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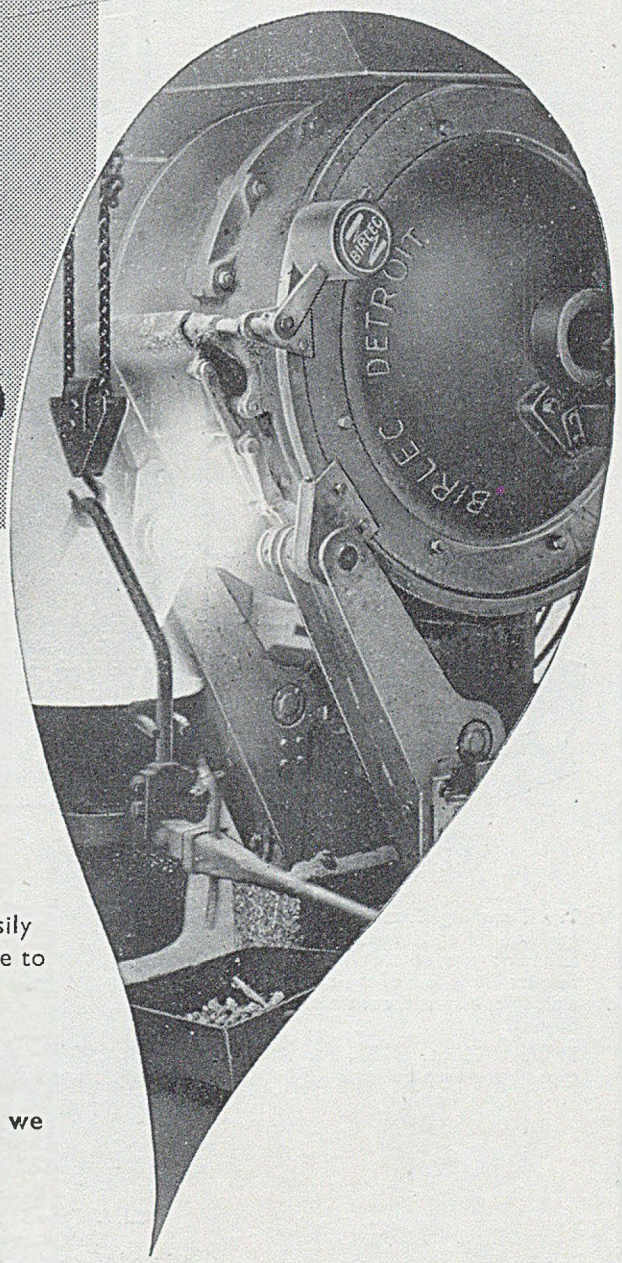

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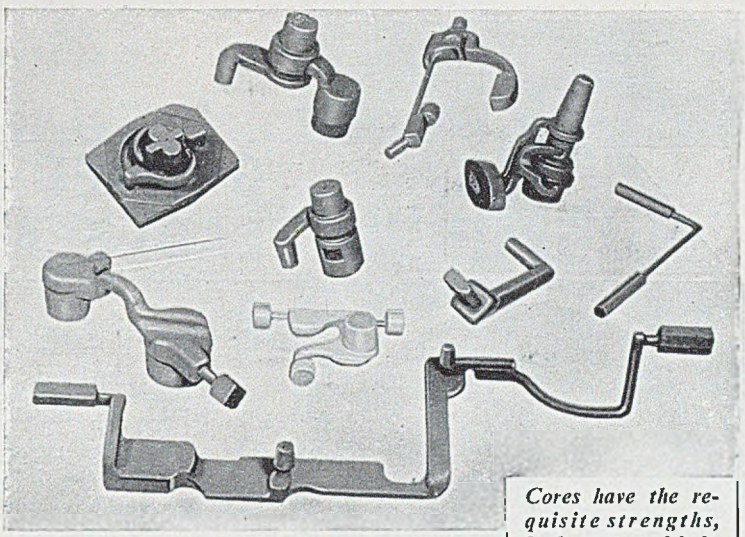

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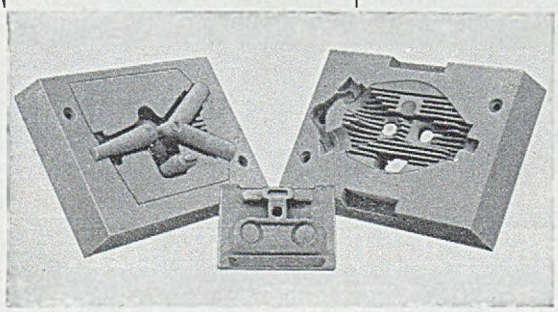

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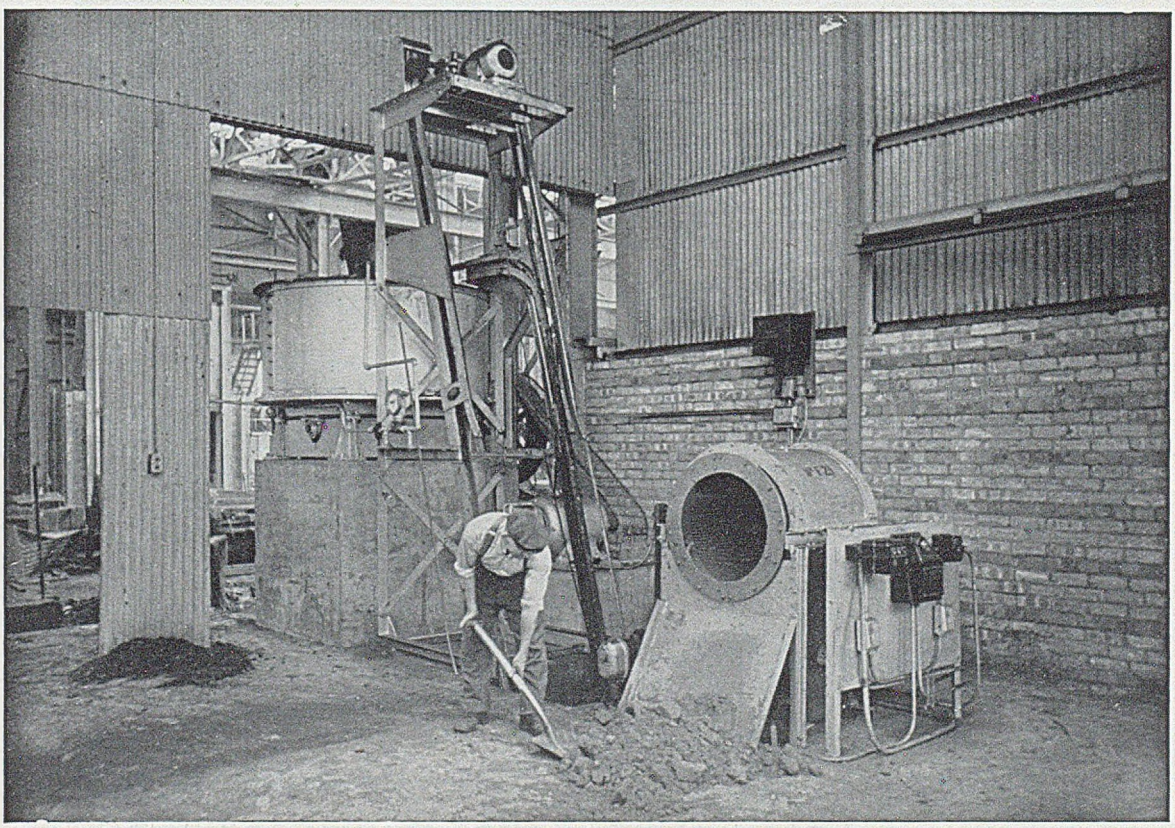

