr. A. E. Sansom, general manager of the Iron Trades Employers' Insurance Association, Limited.

After first extensively reviewing the history of employers' liability in respect of factory regulations, Mr. Sansom referred to a tendency on behalf of workmen's representatives to exploit both trivial and serious accidents to the financial detriment of employers—a state of affairs quite contrary to the spirit of factory legislation. He postulated that there was no solution to the problem of accident prevention solely in the increasing stringency of legislation. What was required, he thought, was much more safety education both of management and operatives. He challenged his audience that few could say with sincerity that they had left undone nothing that could reasonably be done to promote safer working conditions. He would also like to see a greater effort made to appeal to the workman himself, for there was no doubt but that carelessness on his part, much of it through ignorance or apathy, was one of the greatest retarding factors to improvement in the foundry accident record. More accident preventive organizations and more works' safety committees were desirable, without their being stimulated only by an increasing number of accidents in the industry.

Annual Banquet

The annual banquet of the Joint Iron Council was held at the Dorchester, Park Lane, London, W.1, in the evening following the Council's convention. The president, Mr. F. Scopes, who is also chairman of the Council of Iron Producers, which, with the Council of Ironfoundry Associations, constitute the J.I.C., received and welcomed the members and a very large number of distinguished guests. The guest of honour was the Rt. Hon. Duncan Sandys, M.P., the Minister of Supply.

The loyal toasts having been honoured, the PRESIDENT proposed "Her Majesty's Government." He said there were two points he wished to make in the presence of the Minister. First, speaking to the representatives of the iron and foundry industries, he emphasized that in all essentials they now had an Act on the Statute Book which gave members what for several years they had said they wanted. It was now up to every one of them, as members of Associations, directors and managers of companies, and as individuals to do everything they could to make Iron and Steel Act work really well. He felt sure that on their behalf he could assure the Minister and his Parliamentary Secretary, and the chairmen and members of the new Iron and Steel Board and the Steel Realization Agency that they would in fact do their best to build up within the framework of the Act an industry which, to paraphrase the words of the Act, "shall be even more efficient and economic under competitive conditions than it has been in the past." He assured the gentlemen he was addressing that they could rely on the industry's wholehearted co-operation.

Secondly, he expressed the gratitude of those in the industry to the Minister for his appreciation and understanding of their particular problems and for his patience with them, and congratulated him personally, and his colleagues in both Houses, on the great skill with which they had piloted that measure through Parliament.

Without being political, the president next turned to the general effect of the financial and economic policy of Her Majesty's Government, which provided the basis and background for the work of the industry, and indeed, of all industry. In spite of any temporary difficulties and setbacks, he felt sure those in the industry would agree that they looked at the present situation with considerable satisfaction, by contrast with the position two years ago, and they looked forward with confidence.

Restoring the Incentives

From the point of view of industry he would say without hesitation that the most important actions of the last two years had been those directed to restoring incentive. By measures financial and in many other ways, such as the gradual removal of control, Her Majesty's Government had shown that they realized the overriding importance of fostering industrial efficiency through the dispersal of responsibility, rather than through Socialist totalitarian planning; and industry thanked them for it.

THE RT. HON. DUNCAN SANDYS, M.P. (Minister of Supply), responding, first thanked the President, on behalf of Her Majesty's Government, most warmly for the courteous and warm manner in which he had been good enough to propose the toast. It was not necessary, he said, for him to stress the increasing importance of ironfounding in Britain's economy. Pig-iron production, including the production of iron for steel making, in 1945 was running at the rate of 7,000,000 tons a year; in 1952 it had increased to 10¾ million tons per year. As for iron castings, at the end of the war founders were making about 2½ million tons a year; in 1952 they had made no less than 3¾ million tons of iron castings, worth no less than £250 millions. That was a great achievement of which the industry could be truly proud.

He was very glad indeed to see, in the last annual report of the Chief Inspector of Factories, a

statement to the effect that in his impartial opinion there had been a further continued improvement in working conditions in ironfounding, a matter of great importance, and he imagined it was a matter for great satisfaction to all engaged in the industry.

In all that, it would be agreed, an important part had been played by the British Cast Iron Research Association. The Government recognized the importance of the part which that Association had to play in our industrial life, and that recognition of its importance did not only consist in fine words, but it took the practical form of contributing 40 per cent. of the revenue of the Association.

He well realized that the Iron and Steel Bill had aroused very deep, sincere and genuine anxieties among ironfounders. These anxieties were most faithfully explained to him from the very outset, even before the Bill was printed, because there were most detailed consultations with all interests concerned before the Bill went to print; they were most faithfully represented to him by Mr. Scopes, Mr. Newman and by other representatives speaking on behalf of the Joint Iron Council. They were also brought home to him at a later date through rather less formal channels. He was glad to take that happy opportunity to congratulate the organizers of the ironfounders' ballot, in that they had achieved 93 per cent. of favourable votes.

Price Control Dropped

In fairness to the Joint Iron Council, he must say that, as the outcome of the discussions, negotiations and agitations, or as the result of the detailed, thoughtful and careful representations made to him by the Council, it was decided to exclude iron castings from the development clauses of the Iron and Steel Bill. Also, except in very special circumstances, it was decided as the result of those representations, to exclude iron castings from the price-control clauses of the Bill. But the Government still possessed to-day the power to control the prices of iron castings, under the Defence Regulations, and they would continue to exercise that power; but not for very much longer. After consulting the Iron and Steel Board he had decided to abolish price control over all castings and forgings. He had signed and presented the necessary Order revoking the price-control Orders; he had presented it to the House of Commons that afternoon and it would take effect next month, after which there would be no longer any Government control of prices of any castings.

SIR HUBERT HOULDSWORTH, Q.C. (Chairman of the National Coal Board), proposing "The Iron Industry," said the coal industry supplied to the foundries a high-grade coke; indeed, he believed the National Coal Board was almost the sole supplier of that particular type of fuel. The iron industry had the first call on a rather rare high-class coking coal, particularly in Durham and South Wales. The iron and coal industries were also engaged together on many research activities, and their combined contribution to the wellbeing of the country would depend in considerable measure on the success of that joint endeavour. Together they must learn more about how to eke out the supplies of the diminishing high-grade coking coals. They must make further studies of blending, to produce a coke which, by development, could be used as effectively as the high-grade coke to which he had referred.

MR. N. P. NEWMAN, J.P. (vice-president of the J.I.C. and chairman of the Council of Ironfoundry Associations), responding, drew attention to points of importance in the relationship between the two industries—as to costs, competition and export generally. Ironfounders, he said, consumed more than 600,000 tons of coal directly in 1952. But coal made a major contribution indirectly through coke, pig-iron, gas and electricity. Direct coke consumption was more than 1,100,000 tons in 1952, and more than 90 per cent. of that was hard coke mainly from the N.C.B. ovens. Nearly half the cost of pig-iron, gas and electricity was basically the cost of coal. The cost of coal and coke directly in the elements of costs of pig-iron, gas and electricity was more than one-eighth of the ironfounding industry's total operating costs, or about a quarter of the total cost of materials and fuel. In addition, transport and many other costs had an appreciable coal element.

For the sake of his colleagues in the industry, Mr. Newman emphasized those figures to show how important it was that the price of coal be stabilized and if possible reduced. Sir Hubert would quite rightly ask what the industry was doing about it. During recent years, by very special research, it had advanced considerably in cupola practice. An operational research team was engaged on visiting iron foundries, its job being, amongst many others, to advise on economy in fuel consumption those ironfounders who wished to have the team's services. It was hoped to expand that service, with the help of the "conditional aid" grant which had been so generously provided by American friends.

Speaking to his engineering friends present, as well as to ironfounders, he impressed upon them the need for the reduction of costs in the industry rather than a mere reduction in prices, which latter, if carried too far, might undermine the stability of the industry and prevent many things being done which ought to be done. To his engineering friends who were enjoying a buyers' market, and were no doubt "making hay while the sun shone," he emphasized that if they thought to force industry to an uneconomical price situation they might well rue the day, and might put many iron foundries out of business.

MR. D. O. SILLARS (chairman of the Cylinder and Refined Iron Association, and a member of the executive committee of the Joint Iron Council) proposed the health of the guests, and handled the attributes of a very extensive list of visitors in an extremely attractive manner.

THE RT. HON. LORD MANCROFT, M.B.E., T.D. (Lord-in-Waiting to Her Majesty the Queen) responded on behalf of the guests and in a very witty speech expressed their thanks for the kindness and hospitality extended to them by their hosts.

Mould-reaction in Aluminium-alloy Castings*

Discussion of the Paper by Marjorie Whitaker B.Sc., A.I.M.

When the Paper "Mould-reaction in Aluminium-alloy Castings" was presented in the absence of the Authoress by Mr. Ruddle† at the fiftieth annual conference of the Institute of British Foundrymen MR. D. C. G. LEES, opening the discussion, said he believed it was the first time that the Institute had received a paper by a woman author. It was a source of disappointment therefore that she had not been able to present it in person. The Paper was of particular interest because he had himself been concerned with some of the earlier work on the same subject. Looking back, he would like to know whether some of the points that had puzzled him at the time had been elucidated subsequently. For instance, although the fact received little prominence in the Paper, he had found that quite effective inhibition of the metal/mould reaction was sometimes obtained when beryllium was added to the metal alone and there was no inhibitor in the sand, but that effect did not seem to be reliable in all cases. Several causes had been put forward at the time. It was thought possible that contamination of some of the beryllium hardener alloy had taken place with carbon and that so affected some of the beryllium that it was not available for stopping the mould-reaction. However, he had done some experiments which threw much doubt on that explanation. He had been unable to pursue the matter further but it would be interesting to know whether subsequent investigations had cast further light on that, or whether the view adopted as a result of several more years of work had been that the only reliable method of suppressing the reaction was by the joint use of beryllium in the alloy and of inhibitors in the moulding sand.

Shell Moulding as Corroborative Evidence?

He had noticed that work done by Mr. Peck showed that the mould-reaction was not prevented by a variety of variations in the mould constitution itself; various core-binders were tried and the sand was baked at various temperatures, and that work might cast some doubt on the suggestion he was about to make, but with the rise of shell moulding it had occurred to him that there would be merit in seeing whether aluminium/magnesium alloys cast in shell moulds suffered from the mould reaction to the same extent. He was aware that there was only too likely to be sufficient water-vapour in the atmosphere within the shell mould to cause the reaction, but, on the other hand, water was not used to make the mould, and further the mould itself was of an extremely permeable nature, so that any steam generated might be able to escape before it did much damage.

Even if it were shown that some useful reduction in the amount of reaction occurred, founders would still have to look out for trouble, because metals solidified more slowly in shell moulds, and it was known, from work already reported to the Institute of Metals, that the tensile properties of the aluminium/10 per cent. magnesium alloy were very much affected by the grain size of the alloy. It would probably be necessary if shell moulding were to be used, to be quite certain that grain of the alloy was sufficiently refined, by additions of titanium, for example.

Relation with Grain Refinement

Along that line of thought, he would be most interested to hear Miss Whitaker's views on another matter. It was pointed out in the Paper that if the metal/mould reaction were successfully inhibited, there was a very marked concentration of porosity at heat centres. It was known that with some other aluminium alloys any concentration of porosity at a heat centre was diminished by grain refinement, and he was led to inquire whether the findings about grain size had been applied to the concentration of porosity when the mould-reaction was inhibited. Had that concentration of porosity in an inhibited alloy been studied when it was also of a thoroughly refined grain structure.

Mr. Ruddle, in reply, said Miss Whitaker would be very grateful for Mr. Lees' remarks. It was quite true that in the early days of that work it had been found that different batches of beryllium or aluminium/beryllium hardener appeared to have different inhibiting powers. He could not say that that mystery had ever been completely solved, but it had been investigated in considerable detail and a number of impurities which might have been affecting inhibition had been checked, but research workers had been unable to find anything, with the exception of sodium, which was found to have a very harmful effect on the reaction. Furthermore, the unreliability of the aluminium/beryllium hardener had disappeared in later work and it was now found that hardeners from various sources gave identical results. The reason for the variations experienced in the earlier work remained undiscovered. It might simply be that founders now had all the factors influencing the reaction under better control than in the early days. Latterly, it had been found that the reaction was affected by several factors which had been thought unimportant earlier.

Beryllium and Inhibitors

With regard to the joint use of beryllium and inhibitors in the sand, the position now was that if a fairly light section was being cast, an addition

* Paper printed in the JOURNAL, August 13, 1953.
† Mr. Ruddle is a colleague of the Authoress on the staff of the British Non-Ferrous Metals Research Association.

of beryllium to the metal gave adequate inhibition and there was no need to make any addition to the sand, but if sections of 2-in. dia. or more were being cast good inhibition could only be obtained by making an addition to the sand as well as adding beryllium to the metal.

Mr. Lees had also enquired what was known about the reaction in castings made by shell-moulding techniques. He could give no answer to this, as the British Non-Ferrous Metals Research Association had not made any experiments with shell moulds. All he could say was that in the United States magnesium castings were made by the shell-moulding method and there it had been found that mould-reaction could be prevented either by incorporating ammonium bifluoride in the sand or by painting the mould with boric-acid slurry. Both of those methods seemed to give quite satisfactory inhibition with magnesium-base alloys. Mention had also been made of the effect of shell moulding on grain size and hence on the tensile properties of the alloy and, although he had no information available, he agreed that it was likely to be an important point. From theoretical reasoning one would expect that there would be some adverse effect, but that remained to be checked by experimental work.