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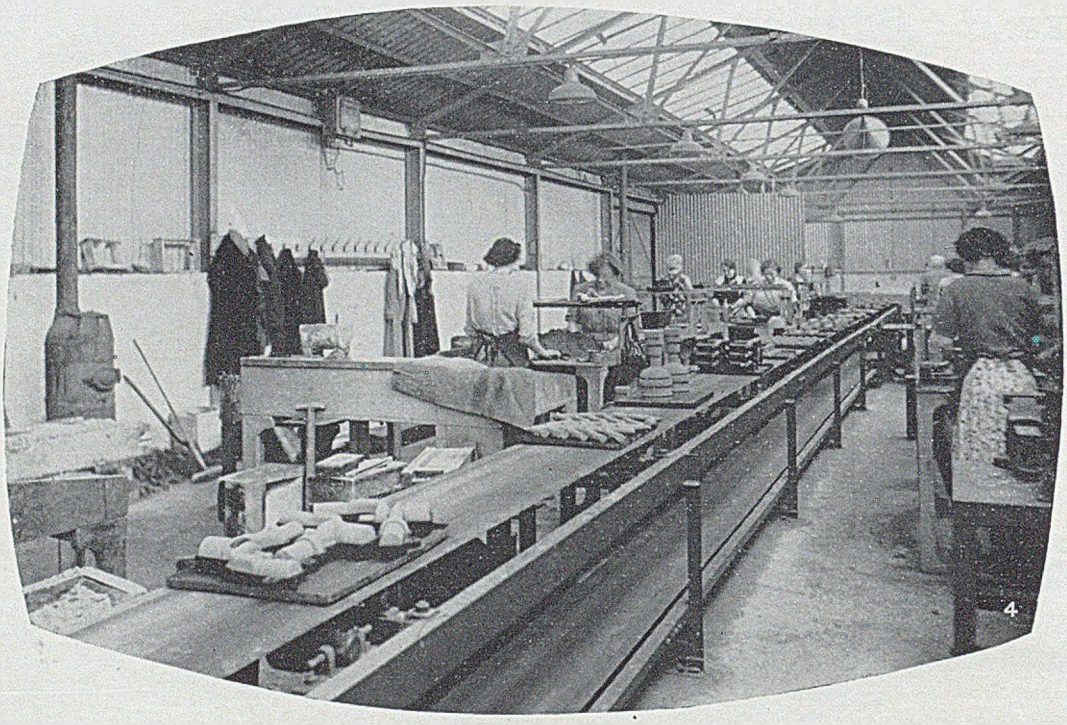

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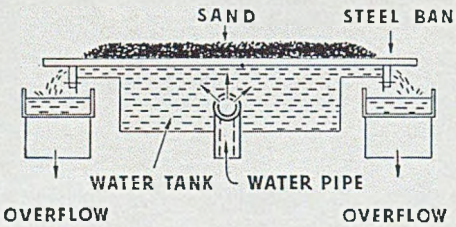

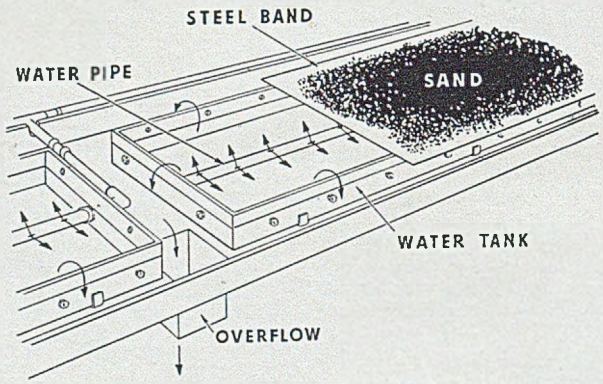

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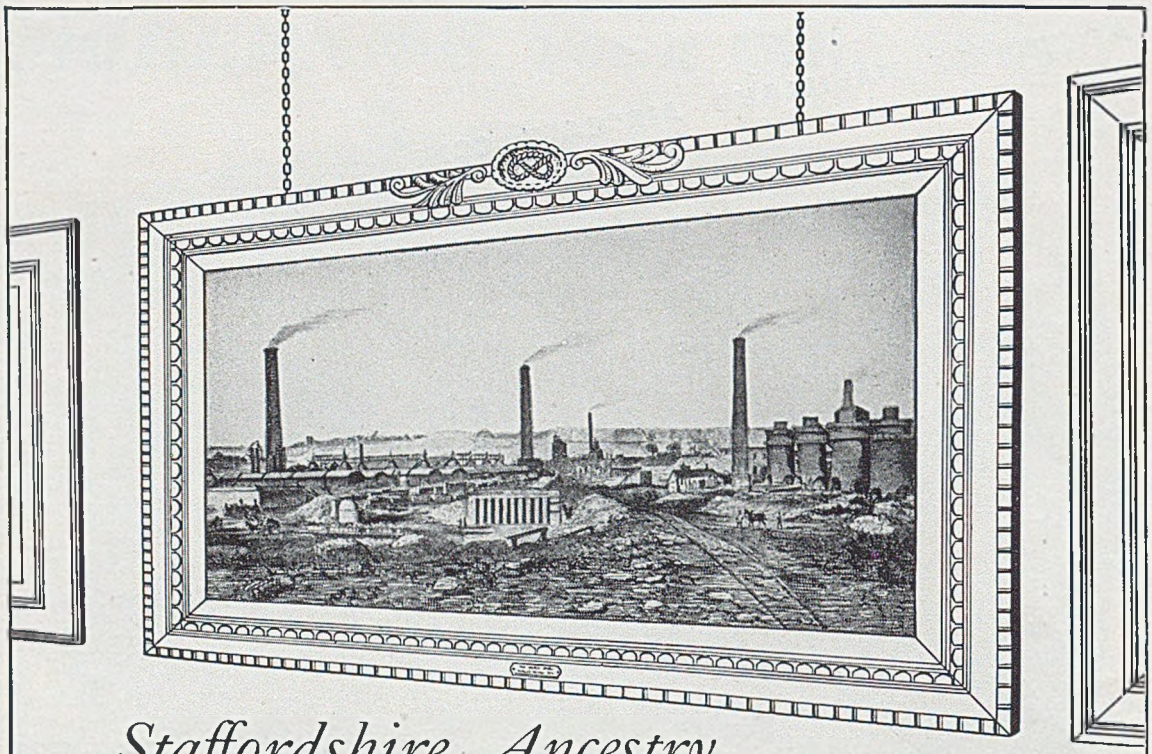