With reference to Mr. Lees' suggestion concerning the concentrations of porosity at the heat centres of castings in which mould-reaction was prevented, Mr. Ruddle said that if a little mould-reaction occurred it often had the effect of somewhat reducing such concentrations of porosity. The combined effects of mould-reaction (or its absence) and grain refinement had not been studied but he agreed it was certainly something which needed doing, and he hoped this point would be cleared up before very long.

MR. WEAVER said that Mr. Lees had mentioned the rate of solidification with shell moulding, and the impression seemed to be general that such castings solidified more slowly than with normal practices. That might be so, but to his knowledge, when casting any metal by shell-moulding techniques, a shell break-through frequently resulted in a very thin shell of metal above the point of break-out, which rather indicated that there was a quick freeze on the surface of the casting even when shell moulded. On using inhibitors, from reading the Paper on shell moulding by Mr. Ames, he gathered that in America inhibitors were used along with P.F.-resin bonded shells, whereas in this country magnesium had been cast quite successfully without the use of inhibitors, and with U.F. resins there was no need for an inhibitor.

MR. RUDDLE, in reply, said the news that inhibitors were not necessary for casting magnesium when the urea-formaldehyde type of resin was used was new and most interesting. With regard to Mr. Weaver's first point about the rate of solidification in shell-moulds, that the fact that a thin shell was found in moulds which had "bled" did not necessarily mean that solidification was faster than in a sand mould. For a proper comparison to be made, it would be necessary to "bleed" shell and sand moulds at equal times after pouring and subsequently to measure the thickness of the metal shells remaining.

MR. J. L. FRANCIS said that if a mould was "bled" it would be found that a shell casting existed inside the mould which showed that the outside of the casting had solidified quickly.

MR. RUDDLE said he doubted very much whether that happened with the type of long-freezing-range alloy, which went very slushy when it started to solidify. It seemed very unlikely.

Influence of Pouring Temperature

DR. D. V. ATTERTON asked whether any work had been done on the influence of pouring temperature on the reaction.

MR. RUDDLE said a few experiments had been carried out which showed that increasing the pouring temperature slightly increased the amount of reaction. The fact that that effect was not large was explained in a Paper by Swain (presented to the Institute of Metals), which described the results of a study of the reaction in a refined "laboratory" apparatus and had shown that the rate of reaction reached the maximum at some temperature between the liquidus and solidus of the alloy—580 deg. C. or thereabouts—so that most of the reaction occurred during solidification. Hence, when a high casting temperature was employed, only a little reaction occurred during cooling down to the liquidus temperature and the total amount of reaction was not greatly affected. It might be that the main effect of a high pouring temperature was that it prolonged the time of solidification; in other words the time at which the metal was at its most reactive temperature.

MR. MILLER asked whether the research workers had at any time experimented with a combination of sulphur and boric acid in relation to the series of aluminium 10 per cent. magnesium alloys, such as L53. When in the U.S.A. some two years ago he had noticed that at least two foundries were adding an inhibitor to their facing sand consisting of approximately 5 per cent. sulphur and 1 per cent. boric acid. The alloy in question had a rather lower magnesium content, of the order of 9 per cent., as was favoured in America. He was informed that the combined inhibitor in question gave perfectly satisfactory results, although in Great Britain it was customary to use "straight" boric acid or sometimes ammonium bifluoride. In fact, sulphur as an inhibitor in relation to aluminium/magnesium alloys was usually frowned upon in this country.

MR. RUDDLE assured Mr. Miller that the matter of inhibition by sulphur had been investigated very carefully and all experiments had led to the conclusion not only that the presence of sulphur did not inhibit the reaction but that it partially destroyed the inhibition provided by other substances. Sulphur should, therefore, never be present in the sand used for making castings in aluminium/magnesium alloys.

THE CHAIRMAN, Mr. John Bell, senior vice-president of the Institute, proposed a vote of thanks to Miss Whitaker for her Paper and to Mr. Ruddle for presenting it and for the ready way in which he had replied to questions. The vote of thanks was carried with acclamation.

WRITTEN COMMENT

MR. A. LOGAN wrote that as this was a unique and historic occasion—it was rather unfortunate that Miss Whitaker should not be able to be present to give the Paper in person.

The Paper lived up to the high standard expected from the B.N.F.M.R.A., and although the conclusions were based on work carried out over past years, and which had already been disclosed to members interested in this problem of mould-reaction, it had not been generally released until now. Members of the B.N.F.M.R.A. were therefore aware of this work and were in a rather difficult position, as many founders have had to make castings in 90/10 aluminium/magnesium alloy, and have had considerable difficulty, and members were not allowed to disclose information to them until released for publication. The remedy, of course, was quite obvious, those in difficulty should become members of the Association.

The publication of this Paper at the present time should go a long way towards improving the knowledge of, therefore aiding the task of, the unfortunate founder who had to produce sound castings in what was undoubtedly a very difficult casting alloy. The final conclusions were quite specific, and if fully carried out should go a long way towards avoiding trouble.

MISS WHITAKER wrote thanking Mr. Logan and other speakers for their good wishes and kind comments about the Paper. She had greatly regretted not being able to present the Paper in person but was very grateful to Mr. Ruddle for deputizing so ably.

Glasgow's Smokeless Zone

The boundaries of a proposed smokeless zone in Glasgow have been approved by a special sub-committee and were submitted recently to the Health Committee of Glasgow Corporation for confirmation. The zone includes the Central Station and, for the most part, commercial premises. Although this district was chosen in preference to a residential area with a great many domestic fireplaces, important considerations arise such as the cost to owners of property who must, where necessary, instal modern appliances.

A survey of the zone, which it is estimated will take three months to complete, will be carried out and considered by the Health Committee, which will then decide on procedure. Special Parliamentary powers will have to be obtained.

RESCUED from a dumping ground in Scotland, the Awatea, an aluminium-alloy lifeboat, was presented last week to the Outward Bound Sea School, Aberdovey (Merioneth), by Lord Burghley, chairman of Birmid Industries, Limited, Smethwick, on behalf of the Group.

Book Review

"Aluminium in Iron and Steel," by Samuel L. Case and Kent R. Van Horn. Published for the Engineering Foundation by Chapman & Hall, Limited, 37, Essex Street, London, W.C.2. Price 68s.

This, the first of a new monograph series of reference textbooks to be published by the Alloys of Iron Committee of the Engineering Foundation, U.S.A., worthily upholds the high standard of the earlier series published before world war II. It is a comprehensive review of the latest information on aluminium in ferrous metallurgy. The book is divided into two parts, namely aluminium as a deoxidizer, and, secondly, as an alloying element in iron and steel. Part one consists of seven chapters, and after dealing with the earlier concept of aluminium as a deoxidizer in steel, it reviews our up-to-date knowledge of the influence of inclusions of aluminium oxides, sulphides and nitrides, and then the influence of small amounts of aluminium on austenitic grain size control, and mechanical properties, such as notch sensitivity, and its effect on ageing. The last chapter in this part of the book discusses the influence of small amounts of aluminium in steel on drawing qualities, hardenability, creep properties, and the stability of iron carbide.

Part two of the book reviews first the binary and the more important ternary systems based on iron and aluminium, then discusses the production and working of commercial alloys in these systems. Separate chapters are devoted to the iron/aluminium base heat-resisting alloys, generally used in the wrought condition, and to the permanent magnet alloys based on iron-aluminium with nickel, cobalt, etc., and which today form the major part of permanent magnet production. These last alloys are used almost exclusively as-cast, and form a special branch of the foundry industry. Subsequent chapters deal with the function of aluminium in nitriding, and the aluminium coating of steel.

The last chapter of the book deals with miscellaneous uses. The first part of this chapter is devoted to aluminium in cast iron, and quotes extensively research work carried out in this field in this country and abroad. This leads to a section on heat-resistant aluminium cast irons, generally containing also some chromium. The main work referred to here was carried out in Germany and Russia, and emphasizes the search for heat-resisting alloy irons to replace more expensive materials involving metals in short supply. Particular reference is made to a Russian heat-resisting cast iron containing 20 to 24 per cent. of aluminium, but it is recorded, as found by workers in this country, that all the aluminium-bearing cast irons present special difficulty in casting. Final sections of the book refer to aluminium in transformer steel, as an alloying element in tool steel, and lastly, as a minor addition in iron-bearing nickel-base high-temperature alloys.

Each chapter carries its own summary. The book is well illustrated, although as emphasized by the authors, some of the illustrations have suffered from being taken from old prints. Apart from a few exceptions, however, the illustrations are good. A comprehensive bibliography of 341 references is included, and the book is well indexed. Although perhaps of limited interest to the practical foundryman, this book is a valuable addition to the literature, and can confidently be recommended to all metallurgists concerned with ferrous metals.

A. B. E.

Notes from the Branches

Tees-side

The first meeting of the session of the Tees-side branch of the Institute of British Foundrymen was held on October 9, in the lecture room of the Apprentice School of Head Wrightson & Company, Limited. The lecturer was Mr. R. Hillier, H.M. Inspector of Factories, Middlesbrough and his subject was the "Iron & Steel Foundries Regulations, 1953." Mr. Hillier, who has a wide experience of Tees-side foundries, explained the outstanding points of the new Regulations in detail. Most of those present realized that these new rules would bring alterations in the present systems, but many of them, possibly, had not reckoned on such sweeping changes. The lecturer gave a clear exposition of all the details and provided good slides to illustrate the major points. Most readers of this JOURNAL will have read the series of articles recently published on this subject—and most of the points contained therein were covered. After the lecture, there was a long session of questions which Mr. Hillier dealt with very capably.

On October 30 the branch held its annual social evening and among those who attended were Mr. E. Longden, the national president, and Mrs. Longden, Mr. T. Makemson, the national secretary, Mr. Gordon Brand, the branch president, and Mrs. Brand. The function was most enjoyable and the national president said in his short speech how delighted he was to meet so many old friends, like Mr. J. K. Smithson, and Mr. J. E. Mercer. Many past presidents were there and all agreed how excellent a function it was—particular tribute being paid to the organizer, the branch secretary, Mr. Frank Shepherd.

West Wales Section

At a dinner given by members of the Institute of British Foundrymen, West Wales section, at the Castle Hotel, Neath, on October 30. Mr. Raymond Jones, production control manager of Richard Thomas & Baldwins' works, Landore, was presented with the Institute's Diploma by Mr. G. MacKinlay, president of the Wales and Monmouthshire branch of the Institute. The Diploma was presented for Mr. Jones' paper given at the 1952 Buxton Conference, on "Production of Ingot moulds by Impeller Ramming in a Mechanized Foundry."

Mr. MacKinlay praised "the great and valuable work" done by Mr. Jones in the Institute. In his response, Mr. Jones stated that it had been a pleasure to him to submit this particular paper on a matter which was of great economic importance in the industry, but he felt that he had only achieved this objective by the valuable assistance afforded him by Mr. Cedric T. Thomas and by Mr. Gwilym Rees, the Group manager at Landore.

Mr. Cedric T. Thomas, of Richard Thomas & Baldwins, proposed the toast of the Institute and said that such a paper as that presented by Mr. Jones was a substantial contribution to foundry practice generally. He also warned members that the foundry industry to-day had great competition from fabricated components and that founders would therefore have to redouble their efforts in the future to secure technical advancement.

Others present at the dinner included Mr. Donald H. Davies, the new general manager of Richard Thomas & Baldwins, West Wales section, and Mr. D. Leslie Blewett, J.P., president of the Swansea and District Metallurgical Society and steel works manager with the same firm. The response on behalf of the Institute was made by Mr. R. B. Templeton.

South African Industry

Industrial output in South Africa in 1952 was valued at £1,000,000,000 compared with £112,000,000 in 1930, according to Mr. F. J. Dutoit, chairman of the Natural Resources Development Council. In an address to the Steel and Engineering Industries' Federation of South Africa, he said that the value of South African materials used by secondary industry increased nine-fold during the same period, the latest figure being in excess of £250,000,000, and constituted nearly three-fifths of all materials used by industry.

Two-thirds of the steel used in the Union was locally manufactured. An ever-increasing output of iron and steel was required and today this approximated to a production of 2,000,000 tons of semis or 2,700,000 ingot tons. Mr. Dutoit was not, however, happy about the position of future coking coal supplies to the Union's metal industries. Conditions of wasteful exploitation of the country's coking coal resources still existed and the situation called for drastic and positive conservation action without further delay.

United Steel's Research Fellowship

The United Steel Companies, Limited, announce that they have established a research fellowship in metallurgy tenable in the Department of Metallurgy, University of Sheffield. The fellowship will be awarded by the Senate of the University. The normal period of tenure will be five years and the holder will be appointed initially for two years and then annually; remuneration will be a minimum of £750 for the first year, rising by annual increments of £50. Arrangements for appointing the fellow are in hand, and the post is to be advertised.

The United Steel Companies state that they are establishing the fellowship since they believe that more research of a fundamental kind into metallurgical problems will be the better for all concerned in the industry.

Changes of Name

Among the companies which have lately assumed new titles are the following, the new names being given in parentheses:—

CARTER & MURDOCH, LIMITED, 62, West Street, Dorking (Dorking Foundry, Limited).

ADAM AUTOMATIC CAMS & TOOLS, LIMITED, 30, Craven Street, London, W.C.2 (Moser Cams & Tools, Limited).

PEASE & PARTNERS TEES FOUNDRIES, LIMITED, 20/26, Northgate, Darlington (Tees Foundries, Limited).

NEW GARTER FOUNDRY (1926), LIMITED, Groveland Foundry, Tipton, Staffs (New Garter Foundry, Limited).

PUDSEY WELDING COMPANY, LIMITED, Carlisle Road, Pudsey, Leeds (Engineering Products (Pudsey), Limited).

PEASE & PARTNERS NORMANBY IRON WORKS, LIMITED, 20/26, Northgate, Darlington (Normanby Iron Works Company, Limited).

SANT STURGESS, LIMITED, workers in stainless steel, etc., 9/11, Standard Road, Park Royal, London, N.W.10 (Sant Sturgess Industries, Limited).

NORMAN BEATTIE (SALES), LIMITED, manufacturers of metal crates, etc., Castleton Works, Trows Lane, Castleton, Rochdale (T.N.R. Engineering (Crates), Limited).

A TALK on the history and evolution of springs was given by Mr. C. Harris, technical manager of Geo. Salter & Company, Limited, West Bromwich, and Mr. R. L. Eccleston (publicity manager), to members of Grantham Engineering Society at the Aveling Barford works canteen, Grantham, on November 3. A film, "The Weigh of the World," was also shown.

High-temperature Melting and Pouring of Grey-iron Castings*

By Dr. I. Iitaka and K. Sekiguchi

Introduction

One of the authors noticed when he visited America that both grey-iron and malleable-iron castings are melted and poured, in that country, at temperatures above 1,500 deg. C. In Japan, these castings are usually melted and poured at temperatures near 1,400 deg. C. High temperature operation (1) necessitates more fuel and (2) good coke; (3) erodes the lining more seriously; (4) hot-blast or dry-air cupolas may in some cases be needed; and (5) severe sand vitrification on the castings may occur. There are many such drawbacks in high-temperature operation. What are, then, the merits of it? The present authors seek to answer this question.

According to Heine's paper†, it may be reasonable to put a border line at 1,466 deg. C. and call the process of melting and pouring at temperatures above this a high-temperature operation. This is the temperature at which the chemical reaction $SiO_2+2C \rightleftharpoons Si+2CO$ reaches equilibrium.

At temperatures above this, the reaction proceeds to the right, that is, SiO_2 is reduced by C increasing the percentage of Si in the molten cast iron.

Experimental Work

In the experiments carried out below 1,350 deg. C. the routine molten iron tapped from a cupola of a foundry was poured as test castings into sand moulds. In the experiments above 1,350 deg. C., the same iron was teemed into a graphite crucible in a kryptol furnace, heated up to the desired temperatures, and poured into the similar moulds. The size of the test castings is shown in Fig. 1, each weighing about 800 gm. The castings were machined into test cylinders 4.0 mm. thick, as shown in Fig 2, and these cylinders were tested with water pressures of 10 to 80 kg per sq. cm. Rockwell hardness was measured on the pieces cut from the gates at ¾ way down from their tops. Outer shrinkage was always observed at the top of the central thick part of the test castings. The amounts of shrinkages were estimated by weighing masses of clay, which were first applied to the shrinkage hollows, smoothed by hand and then detached. Five test castings (and cylinders) were prepared for each temperature and their mean value under the water-pressure test was adopted in the results recorded.

* Report from the Casting Research Laboratory, Wasida University, Tokyo, Japan, and published in their Report No. 4.
† R. W. Heine: Preprint, American Foundrymen's Society (1951).

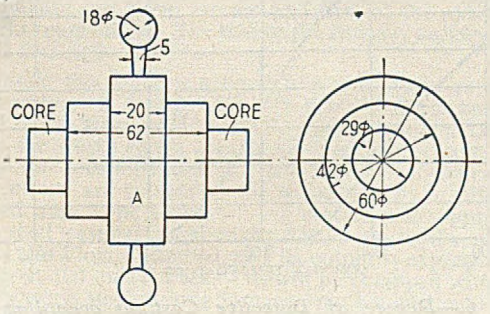


FIG. 1.—*Pattern for the Test Casting.*

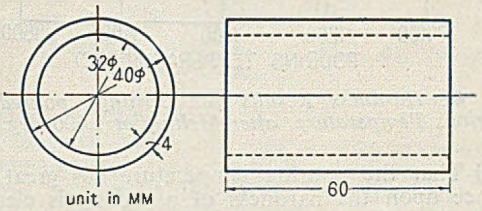


FIG. 2.—*Drawing of the Test Casting.*

Results

Hardness.—Figs. 3 and 4 show the relation between hardness and pouring temperature. In Fig. 3, the pouring temperatures are the same as the melting temperatures, that is, molten iron was poured at the melting temperatures. The region between two dotted lines shows the fluctuating range of the measured values of hardness. In Fig. 4, molten iron was once heated up to 1,600 deg. C. and poured after cooling to the respective temperatures. From these figures one can conclude as follows:—

(1) In comparing Fig 3 with Fig. 4, it is found that the hardnesses corresponding to the same temperatures in both figures are always nearly equal, therefore the melting temperature or the highest temperature reached in melting seems to have no influence upon the hardness of a casting.

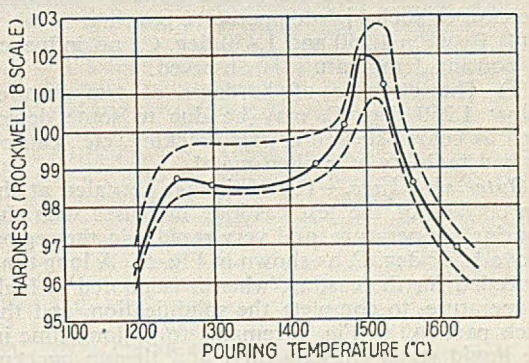


FIG. 3.—*Hardness of Castings poured at Temperatures of Melting.*

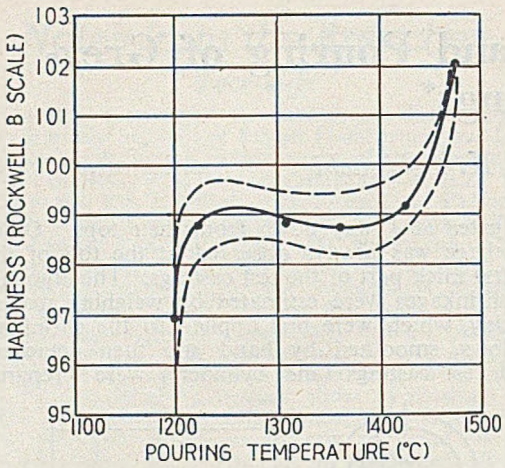


FIG. 4.—*Hardness Results for Castings poured at Various Temperatures after Melting at* 1,600 *deg. C.*

(2) That the pouring temperature has great influence upon the hardness of a casting is clearly shown in both figures.

(3) The hardness reaches a maximum at the pouring temperature of about 1,500 deg. C., and decreases considerably at higher temperatures. The microstructures of the castings poured at temperatures between 1,450 deg. C. and 1,550 deg. C., in Fig. 3, contained Fe_3C network, which was observed in no castings poured at higher temperatures. Therefore the great hardness of the casting poured near 1,500 deg. C. may be attributed to the Fe_3C in the structure; the appearance of Fe_3C may, in turn, be attributed to super-cooling caused by decrease of graphite nuclei and increase of oxides at these temperatures.

The decrease of hardness at temperatures above 1,550 deg. C. may be due to the increase of percentage of Si in the melt and the evolution of much CO gas by the chemical reaction (cited earlier) which reaction proceeds to the right at temperatures above 1,466 deg. C. Both CO and Si are known to accelerate the graphitization phenomenon. Furthermore, the castings may also become soft due to very slow solidification caused by the high temperature of the mould reached in the case of such high-temperature pouring.

(4) Between 1,250 and 1,450 deg. C., no influence of pouring temperature is observed.

(5) The decrease of hardness at temperatures below 1,250 deg. C. may be due to some defect such as coarse structure, hair cracking, etc., caused by bad mobility of molten metal.

Outer shrinkage.—The shrinkage revealed at the top surface of the test castings increases with the pouring temperature, and very rapidly in the region above 1,550 deg. C. as shown in Fig. 5. A long time is needed for the casting, when it is poured at high temperature, to complete the solidification, and the thick part (A) in Fig. 1 remains for a long time in the liquid state, consequently, and therein concentrates the total shrinkage of very large magnitude. At temperatures above 1,550 deg. C., heavy bubbling

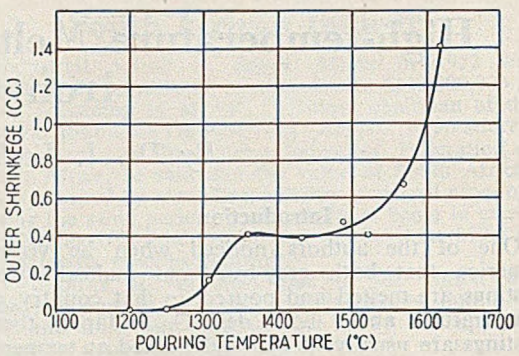


FIG. 5.—*Relation between External Shrinkage and Pouring Temperature.*

of CO gas occurs, as pointed out before and prevents skin formation on the liquid surface so that the shrinkage can concentrate there giving a big external shrink.

When the outer shrinkage is large, there must be little shrinkage in the interior of the casting, resulting naturally in very good resistance to the water-pressure test. As the outer shrinkage is small in the castings poured at low temperatures, a large amount of shrinkage must remain in the interior of the castings and give poor results in the water-pressure test.

Water-pressure test.—The results of water-pressure test are given in Figs. 6, 7 and 8. Water leaks occurred always at the central part of the test cylinders, where they were very thick before machining. Fig. 6 shows the relation between the pouring temperatures and the defectives. Curve I is the case in which castings were made by pouring at melting temperatures. (Pouring temperatures = melting temperatures.) Curve II is the case in which molten iron melted at 1,600 deg. C. was poured after cooling to the respective temperatures. In Fig. 7, the test cylinders are classified into two groups, curve I shows the results for those cylinders poured at temperatures above 1,450 deg. C. and curve II is from the results for temperatures below 1,450 deg. C.

(1) The degree of defectives under water test

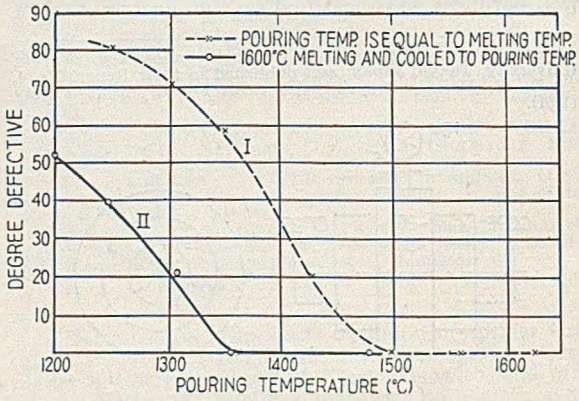


FIG. 6.—*Degree of Defective Castings according to Melting and Pouring Temperature.*

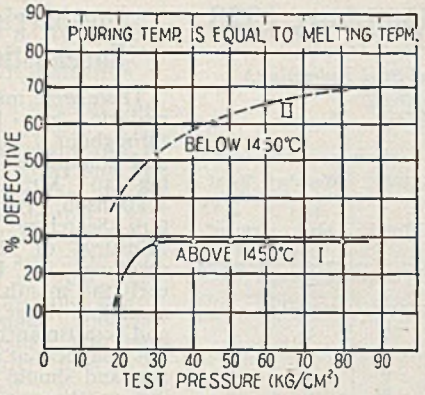


FIG. 7.—*Percentage Defective by Pressure Test according to Pouring Temperature.*

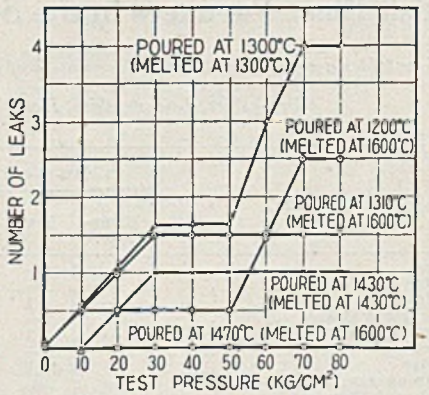


FIG. 8.—*Relation between Test Pressure and Number of "Leakers."*

decreases rapidly with increase in pouring temperature, becoming nearly zero at temperatures above 1,490 deg. C. in curve I and at above 1,360 deg. C. in curve II. This is the most important outcome of the research. Castings poured at higher temperatures show large outer shrinkage (Fig. 5). When large outer shrinkage is produced the inner shrinkage must be small, and the number of sub-microscopic cracks may be few in the interior of the material, probably not interconnected, so that leaks will not occur in these specimens under the water-pressure test. Iron melted at higher temperatures contains little dry slag, which, if present, will very often contaminate the castings, causing leaks under water test. (2) The cylinders once melted at 1,600 deg. C. (curve II in Fig. 6) showed the better result at every pouring temperature. This fact may be attributed to the small quantities both of dry slag on the surface of molten iron and of gas evolution on solidification in that case.