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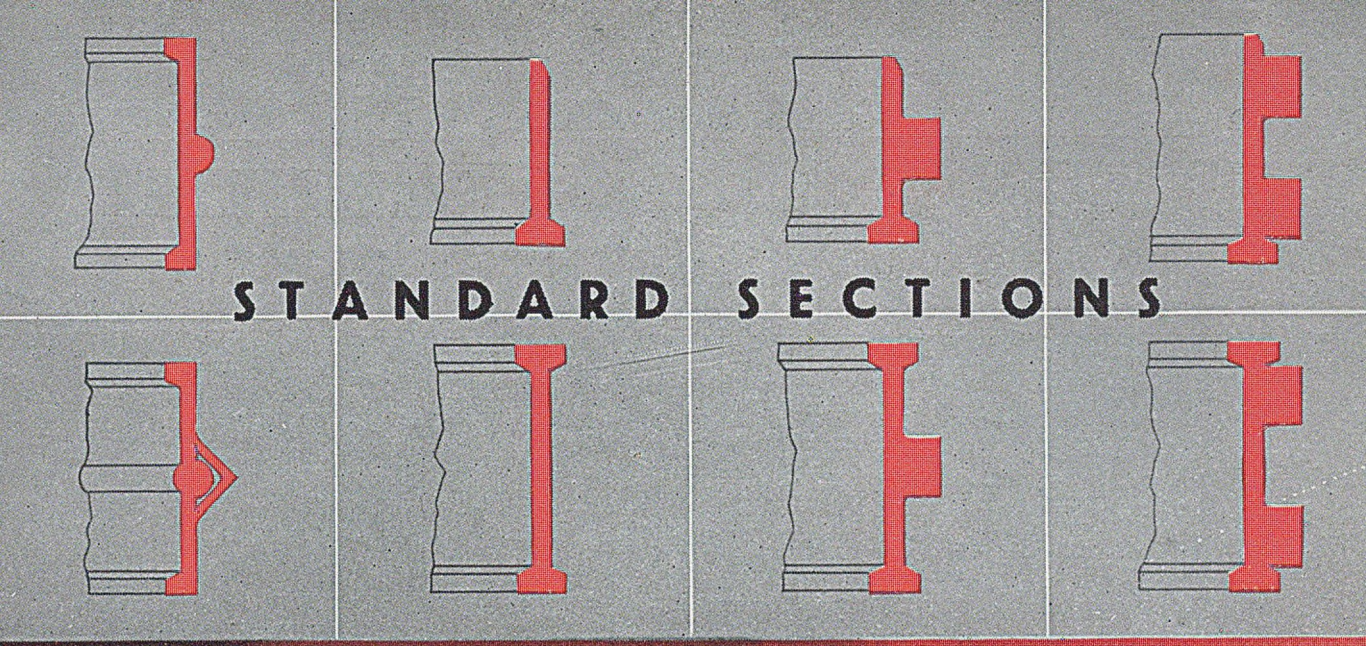