(3) As shown in Fig. 7, the cylinders poured at temperatures above 1,450 deg. C. resist better the water-pressure test. In the case of cylinders poured at temperatures below 1,450 deg. C., the number of leaks increased with test pressure, but, in those poured at high temperatures, the number of leaks did not increase beyond the pressure of 30 kg. per sq. cm. This fact may be explained by the following:—There existed no cracks (sub-microscopic) smaller than a certain size in the cylinders poured at higher temperatures, but small cracks of various size existed in those poured at lower temperatures. Or a second explanation may be true. Leaks under 30 kg. per sq. cm. pressure might have been due to the cracks which had some connection with the outer shrinkage, and such cracks existed in both groups (I, II). The cracks which did not connect with the outer shrinkage existed only in the cylinders poured at lower temperatures (II), and these cracks were responsible for water leaks at higher pressures above 30 kg. per sq. cm. Two kinds of cracks may also be envisaged from Fig. 8.

Stewarts and Lloyds' Foundry Extension

Part of the £1,200,000 extension scheme now going on at the works of Stewarts and Lloyds, Limited, Tollcross Works, Glasgow, will include sprays, foot baths, and heated clothes lockers for the employees. The extension, which is well advanced, is the biggest development that has taken place at the works for many years. Four new buildings are being erected and part of the existing works reorganized. The cost of the foundry building alone is £260,000.

Alongside the foundry a combined amenities centre and laboratory is being built. A large canteen and medical block, which will contain dressing accommodation for the works sports organization, is nearing completion. The fourth building is a new office block. When the extensions are completed the works will be a self-contained unit. The foundry being erected will supply all the steel castings required by the many works of Stewarts and Lloyds, Limited, and its output is expected to be about 100 tons a week. It will be equipped with modern electric steel-melting furnaces, mechanized sand-handling plant, and an extensive dust-collecting system. All floors will be of concrete.

Building Exhibition Exhibits

Allied Ironfounders are staging a most original display this year at the Building Trades Exhibition at Olympia, which opens on November 18 and closes on December 2. On Stand 636/637, Empire Hall, 1st floor, a little bit of Alliance Street, Stockton-on-Tees, will come to London. Here will be seen a replica of a section of one of the houses that formed part of the now famous Stockton Test.* Rebuilt on the stand is a primitive kitchen/living room and, side by side, a section of a similar house *after* improvements had been carried out by Allied Ironfounders with the aid of a Local Authority grant. In the improved house a modern combination grate has replaced the old range, the inconvenient scullery has been pulled down and a new scullery, bathroom and indoor w.c. have been built in the back yard. The scullery has been fitted with a modern cast-iron sink, a ventilated food cupboard and a gas cooker. On the Aga Heat stand (A5/6), at the exhibition, it will be proved that, on a suitable system, the 25/40 Agamatic boiler can produce over a period of seven days 600 gall. of hot water from less than 1 cwt. of coke.

* Described in the JOURNAL, September 3.

British Blast Furnaces in the September Quarter, 1953

(These tables are published through the courtesy of the British Iron and Steel Federation.)

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of the third quarter, 1953.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Clay Cross	—	—	1	—	1	1	2
Ford Motor	—	—	1	—	1	1	1
Holwell Iron	—	1	2	—	3	3	4
Kettering Iron & Coal	—	—	2	—	2	2	2
New Cransley Iron & Steel	—	1	—	—	1	1	2
Renishaw Iron	—	—	2	—	2	2	2
Sheepbridge	—	1	1	—	2	2	2
Stanton Ironworks: Stanton-by-Dale	—	—	5	—	5	5	5
Staveley Iron & Chemical	—	—	4	—	4	4	4
Stewarts and Lloyds: Corby	—	3	—	—	3	3.5	4
Wellingboro' Iron	—	2	—	—	2	2	3
TOTAL	—	8	18	—	26	26.5	31

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Brymbo Steel	—	1	—	—	1	1	1
Darwen & Mostyn	—	—	—	1	1	1	1
Lancashire Steel Corp'n.	—	2	—	1	3	3	3
Summers, J.	—	1	—	—	1	1	1
TOTAL	—	4	—	2	6	6	6

North-West Coast.

Barrow Ironworks	2	—	—	—	2	2	4
Charcoal Iron	—	—	1	—	1	1	1
Millom & Askam	2	—	—	—	2	2	3
United Steel: Workington	2	—	—	1	3	3	3
TOTAL	6	—	1	1	8	8	11

Lincolnshire.

Appleby-Frodingham	—	6	—	—	6	6.6	6
Lysaght's Scunthorpe Works	—	4	—	—	4	4	5
Thomas, R., & Baldwins: Redbourn	—	2	—	—	2	2	3
TOTAL	—	12	—	—	12	12.6	14

North-East Coast.

Cargo Fleet Iron	—	2	—	—	2	2	3
Consett Iron	—	2	—	—	2	2	3
Dorman, Long: Acklam	—	3	—	—	3	3	4
Redcar	—	2	—	—	2	2	2
Cleveland	—	2	—	—	2	2	4
Bessemer	—	3	—	—	3	3	3
South Bank	—	—	—	2	2	2	3
Gjers, Mills & Co.	2	—	—	—	2	2	5
Pease & Partners Normanby Ironworks	2	—	—	—	2	2	3
Skinningrove Iron	—	2	—	—	2	2	3
South Durham Steel & Iron	—	2	—	—	2	2	2
TOTAL	4	18	—	2	24	24	35

Scotland.

Bairds & Scottish Steel: Gartsherrie	1	1	1	—	3	3	5
Carron	—	—	1	—	1	1	4
Colvilles	—	3	—	—	3	3	3
Dixon's	—	1	1	—	2	2	6
TOTAL	1	5	3	—	9	9	18

South Wales and Monmouthshire.

Briton Ferry Works	1	—	—	—	1	1	1
Guest Keen Baldwins: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	2	—	—	2	2	2
Steel Company of Wales: Margam	—	2	—	—	2	1.6	3
TOTAL	2	6	—	—	8	7.6	10

Age-barriers Unrealistic?

There were many unrealistic age-barriers throughout industry and commerce, according to Mr. Harold Watkinson, Parliamentary Secretary to the Ministry of Labour, speaking in London early this month. Technical knowledge, skills, and craftsmanship did not disappear at a stated age, and should not be lost to the nation because of traditional attitudes. About 100,000 men and 40,000 women over 40 were now registered for employment at local offices of the Ministry. Of these some 22,000 men and 11,000 women were being found work each month, of which about 10,000 men and 4,000 women were over 50.

Industrial Health Improved

Since the principles of occupational hygiene embodied in the Factories Act have been in practice there has been a positive improvement in the health of the worker. For instance, there has been a substantial decrease in lead poisoning, from which 38 people died out of the 1,058 cases notified in 1900, while in 1952 there were only 48 cases, none of which was fatal.

Dr. Thomas Bedford, director of the Medical Research Council's unit for the study of occupational hygiene, has referred to a serious lack in the arrangements for education in industrial hygiene in this country. While there were university departments which provided for a post-graduate medical diploma in industrial hygiene, there was no university offering a full course of instruction for non-medical people.

Lloyd's Returns for September

Lloyd's Register shipbuilding returns relating to merchant ships of 100 tons gross and upwards, for the quarter ended September, 1953, show that in Great Britain and Northern Ireland at that date, steamships and motorships under construction totalled 316 ships of 2,190,329 tons gross, compared with 317 ships of 2,123.565 tons in the previous quarter. It includes 139 steamers of 1,151,599 tons and 177 motorships of 1,038,730 tons. In the remainder of the Commonwealth, 32 ships of 176,757 tons were under construction compared with 32 ships of 164,447 tons in the June quarter, these vessels including 19 steamers of 128,957 tons and 13 motorships of 47,600 tons. Oil tankers of 1,000 tons and upwards building in Great Britain and Northern Ireland totalled 104 ships of 1,178,526 tons, compared with 110 ships of 1,212,052 tons in the June quarter and representing 53.8 per cent. of the total tonnage building in this country. World figures of ships being built totalled 344 steamers of 3,032,675 tons and 750 motorships of 2,957,435 tons, making a total of 1,103 ships of 5,991,429 tons (including a few wooden vessels), compared with 1,152 ships of 6,037,432 tons in the June quarter. Ships under construction in the principal districts of Great Britain and Northern Ireland are shown in Table I.

The sizes of steamships and motorships under construction in Great Britain and Northern Irleand included the following:—Under 1,000 tons, 31 steam (motor 45); 1,000 to 2,000 tons, 6 steam (21); 2,000 to 4,000 tons, 17 steam (6); 4,000 to 6,000 tons, 9 steam (19); 6,000 to 8,000 tons, 11 steam (26); 8,000 to 10,000 tons, 18 steam (9); 10,000 to 15,000 tons, 21 steam (47); 15,000 to 20,000 tons, 10 steam (3); 20,000 to 25,000 tons, 13 steam (1); 25,000 to 30,000 tons, 3 steam (nil).

Steamships and motorships under construction abroad at the end of September totalled 787 ships of 3,801,100 tons, a decrease of 112,767 tons as compared with the figures published for June last. As was the case last quarter, figures are not available for China, Poland and Russia. Oil tankers under construction totalled 194 ships of 2,210,589 tons, which is 2,409 tons more than in June last, and represents 58.2 per cent. compared with 56.4 per cent. of the total tonnage being built abroad. They include 24 of 380,874 tons under construction in the United States of America; 29 of 343,265 tons in Germany; 26 of 317,692 tons in Italy; 17 of 252,224 tons in France; 20 of 225,830 tons in Sweden; 20 of 211,580 tons in the Netherlands; and 14 of 125,910 tons in Japan.

TABLE I.—*Ships Under Construction in Principal Districts of Great Britain and Northern Ireland.*

District.	September 30, 1953.		June 30, 1953.		September 30, 1952.	
	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
Aberdeen	14	26,631	14	26,761	20	31,471
Barrow	5	107,130	4	85,340	4	74,389
Belfast	16	187,310	16	188,400	22	228,900
Bristol	5	3,842	4	2,050	6	2,330
Glasgow	84	562,227	79	534,107	76	504,972
Greenock	29	199,020	31	204,860	31	229,897
Dundee	7	45,510	7	49,010	7	52,160
Hartlepool	8	48,305	9	51,750	9	46,530
Hull	23	12,705	25	15,032	39	14,449
Leith	14	41,805	11	37,420	14	36,707
Liverpool	14	142,360	16	141,441	15	105,330
Middlesbrough	17	208,676	16	183,030	15	161,166
Newcastle-upon-Tyne	42	393,130	42	390,555	39	360,363
Southampton	6	6,824	9	7,764	9	8,138
Sunderland	29	203,255	28	198,120	30	203,348

British Blast Furnaces in the September Quarter, 1953—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of the third quarter, 1953.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	0.9	2
Lilleshall	—	—	1	—	1	1	2
Round Oak Steel Works	—	—	1	—	1	1	2
Shelton Iron, Steel & Coal	—	3	—	—	3	3	3
Stewarts and Lloyds: Bilston	—	3	—	—	3	3	3
TOTAL	—	6	3	—	9	8.9	12
Sheffield.							
Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	13	61	25	5	104	104.6	139

Weekly Average Number of Furnaces in Blast during the September Quarter, 1953, and the Previous Four Quarters

District.	1952.		1953.		
	Sept.	Dec.	March.	June.	Sept.
Derby, Leics., Notts., Northants, and Essex	25.8	24.8	27.0	26.8	26.5
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	4	4.5	5.4	6	6
Lincolnshire	13.4	13.4	13	13	12.6
North-East Coast	25	25.2	24.8	24	24
Scotland	9	9	9	8.5	9
Staffs., Shrops., Worcs., and Warwicks.	8	8	8.1	7.8	8.9
S. Wales and Monmouth	9	8.8	9	8.4	7.6
Sheffield	2	2	2	2	2
North-West Coast	8	8	7.15	6.6	8
TOTAL	104.2	103.7	105.45	103.1	104.6

The following companies have furnaces in course of construction or rebuilding:—Darwen & Mostyn Iron R. Thomas & Baldwins (Ebbw Vale); John Summers: Appleby-Frodingham Steel Co. (2): Stewarts and Lloyds (Bilston).

WICKMAN, LIMITED, announce the opening of a London branch factory and offices at Oxgate Lane, Cricklewood, N.W.2. The Company's London area office previously at Stratton Street has been transferred to the new address, where is also now located the firm's London export department. A showroom is being installed in the new premises where machines of the company's manufacture will be displayed, together with many machines of British and Continental manufacture for which the company are selling agents.

Apprenticeship in Vitreous Enamelling

A national apprenticeship scheme for the vitreous-enamelling industry, briefly announced in a recent issue of the JOURNAL, has now been formulated on more advanced lines. This has been undertaken by a committee, the personnel of which is Mr. J. W. G. Pedder, chairman; Mr. L. E. Malec, Mr. W. Thomas, Mr. J. K. Whitaker, and Mr. P. Hilder (assessor, Central Youth Employment Executive), with Mr. C. Hardeman Smith as secretary. The latter's address is 96, Hagley Road, Edgbaston, Birmingham.

The general arrangements made provide for:—

(1) *Recruitment*: From normal school-leaving age.

(2) *Age of entry*: Usually 15 to 16 years, but older entrants may be accepted.

(3) *Probationary period*: Normally of three months; which shall count as part of the apprenticeship period.

(4) *Length of apprenticeship*: Four years. A reduction of this period may be allowed to boys who have remained at school beyond the normal school-leaving age. In this connection due regard will be paid to the educational standard attained.

A booklet on the scheme has been prepared which contains an indenture form, and copies are available on writing to the secretary at the address quoted.

Import Liberalization

The Chancellor of the Exchequer has informed the Ministerial Council of the Organization for European Economic Co-operation that the British Government has decided to introduce before the end of this year further measures of import liberalization. These new measures will enable the U.K. to comply with the general obligation of all member countries of the O.E.E.C. to free from quantitative restriction 75 per cent. of their imports on private account from other member countries. This step has been taken in view of the importance attached by the British Government to maintaining intra-European trade at the highest possible level. Details of the proposed new measures will be announced shortly, together with other particulars of the arrangements for imports from member countries during the first half of 1954.

In addition, from November 1, the travel allowance has been raised from £40 to £50 and, at the same time, the special travel arrangements for Scandinavian countries suspended in 1952 have been restored.

Electrical Exports Lower?

A fall of between 5 and 2 per cent. in exports of electrical goods this year from last year's total of £220,000,000 is forecast by Mr. D. Maxwell Buist, export director of the British Electrical and Allied Manufacturers' Association. Exports in the first half of this year totalled £107,000,000, compared with £114,500,000 in the first half of 1952.

There was a slight fall in exports of capital goods such as generating sets in the first half of this year compared with 1952, the figures being £31,200,000 and £30,400,000 respectively. Orders booked for generating plant during the first nine months of this year, representing deliveries of three years' hence, amount to only 70-m.w. capacity, compared with deliveries totalling 1,000 m.w. last year.

New Catalogues

Synthetic Resins. Available at the Plastics Exhibition, from the stand of Imperial Chemical Industries, Limited (Plastics Division), Welwyn Garden City, Herts, was a nicely-illustrated brochure covering the subjects of resins for core-bonding and the shell-moulding process. Both subjects are dealt with in an interesting and informative manner.

Colloidal Graphite in Oil. Colloidal Graphite, Limited, 6 and 7, St. Dunstan's Lane, London, E.C.3, have sent us an advance copy of a catalogue. Whilst most of the matter deals with machinery lubrication, there is one paragraph devoted to the use of graphited oil in metal forming and a second one on its use as a mould coating—especially in die-casting work.

Conveyors. A four-page leaflet received from Geo. W. King, Limited, Stevenage, illustrates and describes the provision of parts duly machined and drilled, from which the user can construct his own handling systems much after the style of "Meccano" toys. This must obviously make for considerable economies and readers can have a copy of this leaflet by writing to Stevenage.

Synthetic Resins for Shell Moulding. The particular brand of phenolic resin covered in a booklet issued by Leicester, Lovell and Company, Limited, North Baddesley, Southampton, is known as Thor. The book contains an elementary description of the shell-moulding process, but here and there are useful tips and reminders. Temperatures are given in deg. F., which is a pity, as the Foundry Equipment and Supplies Association have standardized on the centigrade scale. This interesting booklet is available to readers on writing to Southampton.

Dust Collection and Removal. Brochure No. 532, received from the Visco Engineering Company, Limited, of Stafford Road, Croydon, covers, in Section I, dust-collection problems in general, showing applications of the plant to various industries, including the foundry. The second section deals with the removal of fumes, and here the subject of collecting the fumes arising from an electric melting furnace are dealt with. These fumes are not poisonous, but they are a nuisance, because they foul the whole shop with grime. This 40-page catalogue is well illustrated and nicely presented. It is available to readers on application to Croydon.

Protection Equipment. The issue of a catalogue covering the provision of goggles, respirators, screens and shields, aprons and gloves by T. W. Ward, Limited, Albion Works, Sheffield, is particularly well timed, because most foundry executives are at the moment thinking around the new regulations covering safety and welfare in iron and steel foundries. Such individuals will appreciate this spiral-bound, well-illustrated, 36-page catalogue. There is an interesting model of a goggle shown on page 5, which allows the lenses to be hinged, and so capable of being lifted away from the eyes. There are listed no fewer than 56 contraptions for eye-protection, yet curiously enough there does not seem to be one suitable for steel furnace operation, where the old-fashioned oval shape is still an essential. Numerous models of respirators and gloves are shown, together with a few examples of other types of protective equipment. The catalogue is available to readers on writing to Albion Works.

Personal

MR. H. E. GORICK, president of the Chartered Institute of Secretaries, was entertained by the Birmingham and district branch of the Institute at a dinner given in his honour on October 30.

MR. SAMUEL J. HAMILTON and MR. FRANK MCNAUGHTON, both foremen, have retired, each after about 40 years' service and have received presentations from their employers, Hurst Nelson & Company, Limited, Motherwell.

MR. SAM DOWNING has been presented with a cheque on his retirement after 52 years' service with the Metals Division of Imperial Chemical Industries, Limited. He started work at 13 and for many years has been a chargehand at the Allen Everitt works.

MR. W. A. BAKER, research manager of the British Non-Ferrous Metals Research Association, has been awarded the D.SC. degree of London University (Faculty of Engineering) for his published work on melting and casting, deoxidation, soldering, and other subjects.

MR. A. ROBERTSON has been appointed general manager of Alley & MacLellan, Limited, engineers and ironfounders, etc., of Glasgow. He succeeds MR. J. R. WILSON, who is retiring from the position of managing director. Mr. Wilson will retain his seat on the Board.

MR. G. M. FLATHER, joint managing director of W. T. Flather, Limited, steelmakers, of Sheffield, has been nominated as one of the directors of the National Industrial Fuel Efficiency Service, the formation of which was announced recently. The service is sponsored by the British Productivity Council.

ON MONDAY, MR. H. W. WILSON, who has been manager of the Southampton branch of the General Electric Company, Limited, since 1938, took up a new appointment as an assistant to Mr. W. J. Bird, London sales manager, and is succeeded at Southampton by MR. D. E. KIDNER.

MR. A. G. HOWE, chief Diesel engineer of Davey Paxman & Company, Limited, was the speaker at a recent meeting of the Eastern branch of the Institution of Mechanical Engineers to which members of the Cambridge University Engineering Society had also been invited. His subject was "Drilling for Oil."

TRIBUTES to the work of MR. R. J. FORBES, Regional Controller, Board of Trade, who is shortly moving from Cambridge to Manchester to take up a similar appointment on the retirement of the North-West Regional Controller, were paid by members of the Eastern Regional Board for Industry at a luncheon following their monthly meeting on November 3 .

MR. ARTHUR WRIGHT JEFFS, who has been elected deputy chairman of the Birmingham Stock Exchange, is chairman of John Shaw (Tools) Limited, Moore and Wright (Sheffield), Limited, Simmons Holloware Company, Limited, British Tool and Engineering Company, Limited, Canning and Wildblood, Limited, and Jenks Bros., Limited, and is also a director of Henry Meadows, Limited, and Stancroft Limited.

MR. JOHN T. FLEMING has been appointed a director of the North British Locomotive Company, Limited, Glasgow. He joined the firm as works general manager in February of last year. MR. A. GRIEVE, assistant secretary, has been appointed secretary of John Brown & Company, Limited, Clydebank, in succession to MR. J. W. BECK, who had been elected a director of the company.

Societe Francaise de Metallurgie

The *Journées d'Automne* of the *Société Française de Métallurgie* are becoming more than the reading of a series of technical papers on metallurgical subjects. They now form, in addition, a meeting place for European metallurgists to exchange experiences in technical subjects and meet in a pleasant social atmosphere. Each year the Maison de la Chimie in Rue Saint-Dominique, Paris 7e, attracts larger numbers of both academic and industrial metallurgists. The meeting last month was certainly no exception. As announced at the opening session on October 19 by the chairman, Ing.-Gén. P. Salmon, president of the Société, in his speech of welcome, some 15 countries were represented by many world-renowned metallurgists. There were about 130 members and guests present at the opening. Subjects discussed were concerned with steels and non-ferrous alloys, transformations in and structures of alloys, metallurgy associated with developments in the atomic energy programme, mechanical properties, and recent techniques in the production of ferrous and non-ferrous metals.

The paper of major interest to foundrymen was by DR. J. R. RAIT and L. W. PATEMAN, of Hadfields, Limited, which described British progress in the casting of metals and alloys. Dr. Rait paid particular attention to the production and control of ingots of steel. Special techniques such as precision or lost-wax, shell, and centrifugal casting were covered, and he also discussed recent progress in the classical methods of casting. Among these were mentioned the use of special strippable feeder heads, exothermic moulding materials and core sands with resin binders.

Fuel-efficiency Exhibits

Exhibits of Kelvin & Hughes (Industrial) Limited, at the Fuel-efficiency Exhibition to be held in the City Hall, Deansgate, Manchester from November 18 to 28, will consist of four sections of a typical industrial undertaking showing instrumentation used at the various stages of the processes used. Flowmeters, draught gauges, multipoint temperature indicators, electronic controllers and a portable pyrometer will be shown.

A number of exhibits of fan-engineering equipment are arranged on the stand of Keith Blackman, Limited, at the same exhibition. These include a range of fan and blower units, heaters and compressors all to be associated with efficient use of fuel, as well as a general selection of industrial gas equipment, including high-pressure and air-blast burner nozzles, injectors and heads.

Fast Furnace Building

How long does it take to build a blast furnace? In some recent cases, the answer has been three or more years, but at Dorman, Long's Redcar works a new furnace has been erected in less than 14 months. This was not a contract job. The company's own bridge department undertook the foundation work, an associated company, the Tees Side Bridge & Engineering Works, Limited, fabricated and erected the main structure, while much of the ancillary work of the main furnace columns was carried out by Dorman, Long's constructional department, the whole of the work from the first excavation to the blowing in of the new furnace being accomplished in 415 days. This new furnace replaces one which is now being dismantled and another similar replacement is planned for next year.

Illustration of Supinex "R" in use by courtesy of Diecastings Ltd., Birmingham 12.

AN ENTIRELY NEW TYPE OF BINDER, STARTLING IN ITS PERFORMANCE . . . . FUMES AND GASES GREATLY REDUCED

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News in Brief

RECENTLY, members of the Grangemouth Town Council were shown Allied Ironfounders' film, "The Stockton Test."

JOHN M. MOORWOOD, LIMITED, propose the erection of a new foundry, warehouse and offices at Stevenson Road, Sheffield.

DR. DANIEL HANSON, professor of Metallurgy and director of the Department of Metallurgy at Birmingham University, left £16,027 (£15,071).

FARM MECHANIZATION, LIMITED, Commercial Road, Ladybank, are to erect a servicing department and showroom at Halbeath Road, at an estimated cost of £8,000.

CHAMBERLAIN INDUSTRIES, LIMITED, of Staffa Works, Staffa Road, Leyton, E.10, have appointed Electricals, Limited, 14 Claremont Place, Newcastle-upon-Tyne, 2, as their main distributors and stockists in that area.

BECAUSE new industries are expected to be placed in Droitwich as a result of Birmingham's "overspill" proposals, the Droitwich Borough Council has agreed to form a new Committee of Industrial Development.

BRITISH INSULATED CALLENDER'S CABLES, LIMITED, announce that with effect from November 23, the address of their Bristol Branch will be 7 & 9, Barton Street, Bristol. The telephone number (Bristol 23453-4) is unchanged.

THE PROPOSED SCRIP ISSUE of one new 5s. ordinary share for every two held in John Shaw & Sons, Wolverhampton, Limited, the financial company which controls John Shaw Tools, Limited, etc., has been given Treasury consent.

GLENFIELD & KENNEDY, LIMITED, engineers, Kilmarnock, are to provide an extension to their present engineering shop at an estimated cost of £16,800. Plans have been prepared and have been approved by the local authority.

IN ADDITION to the contributors mentioned last week to the symposium on shell moulding to be held at the Utrecht on November 25, Mr. Koch of the Philips' concern will give a paper. Baron Krayenhoff has agreed to be discussion master.

FOR RECONDITIONING 324 Petter PU8 engines and 133 Fowler generating sets in use by the Army, two contracts have been awarded by the Ministry of Supply to the service division of Petters, Limited, Burton-on-the-Wolds, near Loughborough, which are worth nearly £30,000.

AN ORDER worth almost £200,000 has been received by the Clyde Crane & Engineering Company, Limited, Mossend (Lanarkshire), for three heavy grabbing cranes, which will take more than 18 months to construct. The firm has a full order-book with several orders from Australia and South Africa.

WILLIAM ASQUITH, LIMITED, machine-tool makers, of Halifax, have announced the completion of the purchase of the whole of the issued ordinary share capital of Drummons Bros., of Guildford. The firm is to continue as a separate entity and no Halifax workpeople will be transferred to Guildford.

FIFE COUNTY COUNCIL are to carry out extensions to the Lauder Technical College, Buchanan Street, at a cost of £14,000. It is proposed to erect an electrical laboratory, engineering workshop, a heat laboratory, staff room, cloakroom, lavatory accommodation, stores, boiler room, and heating chamber.

A SECTIONAL MEETING of the World Power Conference is to be held at Rio de Janeiro, Brazil, from July 25 to August 8, 1954, and the technical programme is available from Dr. A. Parker, C.B.E., honorary secretary of the British national committee at 201-2, Grand Buildings, Trafalgar Square, London, W.C.2.