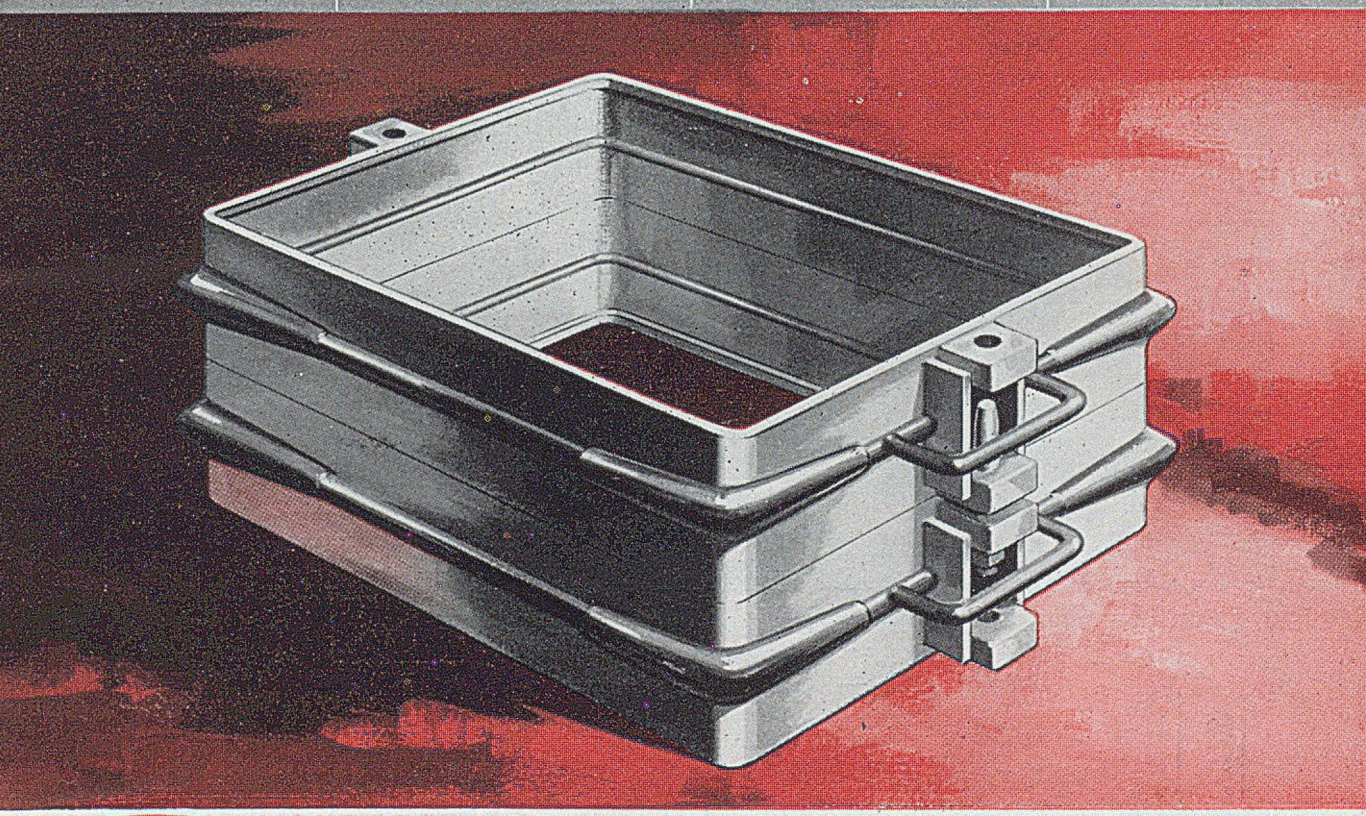

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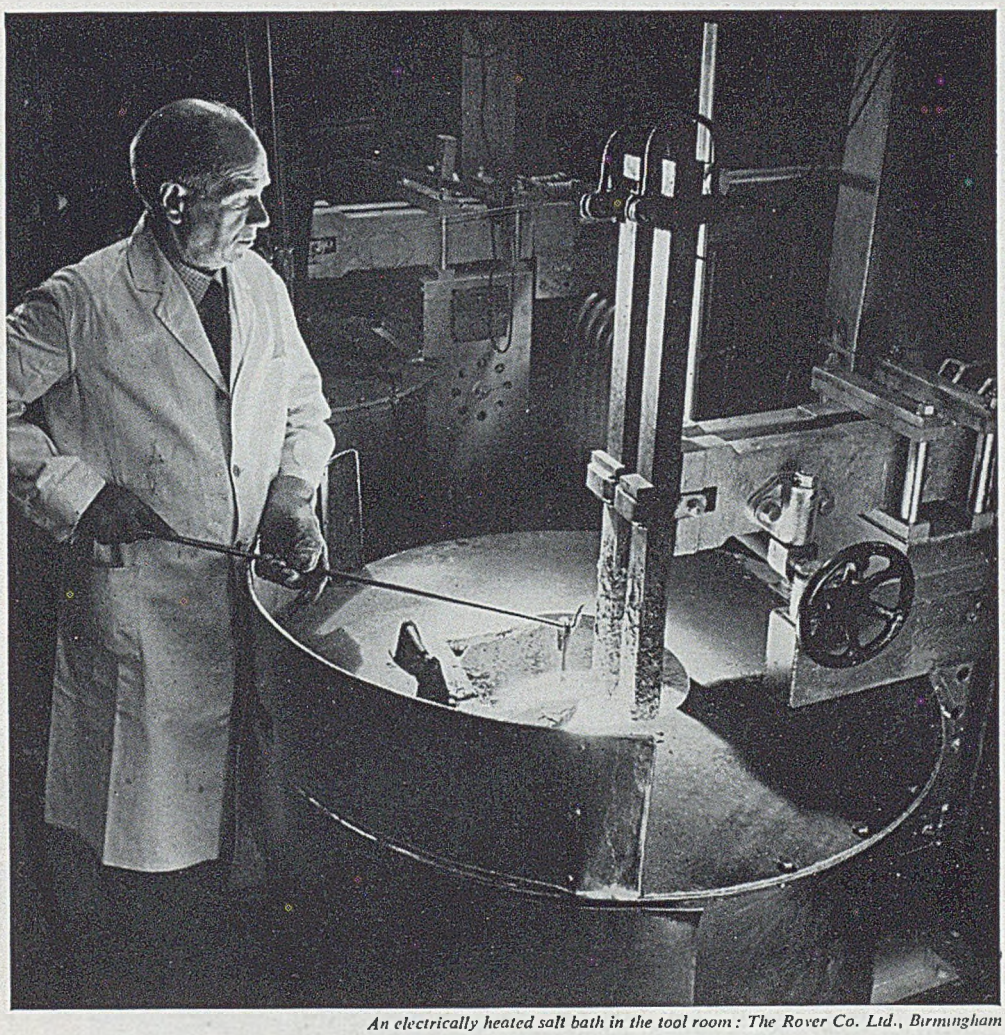

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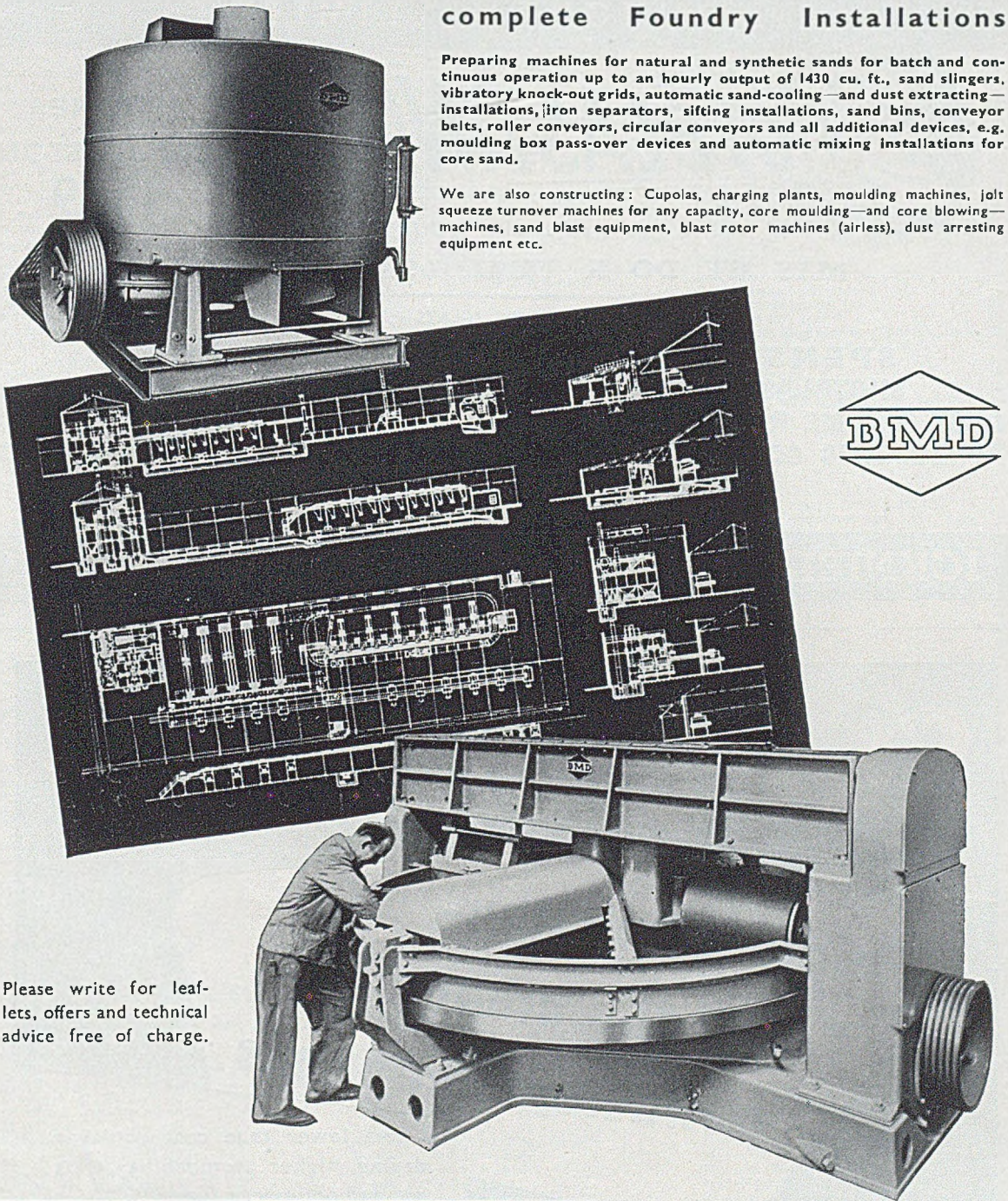