A NEW COMPANY named Bestobell (Canada), Limited, which will commence operations in about a month's time in Toronto, has been formed by Bell's Asbestos and Engineering, Limited, Slough (Bucks). The Canadian company will handle magnetic level controls, steamed hydraulic valves, and asbestos products of various kinds.

THE GENERAL COUNCIL of the Scottish Trades Union Congress has submitted a statement to the Government calling for action to bridge the gap between compensation for industrial injuries awarded by Scottish and English Courts. It has asked for legislation to remedy what is described as "an unfair and indefensible position."

THE BIRMINGHAM AND DISTRICT sub-area of the Midlands Electricity Board is holding an exhibition entitled "Lighting for Efficiency and Productivity" in Chester Road, Aston, for two weeks beginning November 9. The first part of the exhibition is devoted to general factory lighting and the second to lighting as an aid to production.

TO CELEBRATE 50 years' association with the electrical industry, Mr. John Godden of John Godden (Stoke), Limited, entertained his staff to a social evening in the Grand Hotel, Hanley. On behalf of the staff, a radiogram and records were presented to Mr. Godden by Mrs. F. E. Woodward, a director of the firm. During the evening a collection in aid of the Electrical Industries Benevolent Association realized £11 18s. 0d.

IT IS ESTIMATED that shipbuilding output on the Tyne during 1953 will total 26 vessels amounting to about 215,000 tons gross. Last year 26 ships totalling 195,798 tons were built, while in 1951 a post-war record of 39 ships at 239,700 tons was achieved. Six vessels are due to be launched in the last two months of the year, but it is uncertain if all of them will be completed by the end of December, so some might eventually pass over into 1954.

A RISE of £252,900 in group trading profits and an increase of 5 per cent., tax free, in the ordinary distribution are announced by the directors of Herbert Morris, Limited, crane manufacturers, eac., of Loughborough, in their preliminary statement for the year ended July 31, 1953. The ordinary dividend is maintained at 20 per cent. with an unchanged final of 15 per cent., but the bonus is raised from 5 per cent. to 10 per cent. to make a total of 30 per cent., tax free, against 25 per cent., tax free, previously.

ALTHOUGH only foundries in the area fail to show the all-round quickening of production evident in most industries, unemployment in the five counties comprising the Midland region is now at its lowest for the past 20 months. Figures issued on November 6 relating to the last count taken give a total of 16,305 persons unemployed, the lowest figure since February, 1952, when the total was 12,584. At the last count, the number of Midland workers temporarily stopped for various reasons was 1,201, a decrease of 85 over the previous month.

MR. N. W. R. MAWLE, managing director of British Typewriters, Limited, West Bromwich, who has recently returned from a round-the-world trip lasting 9 weeks, has formed the impression that the words "Made in Britain" still mean a great deal to buyers all over the world. Mr. Mawle met some complaints

(*Continued on page* 614)

News in Brief

(*Continued from p.* 612)

of quality being much below pre-war level, chiefly due to the use of inferior materials through shortage and not to a deterioration in the standard of workmanship. Mr. Mawle brought back orders from Australia alone, for £10,000 worth of his firm's products.

ARRANGEMENTS ARE ANNOUNCED whereby Metropolitan Vickers Electrical Company, Limited, have taken over the manufacture, sale, and servicing of resistance welding and heating machines formerly manufactured by British Insulated Callender's Cables, Limited. The new Metrovick range of arc-welding and resistance welding equipment will be supplemented by the addition of further models of pedestal spot, slow butt, hand-flash butt, and automatic-flash butt welders, and also rivet heaters, resistance brazing machines, and wire-rope parting machines.

SIR JOHN GREAVES has joined the Board of Ransomes Sims & Jefferies, Limited. Sir John is managing director of Davey Paxman & Company and a director of Ruston & Hornsby. It was announced earlier this year that Ransomes Sims & Jefferies will manufacture Diesel engines in collaboration with Davey Paxman & Company, Limited. Ruston & Hornsby, Limited, are also making the same engine. Mr. G. Pawlyn has been appointed deputy-chairman of Ransomes Sims & Jefferies. He succeeds Mr. J. H. W. Pawlyn, who has decided to give up that post but will remain a director of the company.

A STABILIZATION PERIOD of two or three years was necessary to the shipbuilding industry if it was not to founder in the seas of competition, said Mr. George Morrison, managing director of Greenock Dockyard Company, Limited, at the launch of the cargo passenger steamer, Clan Stewart, which is being built for Clan Line Steamers, Limited. Mr. H. R. Cayzer, a director of both companies, pointed out that it was becoming uneconomic to build a ship. In this case, in face of steel difficulties and labour shortage, the ship was nine months overdue and the price had risen by 18 per cent. since it was first ordered, in January, 1951.

THE DIRECTORS of Desoutter Bros. (Holdings), Limited, manufacturers of pneumatic and electrical tools, of London, N.W.9, have announced that they will pay interim ordinary dividends when trading results so permit. For the current year an interim 7½ per cent., less tax, has been declared, payable on December 1 to holders, registered on November 17. For 1952 one payment of 18 per cent., less tax, was made. This interim dividend must not be construed as giving any indication as to the amount of the final dividend, the directors emphasize, although it may be assumed that the results to date, are, in their opinion, satisfactory.

SO SUCCESSFUL is the pioneer course on packaging organized by the Institute of Packaging in conjunction with the Birmingham Education Committee, that the northern area of the Institute is now negotiating for a similar course in Manchester. No fewer than 45 students from firms in the Midlands have been attending the course, which ends on December 9, and Mr. Harry Jefford, chairman of the Midland area of the Institute states that many applicants had to be refused. The aim of the course is to teach packaging as a technology and the experiment has been watched with interest by firms throughout the country.

TO MARK the second anniversary of the inauguration of the apprentice training scheme operated by Smith & Wellstood, Limited, and Mitchell Russell & Company, Limited, Bonnybridge, parents' nights were held in the "Esse" Restaurant recently. The parents of all apprentices were invited to attend and invitations were also extended to youth employment officers, local headmasters with their technical teachers, Day Release Centre teachers, and trade union representatives. The purposes of the visits were threefold—to enable parents to see what their sons were doing; to convey some idea of the scope of the training scheme; and to afford an opportunity for the employers to meet the parents. The response was most encouraging, more than 100 persons being in attendance on each evening.

AT THE ANNUAL MEETING in Birmingham last month of the Midland Region of the Council of British Manufacturers of Petroleum Equipment, Mr. K. M. Leach, of Audley Engineering Company, Limited, Newport, said that if members were not spending 1 per cent. of their sales turnover on research and development they were not spending enough. He feared that not many were spending that amount. Mr. Douglas Wilson, the national chairman, said that we have in this country an inventiveness second to none but we are spending a lot of the country's money on licences. The meeting was addressed by Mr. Walter Kohring, chief engineer of the Vacuum Oil Company's new refinery at Coryton, who suggested that firms should send their foremen and fitters to the refineries to see the conditions under which equipment was used.

IT IS estimated that the total working population increased slightly during September, contrasting with a slight decrease in September last year. In the basic industries, employment fell by 18,000 largely due to a seasonal decline in agriculture and road transport. Employment in the manufacturing industries rose by 53,000. All the main sectors showed increases including 15,000 in engineering, metal goods and precision instruments (about half of which was in the electrical goods industries), 8,000 in vehicles, 8,000 in textiles and 12,000 in the "other manufactures" group. The number of persons registered as unemployed at October 12 was 309,100 including 10,100 temporarily stopped. The total showed an increase of 17,100 since September 14. Of the total, 117,700 had been unemployed for more than eight weeks. Unemployment in October represented 1.5 per cent. of the estimated total number of employees compared with 1.4 per cent. in September and 1.9 per cent. a year ago.

AN APPEAL by the Parkinson Stove Company, Limited, of Stechford, Birmingham, against a judgment by Mr. Justice Pilcher awarding £885 damages to La Compagnie de Commerce et Commission S.A.R.L. of Paris, for a breach of contract, was allowed by the Court of Appeal on November 6. The French company had sued the Parkinson Stove Company regarding the proposed sale of 100 tons of sheet steel valued at £10,000. The defendant company had contended that there was no completed contract, but Judge Pilcher had ruled against it. The Court allowing the appeal entered judgment for the defendants with two-thirds the costs. Lord Justice Singleton said that an order sent to the French company by the defendants was accompanied by an acceptance form to be signed. The form was not returned but later the French firm wrote a letter which it claimed to be an acceptance. The Court could not find in the letter any words of acceptance. Lord Justice Hodson concurred but Lord Justice Birkett dissented, holding the opinion that the letter was an acceptance. Leave was given to appeal to the House of Lords.

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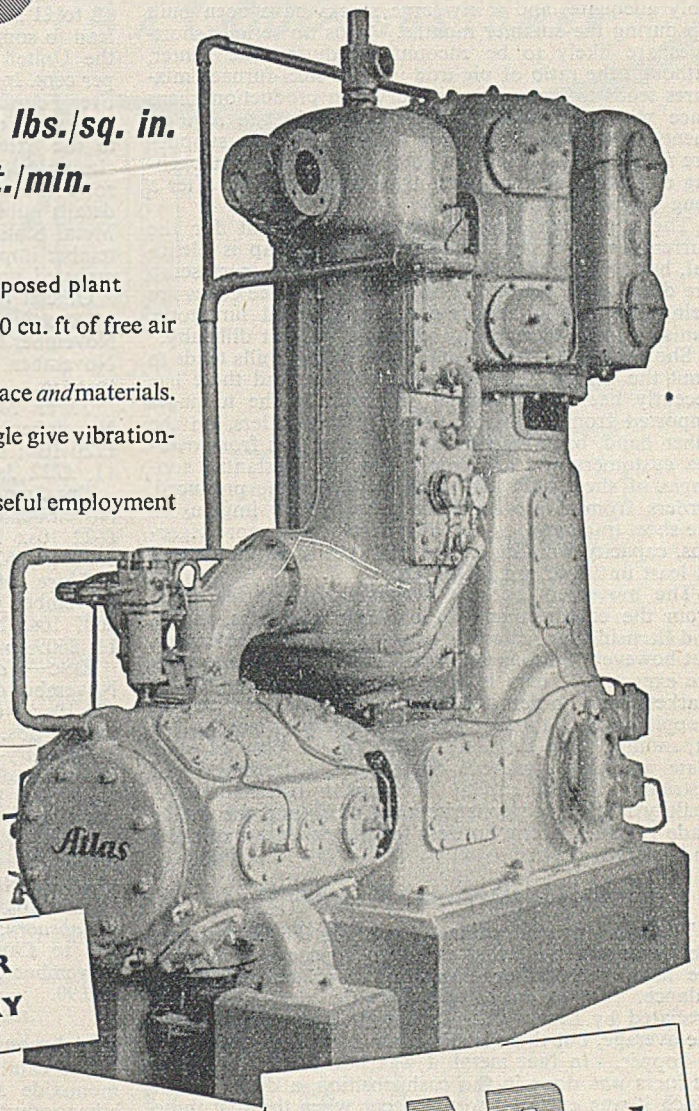

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Raw Material Markets

Iron and Steel

Pig-iron production is running along on uneventful lines. Blast-furnace operators in these days have few anxieties. They are well supplied with ore, coke, limestone, and scrap, and are regularly disposing of most of their outputs. Further expansion is not expected until new furnaces in course of construction are ready for operation, but current supplies of pig-iron are reasonably adequate, and fairly large stocks have been built up during the summer months. Thus no serious shortages are likely to be encountered during the winter, although the ratio of pig-iron used in steel-furnace mixtures tends to increase. Foundry-iron production keeps pace with, and possibly slightly exceeds, the requirements of the makers of iron castings, but the supplies are not large and it is to be noted that there is a quickening of activity at the light and jobbing foundries after a long period of quiet trade.

The supply of scrap is generally sufficient for the current needs of the foundries. Light scrap is plentiful, but arisings of heavy cast-iron and machinery scrap are disposed of readily. Foundry and furnace cokes are being received in adequate quantities, and limestone, ganister, and firebricks are obtained without difficulty.

Short-time working of the bar re-rolling mills tends to limit the consumption of foreign billets, and there has recently been a substantial reduction in the tonnages imported from Western Europe. Sheet rollers, on the other hand, have received a spate of orders from oversea customers and are now taking up substantial tonnages of sheet bars and slabs, mainly home produced. Orders from Argentina have given a new impetus to the sheet trade and, as home demand is also more vigorous, capacity working at the mills seems to be assured at least until the end of the year.

The movement for the liberation of oversea trade from the entanglements of embargoes, quotas, tariffs, and licensing restrictions is slowly gathering momentum, but however vigorous the export drive, no easy successes are expected. There is keen competition in the export markets and orders of any magnitude are scarce. Happily, the steel industry is sustained by a vigorous and expanding home demand, which in the case of steel plate and sheets exceeds the supply. Relaxation of restrictions upon capital investment foreshadows a healthy market for constructional steel, and the motor trade is also a strong buttress for the producers of sheet and special steels.