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PRINCIPAL CONTENTS

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

Training of Foundry Scientists

At the recent meeting of the Ironfounders' National Confederation, Dr. Ivanhoff posed and answered in his lecture the question as to whether foundry science should be taught at university standard. He made out an excellent case, but in doing so departed from the traditional syllabus. He wanted men who could make a proper scientific approach to such questions as heat flow, mould/metal reactions and the like. The ordinary metallurgical training, he believed, did not confer such qualities. Moreover, Dr. Ivanhoff, deeming that a novel attack must be made on such subjects, prefers men who have not laboured under an overcrowded agenda, but those who have had leisure time to develop original thought. With this we whole-heartedly agree, for amongst the most ignorant beyond the ambit of their immediate studies are some of the graduates of the modern universities.

We hesitate to recommend departure from the traditional in education and even deplore some of the more recent innovations, based on "cock-eyed" psychology, which aims at developing inherent potentialities, and a classification of aptitudes at far too early an age. Dr. Ivanhoff's suggestions are not revolutionary, but merely an assertion that a basic industry, such as that for manufacture of castings, has discovered it needs scientific help of the type which can only be provided by a return to the sort of education dispensed by the older universities. Where techniques are known, there is no difficulty, provided the demand is there, in having them taught at the various scholastic establishments. Yet the foundry industry is beset with troubles for which no reasoned cure can be postulated.

Dr. Pearce, who in discussion supported Dr. Ivanhoff's pleas, left us with the impression that a percentage of the ex-students of the National Foundry College should fill the lecturer's needs. By training men here in sufficient quantity there should emerge a corps who, by natural ability reinforced by advanced studies, could provide the industry with the necessary scientific personnel. Dr. Pearce, by means of statistics, clearly showed that this country was training far too few such men as compared with most overseas countries. The only divergence in the two approaches was that one wanted increased leisure during training and the other many more highly-trained men, from which the élite scientists would emerge. We would hesitate to pronounce a verdict, but we were impressed that Dr. Pearce's scheme—largely due to his personal enthusiasm—is in being and merely needs expanding. Still, Dr. Ivanhoff's views should somehow or other be incorporated. Whatever be done, it can but be a compromise.

Meehanite Conference

The 21st annual conference of the International Meehanite Research Institute was held at the Grand Hotel, Scarborough, from May 12 to 14. Representatives from Great Britain and many European countries were present and as usual the subjects discussed covered a wide range of foundry activities. The conference opened under the presidency of Mr. W. H. Harper, of John Harper (Meehanite) Limited, who welcomed new members. In his address he referred to the importance of research, particularly in meeting the more difficult present-day market conditions. He stressed the need for efficient operation of plant and the pooling of experience in improved methods.

Technical Session

The technical session then opened under the chairmanship of Mr. E. M. Currie. Subjects listed for discussion included reports on "Castings Service Records"; "Foundry Rationalization"; "Chemical Plant Symposium"; "Protective Coatings"; "Shell Moulding"; "Testing Errors"; "Casting Surface Finish" and "Welding of Meehanite." This part ended with the showing of a film produced by Glenfield and Kennedy Limited.

In the management session, under the chairmanship of Mr. W. H. Harper, papers were presented by Brig. P. J. Slater on "Conditions of Sale" and by Mr. J. Cameron Jnr., on "Health and Safety in the Foundry." The metallurgical session was presided over by Mr. G. B. Taylor and reports included "Operation of a Basic-lined Cupola"; "Prevention of Graphite Corrosion"; "Coke Evaluation"; "Modulus of Elasticity Determination"; "Non-destructive Testing"; "Pouring Speeds" and "Application of the Holding Furnace." In the foundry session, which was presided over by Mr. E. K. Gould, papers on "Economies by the use of Cover Cores," "Exothermic Materials," "Sand-handling Systems." "Cleaning-shop Methods" and "Economies through Pattern Rigging" were given.

The annual dinner was held on the evening of May 13 and was presided over by Mr. E. M. Currie who reviewed the work and growth of the organization. The toast to the Institute was proposed by Mr. J. D. Carmichael and responded to by Mr. W. H. Harper. The toast "Visitors from Abroad" was proposed by Mr. H. R. Newman.

Institution of Metallurgists

On Wednesday of last week, the Institution of Metallurgists held their annual meeting and general meeting at the Park Lane Hotel, London. After formal business had been transacted, Dr. L. B. Pfeil, A.R.S.M., F.R.S. (director, Mond Nickel Company, Limited), was elected as president, with Dr. C. W. Dannat, A.R.S.M., F.R.I.C. (London University), and Dr. L. Northcott, PH.D., F.R.I.C. (Woolwich Arsenal), as vice-presidents. Mr. G. L. Bailey (British Non-Ferrous Metals Research Association) was elected as honorary treasurer.

Then followed Dr. Pfeil's presidential address, which dealt mainly with "milestones" among metallurgical developments he had witnessed during the last 30 years.

Progress in Cast Iron

On the subject of cast iron, Dr. Pfeil said this material had, during the past thirty years, been developed and improved to an extent which made the modern engineering irons scarcely recognizable as related to the earlier types. Advances which had taken place, in methods of production and treatment, and by means of alloying, were strikingly illustrated by British Standard specifications, issued at various stages over this period. Whereas, in 1928, the first British Standard covered only two grades of cast iron, having, respectively, tensile strengths of 9 and 11 tons per sq. in., improvements in foundry technique had by 1938 made possible specification of "high-duty" iron castings of three grades, of 14, 17 and 20 tons tensile. In 1941, a new 23-ton grade was standardized, and in 1945 a composite specification was drawn up covering various grades ranging in tensile strength from 10 to 26 tons per sq. in. "Special" grades of cast iron should not be omitted from review, since these materials (such as the austenitic corrosion-resisting and non-magnetic types) had been developed mainly within the past 30 years, and their advent had widened the scope of application of cast irons far beyond limits foreseeable in earlier years. Finally, an important development in this field had been that of the spheroidal- or nodular-graphite cast irons, in which by treatment with magnesium or cerium, the flake-graphite structure, which was characteristically associated with brittleness in cast iron, was changed to a spheroidal form.

Following the meeting there was held a conversazione at which members gathered in informal groups to discuss metallurgical topics of the day.

The illustration shows H.R.H. the Duke of Edinburgh on the stand of Bakelite, Limited, at the B.I.F., Birmingham, with Mr. H. V. Potter, B.SC., F.R.I.C., M.I.CHEM.E., chairman and managing director of the company, examining a foundry shell-mould made with resin. From the foundry point of view, exhibits of shell moulding undoubtedly "stole the show" at this year's British Industries Fair, and the Duke also showed great interest in other stands featuring this process.

Fluidity Test for Quality Control in the Foundry

*By T. P. Yao, B.Sc., Ph.D.**

Of the many problems which confront the foundryman, the "misrun" casting is one of the most serious. In some foundries, misrun castings account for 25 per cent. of the total scrap, and the financial loss due to this defect is considerable. This article describes the development of simple apparatus for routine fluidity testing and the application in the foundry of the results secured.

In recent years, comprehensive investigations have been made of the fluidity of liquid metals and alloys, with the aim of obtaining information that might help to prevent this form of casting defect. So far, however, very little information has been made known with regard to the adoption of a fluidity test as a means of quality control in the foundry, and to its possible value in improving production. Two main reasons account for this fact: first the equipment needed and the operations involved in accurate testing are too cumbersome for quick routine work on the foundry floor. Secondly, in those foundries where certain simple fluidity-testing methods have been adopted, too much attention has been given to the inherent properties of the metal, and no effort has been made to study non-inherent factors that may markedly affect the apparent fluidity of the molten metal. Thus, the fluidity test has been deprived of its full effectiveness as a means of quality control.

Major interests which underlie the present work are first, to devise a simple and reliable fluidity test which requires neither skilled labour nor intricate equipment, and secondly, with this simple fluidity testing method to investigate the cause of misrun castings in a modern foundry and possible methods of eliminating such defects.

Miniature Spiral Fluidity Test-piece

Numerous types of test mould have been used for fluidity tests. The type which is most commonly used is the spiral mould made either in green- or dry-sand,[1] or in metal or graphite.[2] Sub-committee T.S.6 of the Institute of British Foundrymen Technical Council recommended a U-shaped test-piece[3] from which run three vertical limbs of different diameters. A similar type of test-piece with a three-stepped runner, with one vertical vent on each step, has been used in certain foundries.

The Saeger and Krynitsky spiral test-piece, which is normally used for testing the fluidity of ferrous metals, has the disadvantages of taking too much labour to prepare the mould and too much metal for testing, and is, therefore, unsuitable for quick routine testing on the foundry floor. The U-shaped and vertically-vented test-pieces are unsound in principle since the height to which the flowing metal will surge in vertical vents is determined mainly by the change of momentum of the stream, which is affected by a pressure wave generated inside the mould and by any change in the cross-section. Fig. 1 is an experimentally-determined curve showing the height to which the molten metal surged in vertical vents spaced at regular intervals along the spiral channel of a mould of the type used by Saeger and Krynitsky. Obviously, the surging height cannot be taken as a measure of fluidity.

In order to minimize the shortcomings of the Saeger and Krynitsky spiral mould without forfeiting its advantage of accuracy, a miniature spiral test-piece (Fig. 2) with a semicircular section of $\frac{3}{16}$ in. dia. and a $\frac{1}{4}$-in. spacing, has been devised. This kind of miniature spiral test-piece can be moulded in a small pouring bush 3 in. high and $3\frac{1}{2}$ in. dia. (Fig. 3). A comparison between the Saeger and Krynitsky test-piece and the miniature test-piece is given in Table I.

There are several advantages in using the miniature spiral test-piece, for, besides the saving of metal and sand, a number of miniature test-moulds can be rammed in a short period of time and carried to the casting site wherever the test is needed, and the test can be easily made by pouring the molten metal from a small ladle. The spiral length can be determined visually by knocking out the mould immediately after casting, thus giving rapid information about the fluidity of the bulk of the metal prior to casting. If a large number of test-moulds were needed, a mechanical rammer with the impression of a spiral on the die could be made easily.

* Royal School of Mines, London; formerly the Department of Industrial Metallurgy, University of Birmingham.

TABLE I.—*Comparative Data for the Saeger and Krynitsky and the Miniature Spiral Fluidity Test-moulds.*

Test-piece.	Cross-section (sq. in.).	Dia. of spiral (in.).	Wt. of metal (lb.).	Wt. of sand (lb.).	Wt. of sand and moulding box (lb.).	Time taken to ram one mould (min.)
Saeger and Krynitsky	0.1	8	9	52	78	15 to 20
Miniature spiral	0.055	3	1.2	5	14	3 to 5

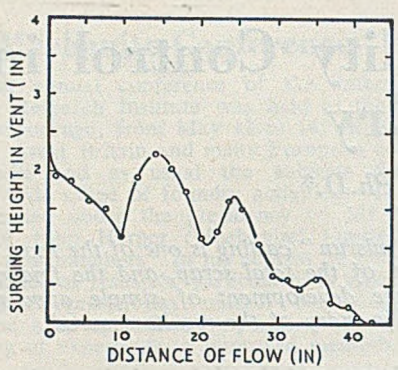

FIG. 1.—*Surging Wave of Liquid Cast Iron Flowing in the Spiral Mould.*

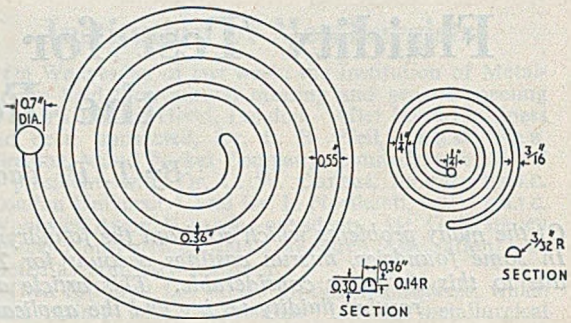

FIG. 2.—*Saeger and Krynitsky Spiral Test-piece (left) and Miniature Spiral Test-piece (right).*

Experimental Results

(*a*) *Relationship between pouring temperature and spiral length.*—Tests were made to determine the relationship between the pouring temperature and the fluidity of cast iron using both the Saeger & Krynitsky test-piece and the miniature test-piece, and the results are shown in Figs. 4 and 5. The relationship is linear for both types of test-piece, and the results for the miniature test-piece show less scatter than those for the larger spirals, particularly in the lower-temperature range.