Non-ferrous Metals

Towards the end of last week all the non-ferrous metals wore a somewhat careworn appearance, and for the most part values closed lower or unchanged on balance. An exception was forward zinc, which appreciated by nearly £2. Turnovers were rather above the average, but there is still room for increased activity in copper. In that metal it was noticeable that more business was done in the cash position, a development which it was expected would occur when the first three months had passed. But instead of a keen demand for cash, it was seen that metal came on offer, probably because the short position for early November, established when the market opened, had been liquidated in advance. In consequence, at midday on Friday last, the settlement price was no more than £236, a drop of £6 10s. in comparison with the previous Friday, but at the afternoon session sellers showed some reserve and the quotation improved to £237 10s. This brought the net loss for the week in the cash price down to £5, but three months closed 5s. up, so that the backwardation narrowed to £14 10s. Demand from consumers is well maintained and consumption appears to be improving.

Rumours regarding the progress of the Chile-American negotiations continue to circulate, but there can be little doubt that eventually some solution will be found to the difficulties which have so far prevented agreement being reached. Production in Chile has declined owing to strikes at the mines.

In zinc the feature is the appreciation in the forward position and the narrowing of the backwardation from £3 to £1 5s. This is a step in the right direction and may lead to some hedge selling by consumers and others. In the United States the current quotation remains at 10 per cent. In lead also the premium for the current month over February declined to £3 15s., which compared with £6 a week earlier. Tin was fairly steady, but lost ground to the extent of £5 in the cash price, three months' closing without change, while the backwardation narrowed to £12 10s. It is satisfactory to note from the details published by the British Bureau of Non-ferrous Metal Statistics that U.K. consumption of tin in September improved sharply to 1,820 tons, the best figure reported since last December.

Official metal prices were as follow:—

COPPER, Standard—*Cash:* November 5, £236 to £237; November 6, £235 to £236; November 9, £232 to £235; November 10, £236 to £238; November 11, £235 15s. to £236.

Three Months: November 5, £223 to £223 10s.; November 6, £222 to £222 10s.; November 9, £220 to £220 10s.; November 10, £221 to £221 10s.; November 11, £222 5s. to £222 10s.

TIN, Standard—*Cash:* November 5, £617 10s. to £620; November 6, £617 10s. to £620; November 9, £620 to £622 10s.; November 10, £615 to £620; November 11, £620 to £622 10s.

Three Months: November 5, £607 10s. to £608; November 6, £606 to £607 10s.; November 9, £606 to £607 10s.; November 10, £605 to £607 10s.; November 11, £609 to £610.

ZINC—*November:* November 5, £75 to £75 5s.; November 6, £75 10s. to £75 15s.; November 9, £75 to £75 10s.; November 10, £75 10s. to £75 15s.; November 11, £75 15s. to £76.

February—November 5, £74 to £74 5s.; November 6, £74 5s. to £74 10s.; November 9, £73 10s. to £73 15s.; November 10, £74 to £74 5s.; November 11, £74 5s. to £74 10s.

LEAD—*November:* November 5, £94 to £94 5s.; November 6, £94 to £94 5s.; November 9, £93 5s. to £93 15s.; November 10, £93 10s. to £93 15s.; November 11, £93 10s. to £93 15s.

February: November 5, £90 to £90 5s.; November 6, £90 to £90 10s.; November 9, £89 5s. to £89 10s.; November 10, £89 15s. to £90; November 11, £89 10s. to £90.

Enrichment of Industrial Gases

The catalytic synthesis of methane from the carbon-monoxide and hydrogen contained in water-gas and other industrial gases has long been known as a possible process for the enrichment of such gases to the calorific value of town-gas. Fuel Research Technical Paper No. 57, published by the Department of Scientific and Industrial Research (2s. net, by post 2s. 1½d.), describes work carried out at the Fuel Research Station, Greenwich, with the object of developing a process suitable for large-scale operation. Such a process could be applied to water-gas or producer-gas made from coal or coke by existing processes. It could also form the final stage in the production of town-gas by the complete gasification of low-grade fuels.

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

(Delivered unless otherwise stated)

November 11, 1953

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £13 18s. 0d.; 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. 0d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £18 3s. 0d.; South Zone, £18 5s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £19 3s. 0d.; South Zone, £19 5s. 6d.

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. Coast and N.-W. Coast of England, £16 12s. 0d.; Scotland (Scotch iron), £16 18s. 6d.; Sheffield, £17 13s. 0d.; 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. 0d., basis 45 per cent. Si, scale 21s. 6d. per unit; 70/84 per cent., £82 10s. 0d., basis 75 per cent. Si, scale 23s. per unit.

Ferro-vanadium.—50/60 per cent., 23s. 8d. to 25s. 0d. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 10s. 0d. to 11s. 0d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £165 0s. 0d. to £181 0s. 0d. per ton; 38/40 per cent., £229 0s. 0d. to £235 0s. 0d. per ton.

Ferro-tungsten.—80/85 per cent., 16s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 19s. 6d. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent. C, £85 4s. 0d., basis 60 per cent. Cr, scale 28s. 3d. per unit; 6/8 per cent. C, £80 17s. 0d., 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. 0d. per lb.

Metallic Chromium.—98/99 per cent., 6s. 3d. to 6s. 9d. per lb.

Metallic Manganese.—93/95 per cent., carbon-free, £225 0s. 0d. to £232 0s. 0d. per ton; 96/98 per cent., £255 0s. 0d. to £262 0s. 0d. per ton.

Ferro-columbium.—60/75 per cent., Nb + Ta, 40s. 0d. to 70s. 0d. 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 0s. 0d.; silico-manganese, £33 16s. 0d.; free-cutting, £28 16s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £32 12s. 0d.; case-hardening, £33 0s. 0d.; silico-manganese, £34 17s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic soft up to 0.25 per cent. C, £29 16s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £30 16s. 0d.; acid, up to 0.25 per cent. C, £33 0s. 0d.

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. 0d.; 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. 0d.; 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.—Cash, £235 15s. 0d. to £236 0s. 0d.; three months, £222 5s. 0d. to £222 10s. 0d.; settlement, £236 0s. 0d.

Tin.—Cash, £620 0s. 0d. to £622 10s. 0d.: three months, £609 0s. 0d. to £610 0s. 0d.; settlement, £620 0s. 0d.

Zinc.—October, £75 15s. 0d. to £76 0s. 0d.; January, £74 5s. 0d. to £74 10s. 0d.

Refined Pig-lead.—October, £93 10s. 0d. to £93 15s. 0d.; January, £89 10s. 0d. to £90 0s. 0d.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £104 0s. 0d.; rolled zinc (boiler plates), all English destinations, £101 15s. 0d.; zinc oxide (Red Seal), d/d buyers premises, £87 0s. 0d.

Other Metals.—Aluminium, ingots, £150 0s. 0d.; magnesium, ingots, 2s. 10½d. per lb.; antimony, English, 99 per cent., £210 0s. 0d.; quicksilver, ex warehouse, £61 15s. 0d.; nickel, £483 0s. 0d.

Brass.—Solid-drawn tubes, 22⅜d. per lb.; rods, drawn, 32⅜d.; sheets to 10 w.g., 243s. 0d. per cwt.; wire, 30½d.; rolled metal, 239s. 9d. per cwt.

Copper Tubes, etc.—Solid-drawn tubes, 27⅜d. per lb.; wire, 269s. 9d per cwt. basis; 20 s.w.g., 298s. 9d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £185 0s. 0d. to £191 0s. 0d.; BS. 1400—LG3—1 (86/7/5/2), £200 0s. 0d. to £208 0s. 0d.; BS 1400—G1—1 (88/10/2), £262 0s. 0d. to £285 0s. 0d.; Admiralty GM (88/10/2), virgin quality, £272 0s. 0d. to £300 0s. 0d. per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £265 0s. 0d. to £295 0s. 0d.; L.P.Bl, £215 0s. 0d. to £240 0s. 0d. per ton.

Phosphor Bronze.—Strip, 357s. 3d. per cwt.; sheets to 10 w.g., 379s. 0d. per cwt.; wire, 44½d. per lb.; rods, 38⅜d.; tubes, 37d.; chill cast bars: solids 41d., cored 42d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × .056, 3s. 0¾d. per lb.; round wire, 10g., in. coils (10 per cent.), 3s. 6d.; special quality turning rod, 10 per cent ½ in. dia., in straight lengths, 3s. 5d. All prices are net,

Forthcoming Events

NOVEMBER 16

Institute of Metals

Sheffield local section:—"Indentation Hardness," by D. Tabor, 7.30 p.m., in Mappin Hall, St. George's Square. Joint meeting with the Sheffield Metallurgical Association and the Sheffield Society of Engineers and Metallurgists.

Incorporated Plant Engineers

Merseyside & North Wales branch:—"Fan Engineering," by R. H. Holbeche, 7.15 p.m., at Radiant House, Bold Street, Liverpool.

Institution of Production Engineers

Oxford section:—"Increased Productivity with Present Equipment," by S. Erskine-Murray, 7.15 p.m., in the Randolph Hotel, Beaumont Street, Oxford.

Purchasing Officers' Association

East London branch:—"Law in relation to Purchasing," by J. M. Grammer, at the Red House, Redbridge Lane, Ilford.

NOVEMBER 17

Institute of British Foundrymen

East Anglian section:—A paper on "Sands," by A. P. Lovat, 7.30 p.m., in the Central Library, Ipswich.

Coventry and District Students' section:—"Manufacture of Heavy Steel Castings," by C. J. Dadswell, 7.15 p.m., in Room A.5, at Coventry Technical College.

Purchasing Officers' Association

Birmingham branch:—"Education for Industry and Commerce," by C. McCaw, 6.30 p.m., at the Colmore Room, Grand Hotel.

NOVEMBER 18—28

Combustion Engineering Association

Fuel Efficiency in Industry and Home Exhibition. City Hall, Deansgate, Manchester. Open from 10.30 a.m. to 7 p.m. weekdays and from 10.30 a.m. to 9 p.m. on Saturdays. Admission is 1/6 including tax.

NOVEMBER 18

Institute of British Foundrymen

Scottish North-eastern section:—Film night, 7.30 p.m., Imperial Hotel, Keptie Street, Arbroath.

Institute of Vitreous Enamellers

Northern section:—"Furnace Construction and Fuel Economy," 7.30 p.m., at the Queens Hotel, Manchester.

Institution of Works Managers

Tees-side branch:—"Industrial Toxicology," by Dr. A. J. Amor, 7.30 p.m., in the Vane Arms Hotel, Stockton-on-Tees.

Institute of Fuel

Yorkshire section:—"Recovery and Use of Waste Heat in Industry," by S. J. Eardley, 6.30 p.m., the University Leeds.

Incorporated Plant Engineers

Western branch:—Open forum, 7.15 p.m., Grand Hotel, Bristol.

Institution of Production Engineers

Gloucester & District section:—"Application of Motion Study," by Miss A. G. Shaw, 7.15 p.m., The Bell Hotel.

NOVEMBER 19

Glasgow section:—"Metal Finishing and Hard Coating," by S. A. J. Murray, 7.30 p.m., the Institution of Engineers and Shipbuilders in Scotland.

Incorporated Plant Engineers

Blackburn branch:—"Electrical Hazards," by D. A. Picken, 7.30 p.m. at the Grosvenor Hotel, Lord Street.

North-east Metallurgical Society

Discussion:—"Training of a Metallurgist," opened by A. D. Merriman, 7.15 p.m., at the Cleveland Scientific and Technical Institute, Middlesbrough.

NOVEMBER 21

Institute of British Foundrymen

East Midlands branch:—"Production and Quality Control in an Investment Foundry," by D. F. B. Tedds, 6 p.m., in the College of Technology and Commerce, Leicester.

Bristol and West of England branch:—"Efficient Production Methods for Machine-tool Castings," by G. W. Nichols, 10.45 a.m., The Grand Hotel, Bristol.

PROVISIONAL FIGURES for September show that Italian output of pig-iron was 116,100 metric tons. Other figures were:—Ferro-alloys, 8,200 tons; crude steel, 303,000 tons; hot-rolled products, 215,700 tons.

CLASSIFIED ADVERTISEMENTS

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

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

SITUATIONS WANTED

EXPERIENCED BENCH MOULDER requires work in Lancashire area. Ferrous or non-ferrous. 25 years' experience moulding; 10 years foreman.—Box 3881, FOUNDRY TRADE JOURNAL.

ACCOUNTANT, experienced foundry administration, desires appointment which would lead to Directorship or Partnership in small Steel Foundry.—Box 3867, FOUNDRY TRADE JOURNAL.

PROGRESSIVE position in Patternshop, Foundry or Methods desired by PATTERNMAKER - CHECKER (42). A.M.I.B.F., C. and G. foundry practice. Experienced wood and metal patterns for loose and mechanised production for iron and steel. Familiar with atmospheric, exothermic, knockoff-heads, core blowing.—Box 3880, FOUNDRY TRADE JOURNAL.

CONTROL CHEMIST desires supervisory appointment, Lancashire area. 18 years' experience vitreous enamelling of cast iron, wet process. Practical knowledge of frit making, control testing of frits and vitreous enamel research. Fully trained in chemical analysis of cast iron steel, and all foundry raw materials. Experience includes cupola control, sand testing and mechanical founding. Accommodation preferred.—Box 3839, 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.

WANTED.—Outside REPRESENTATIVE, on commission, for Iron Foundry in the North-West Area. No objection to other connections.—Apply A. BARTON (ENGINEERS), LTD., Providence Foundry & Engine Works, St. Helens Junction, Lancashire.