(*b*) *Effect of ferro-static head, rate of pouring, and moisture content of sand on the apparent fluidity of cast iron.*—Tests were made using the miniature test-piece to investigate the effect of the above factors on the fluidity of grey cast iron, as represented by the spiral length, and the results are shown in Figs. 6, 7 and 8, respectively. There is a parabolic relationship between the fluidity and the ferro-static head:

$$F = k\sqrt{H}$$

where F represents the spiral length and H the ferro-static head. The relationship between the rate of pouring—varied by using different sizes of pouring hole—and the fluidity is also parabolic, with the fluidity approaching asymptotically a maximum value when the rate of pouring exceeds a certain value. The fluidity decreases as the moisture content of the sand increases, within the range of 3 to 7 per cent.

Factors Affecting the Fluidity of Molten Iron

(*a*) *Fluidity variation due to compositional change throughout the working shift.*—In the majority of mechanized foundries, the composition of the liquid metal is normally well controlled throughout a working shift. For instance, in the foundry where the present research was carried out, samples are taken from the receiver at intervals of one hour throughout the shift and Table II gives analyses for a typical day's run.

This shows that the maximum variation in total carbon was only ±0.2, silicon ±0.025, and phosphorus ±0.012 per cent. The maximum variation in the "carbon-equivalent based on fluidity"[4] (C.E.F. = T.C. + Si/3 + P/2) is only of the order of ±0.1 per cent., which, according to Evans' results is only equivalent to a fluidity variation of 2 in. on the Saeger & Krynitsky spiral, or, correspondingly, to a temperature variation of ±7 deg. C. On the other hand, as shown later, the maximum temperature variation of the liquid metal from the receiver in a working shift was commonly as high as ±40 deg. C., and that from the ladle, ±70 deg. C. Therefore, compared with the temperature factor, that of composition has a relatively small effect on the fluidity of the liquid metal in a foundry, where the analysis of the metal is strictly controlled. However, in foundries where the metal composition shows wide variations, the compositional factor may be of considerable importance in relation to fluidity.

(*b*) *Fluidity variation due to variations in the temperature of the molten iron during the shift.*—In the foundry where the investigation was carried out, the temperature of the liquid metal from the receiver was found to be under a periodic variation

TABLE II.—*Analyses of the Cast Iron in a Mechanized Foundry.*

Time sampled.	T.C.	Si.	P.	Mn.	S.	C.E.F.
7–8 a.m. ..	3.41	2.35	0.150	—	—	4.208
8–9 ,, ..	3.40	2.35	0.146	—	—	4.256
9–10 ,, ..	3.38	2.35	0.150	—	—	4.238
10–11 ,, ..	3.31	2.30	0.160	—	—	4.157
11–12 ,, ..	3.43	2.35	0.152	0.62	0.101	4.289
12–1 p.m. ..	3.37	2.35	0.150	—	—	4.228
1–2 ,, ..	3.23	2.30	0.170	—	—	4.092
2–3 ,, ..	3.28	2.30	0.154	0.65	0.104	4.124
3–4 ,, ..	3.34	2.35	0.150	—	—	4.198
4–5 ,, ..	3.30	2.35	0.160	—	—	4.163
5.00 ,, ..	3.29	2.30	0.150	—	—	4.132
Maximum variation	±0.2	±0.025	±0.012	±0.025	±0.0015	±0.1

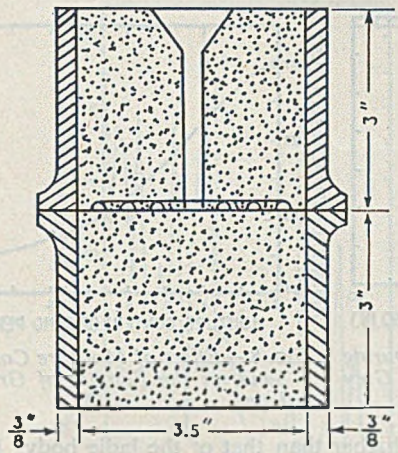

FIG. 3.—*Section through a Miniature Spiral Fluidity Test-mould (conveniently made in Runner Bushes).*

throughout the working shift, as shown in Fig. 9. The start of the shift, the breakfast-time break and the lunch-time break, each were followed by a drop in the temperature of the metal due to the damping down of the cupola and of the receiver. The maximum drop from the normal working temperature was sometimes as high as 80 deg. C., and at least one hour was required for the temperature to rise again to the normal working value. If 1,320 deg. C. (measured with an optical pyrometer), is taken as the average working temperature, then the fluidity value in the cold-metal period might be as low as one-third of its normal average value.

The temperature depression after the resumption of the shift was greatly accentuated by the absorption of heat by the ladle which had cooled down during the break. The temperature drop in the ladle might be as high as 80 deg. C. for a 14- to 19-cwt. ladle, and 60 deg. C. for a 5-cwt. ladle. This drop was gradually reduced to 15 and 20 deg. C., respectively, after the ladle had been used a number of times. The temperature of the metal, measured in the spout of the ladle, was always considerably lower than that in the ladle body because the cold metal was always washed into the spout when the ladle received hot metal from the receiver and because the spout had a bigger ratio of surface area to volume than had the ladle body. Consequently, the fluidity of the liquid metal was further reduced.

The periodic variation of the fluidity of the liquid metal, caused by the periodic temperature variations, is illustrated in Fig. 9, in which both the theoretical fluidity values, as derived from the temperature curves, and the actual values as measured, are given. From the characteristics of these curves, there is good reason to believe that most misrun castings occur in these periods of temperature depression.

(*c*) *Other factors.*—Besides the compositional and temperature factors, other factors that may affect the apparent fluidity of cast iron in the foundry are the moisture content of the sand, the pouring rate and the pouring height, the ferro-static head, and the design and venting of the mould. Since the

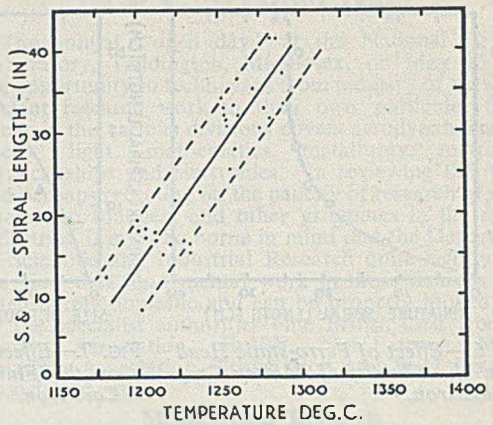

FIG. 4.—*Casting Temperature: Spiral Length Relationship with the Saeger and Krynitsky Test-piece.*

moisture content of sand in a mechanized foundry is well controlled, this factor can be neglected. High pouring height and pouring rate, and high ferro-static head are often favoured in order to obtain high fluidity, provided they introduce no adverse effect which may cause other defects. There is no definite rule with regard to the effect of mould design on the apparent fluidity of liquid metal, and it is impracticable generally to design the mould to suit the fluidity. On the other hand, it is perfectly feasible to test and control the fluidity of the metal to suit the specific mould design.