GENERAL MANAGER with proved ability required for an old and well established Foundry in the Stourbridge Area who are developing a new section for the production of High Duty Alloy Iron Castings. The position offers excellent prospects to a really sound man between 30/45 years of age and who has had all the experience necessary in regard to the control of labour, Moulding Methods, Sand Control and Core Making "know how" and a metallurgical knowledge would be an asset. Commencing salary between £850 and £1,000 per annum plus a participating bonus and after a probationary period of say six months, an opportunity to acquire a Directorship on very attractive terms would be considered. The position will not be an easy one in the early stages, but to a suitable man possessing the will to work and make good every encouragement will be given. All replies which must contain full details as to experience, etc., will be treated in the strictest of confidence. Apply in writing to BOX 3874, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

FOUNDRY PATTERNMAKER, to take full charge of Wood and Metal Pattern Shop servicing repetition Grey Iron Foundry. Applicants must have considerable experience of high-grade pattern production and some previous supervisory experience. Salary according to qualifications and experience.—Write for application form to: PRODUCTION MANAGER, Messrs. Henry Wallwork & Co., Red Bank, Manchester, 4.

FOUNDRY PRODUCTION EXECUTIVE required by Company producing Automobile Castings of the highest quality. Applicants must possess initiative and have a progressive outlook, and have had a first-class foundry experience. Must be able to get results. Applicants not possessing these qualifications will not be considered. Midland area.—Box 3871, FOUNDRY TRADE JOURNAL.

MANAGER required for small Iron Foundry. Machine and loose Pattern Moulding. Must be good organiser, capable of supervising Works and Office.—Apply in writing, stating age, training experience, and salary required, to CLAYTAT, LTD., Atlas Works, Clayton-le-Moors.

ENGINEER required for development methods and design of plant for manufacture of aircraft quality steel castings by investment processes. Must have had a good basic engineering training, to degree or H.N.C., and experience preferably including aircraft detail tooling design, or steel casting development or injection moulding. Must be able and willing to serve as a Senior or Leading Draughtsman.—Apply, with summary of training, experience and salaries received to the PERSONNEL MANAGER, The Fairey Aviation Co., Ltd., Hayes, Middlesex.

ASSISTANT METALLURGIST required for experimental Foundry in the research laboratory of a large light alloy firm in Southern England. The successful candidate will be required to work on the development of aluminium and magnesium base alloys, and should have a good knowledge of sand and die casting technique with qualifications of the L.I.M. or H.N.C. standard. The salary will be generous and commensurate with qualifications and experience.—Apply to Box 3870, FOUNDRY TRADE JOURNAL.

NATIONAL FOUNDRY COLLEGE.

APPLICATIONS invited for post of LECTURER. Candidates must have had sound industrial experience in the foundry industry. Experience in pattern-making or foundry methods and planning an advantage.

University degree or its equivalent essential, and a National Foundry College Diploma desirable. Teaching experience an advantage. Salary £940, rising to £1,090 per annum by annual increments of £25.

Full particulars obtainable from HEAD OF THE NATIONAL FOUNDRY COLLEGE, Wulfruna Street, Wolverhampton.

2nd November 1953.

SITUATIONS VACANT—*contd.*

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

REPRESENTATIVE required for London area selling Grey Iron Malleable and Steel Engineering Castings. Good technical knowledge and connection essential. Car provided. Permanent position.—Box 3868, FOUNDRY TRADE JOURNAL.

FOUNDRY COREMAKING FOREMAN required by South London Company engaged on High Duty General Engineering Castings up to 5 tons. Must be capable of giving firm instructions, demonstrating, and fixing piecework prices.—Box 3873, FOUNDRY TRADE JOURNAL.

ASSISTANT FOUNDRY MANAGER required for important Grey Iron Foundry in South Wales. Applicant must be first-class man with extensive practical experience of foundry work, together with sound technical knowledge of foundry metallurgy and quality control.—Write, stating age, experience, and salary required.—Box 3879, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required by South London Company engaged on General Engineering Castings up to 5 tons. Must be time served moulder, capable of giving firm instructions in all aspects of green, dry and loam work. Organising ability, together with a knowledge of costs and delivery schedules essential. Preference will be given to applicants having practical experience in Mechanite or High Duty Irons.—Box 3872, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required for small Light Castings Foundry in South-East England. Applicants must have had good experience in the class of work, preferably with L.C.C. fittings, and should, if necessary, be able to work with own hands to instruct unskilled labour and be fully conversant with cupola practice, and be able to work same if necessary. This is a progressive position for the right man not afraid of hard work and who requires eventual interest in Foundry.—Write, giving full details and stating if able to work on own initiative, to Box 3866, FOUNDRY TRADE JOURNAL.

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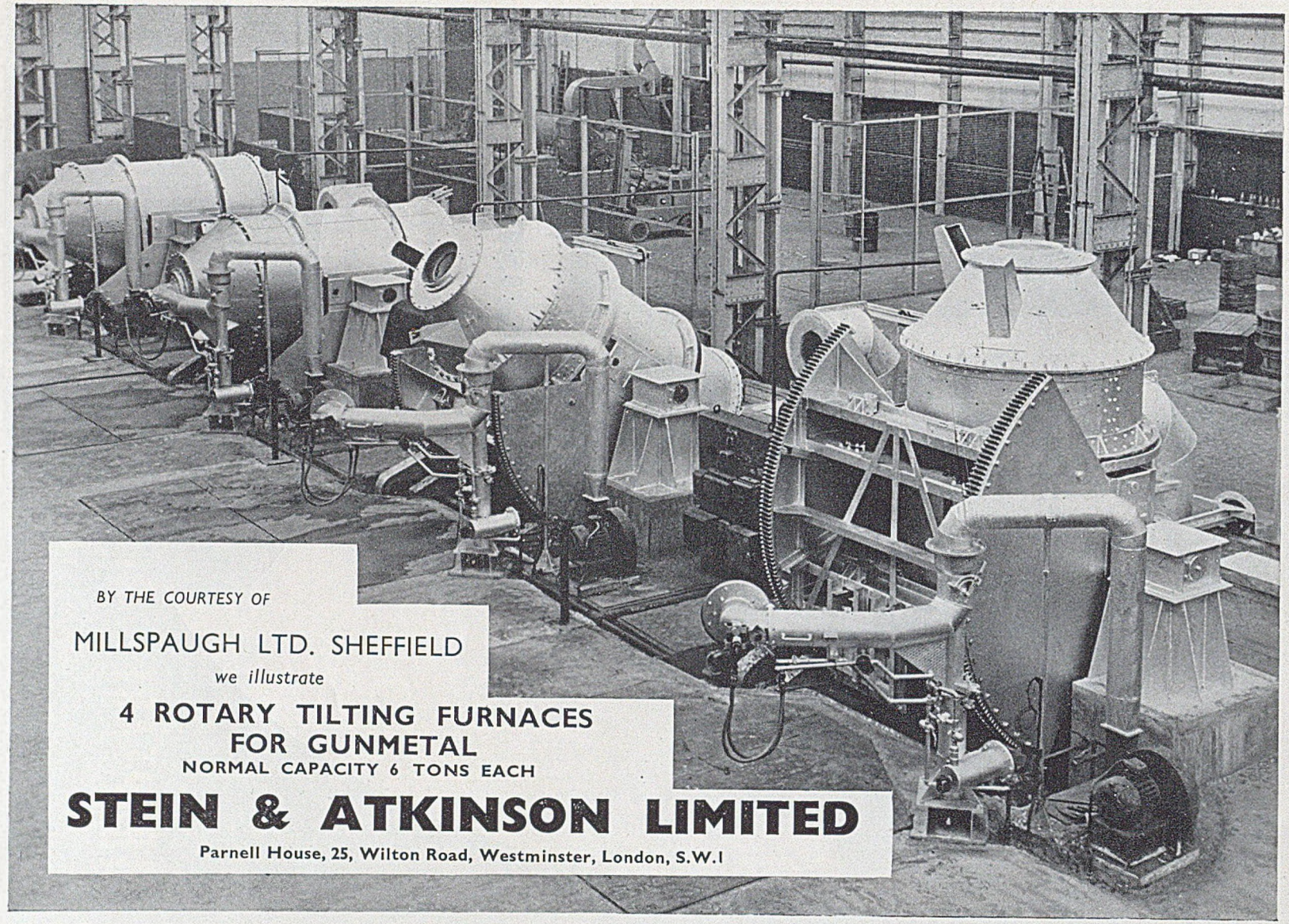
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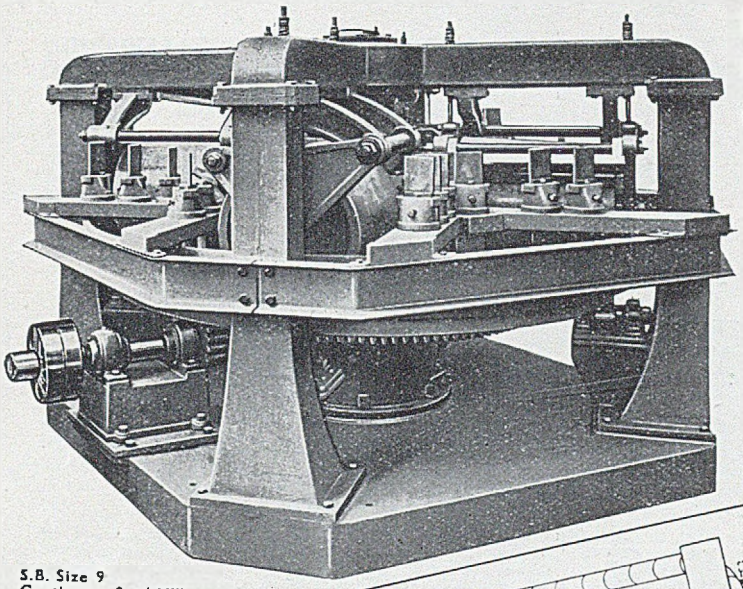

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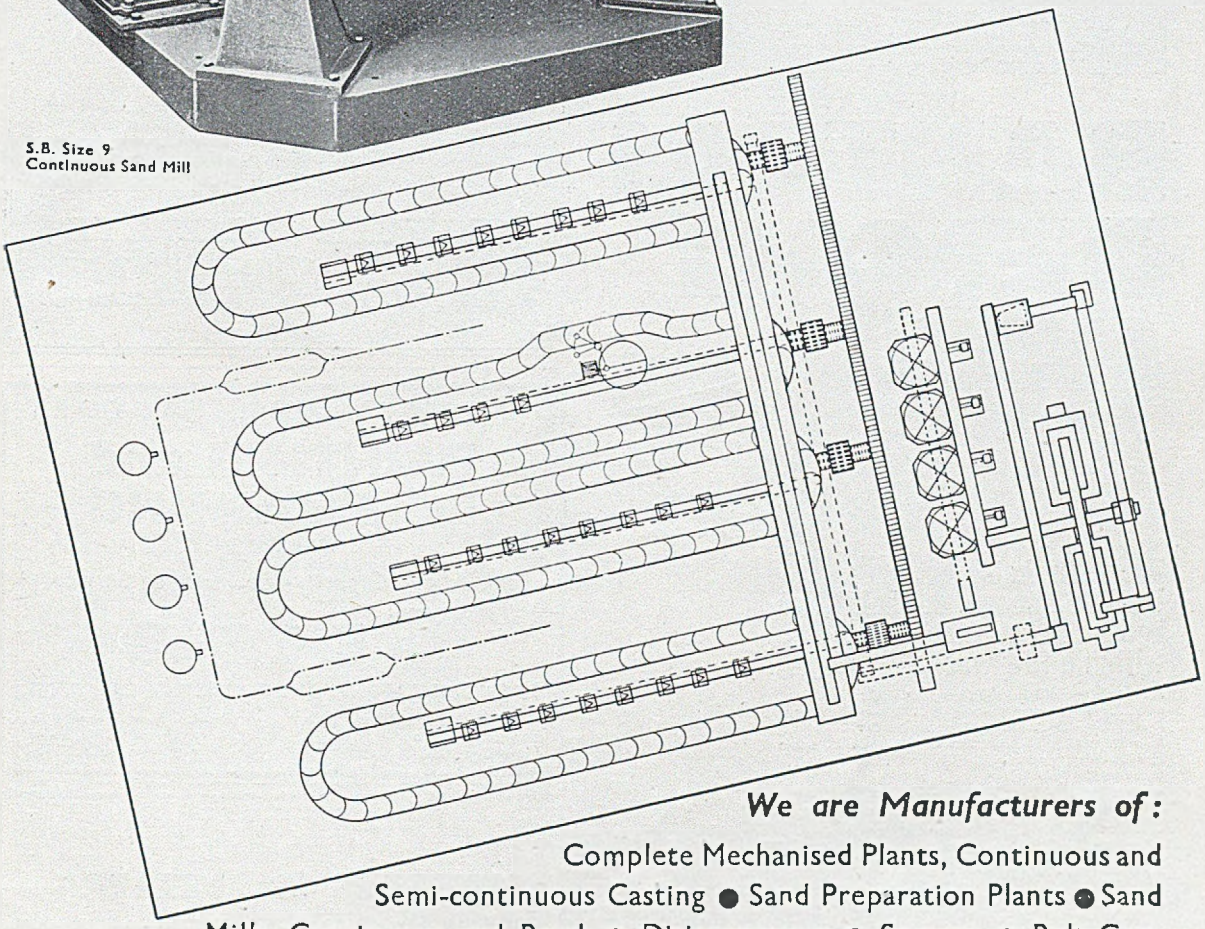

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