(*d*) *"Specific Critical Fluidity Value" for a given mould design.*—Supposing all other factors are identical, then for a certain specific mould design, there must be a "critical fluidity value" below which misrun castings are bound to occur. Fig. 10 illustrates a casting-time/temperature and fluidity/temperature diagram for casting a flywheel It is seen that the casting time increases very rapidly when the casting temperature—and correspondingly the fluidity value—approaches a certain critical value. In this case, 12 cm. of the miniature-spiral length is the critical fluidity value below which the casting time tends to increase towards infinity or, in other words, the casting tends to "misrun." For a given mould design, the specific critical fluidity value

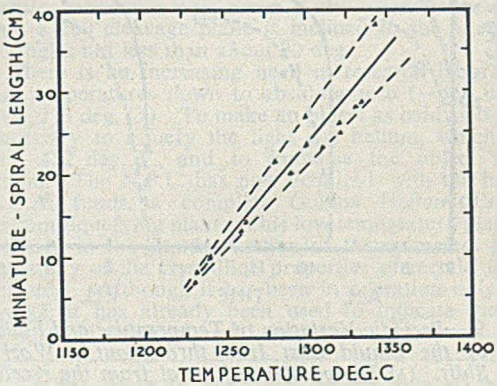

FIG. 5.—*Casting Temperature: Spiral Length Relationship with the Miniature Test-piece.*

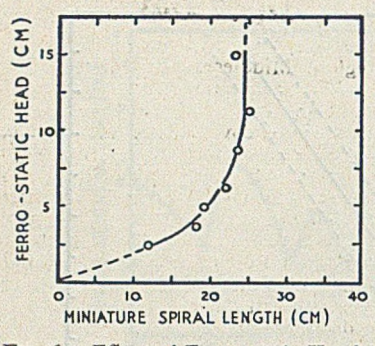

FIG. 6.—*Effect of Ferro-static Head on the Fluidity of Molten Grey Cast Iron.*

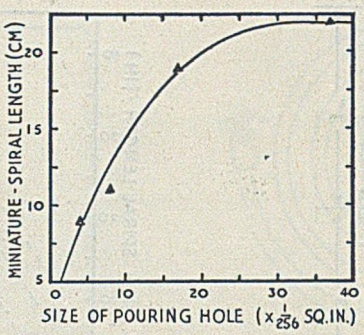

FIG. 7.—*Effect of Rate of Pouring on the Fluidity of Molten Grey Cast Iron.*

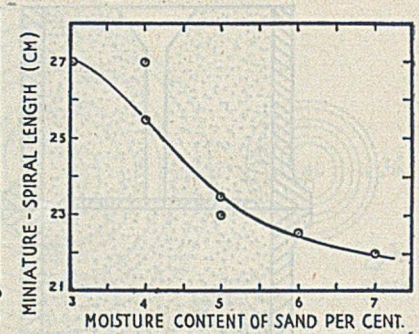

FIG. 8.—*Effect of Moisture Content of Sand on the Fluidity of Grey Cast Iron.*

can be found by carrying out a series of tests and, once this value has been found, check tests can be made on the liquid metal using the miniature-spiral test-piece. Thus, the occurrence of " misrun " castings may be prevented.

The observations described earlier suggest that temperature variation is the dominant factor in determining the fluidity variation of the liquid metal in a mechanized foundry. To confirm this and to test the effect of improved temperature control on production, two modifications in the process were tried. In the first, the casters were advised to pour the hot metal from the receiver into the ladle through the ladle spout, so that the chilled metal in the spout would be washed into the ladle body. Thus, eventually, the temperature of the spout would be slightly higher than that of the ladle body. During the second experiment, the breakfast-time break at 9.00 to 9.15 a.m. was stopped, and hence the temperature-depression period which originally followed this break was avoided. Statistics of the number of rejects of " misrun " castings before and during these two experimental periods are plotted in Fig. 11. The number of reject castings due to " misrun " dropped very markedly after the first experiment was started. The statistics taken during the second experiment show that only two out of ten days yield rather high values, the majority showing con siderable improvement.

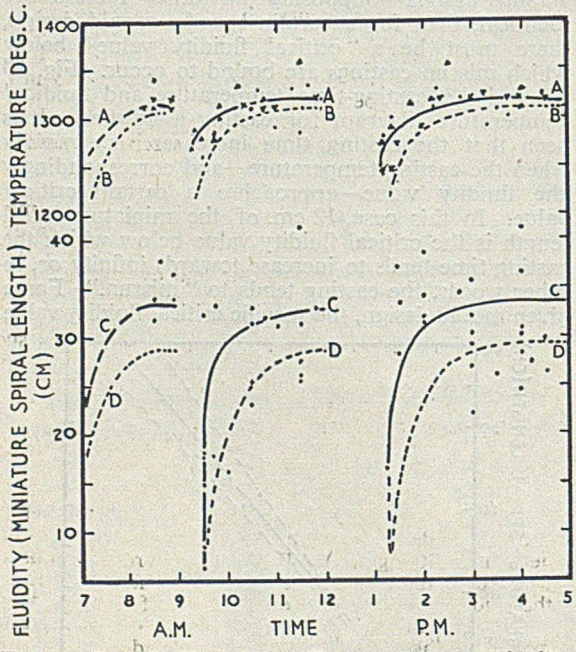

FIG. 9.—*Periodic Variation of Temperature and Fluidity of the Liquid Cast Iron throughout a Working Shift.* (A) *Temperature of metal from the receiver;* (B) *temperature of metal from the ladle;* (C) *fluidity of metal from the receiver; and* (D) *fluidity of metal from the ladle.*

Conclusions

(*a*) The miniature-spiral test provides a simple means of determining the fluidity of the liquid metal. Hence, its use as a routine test is of value for quality control in the foundry.

(*b*) Tests with the miniature-spiral test-piece show that the fluidity of grey cast iron varies linearly with the casting temperature in the working range above 1,250 deg. C.; that there is a parabolic relationship between the fluidity and both the ferro-static head and the rate of pouring, and an increase in the

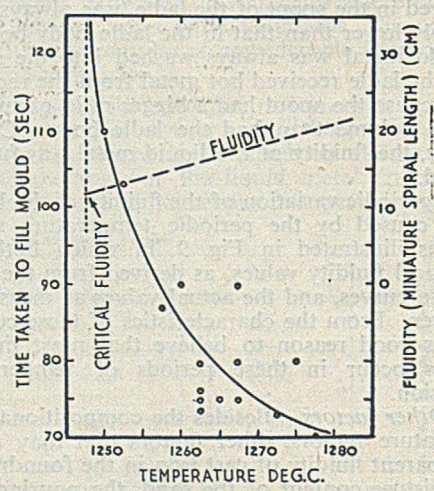

FIG. 10.—*Casting-time: Temperature, and Fluidity: Temperature Relationship for the Pouring of a Flywheel Casting.*

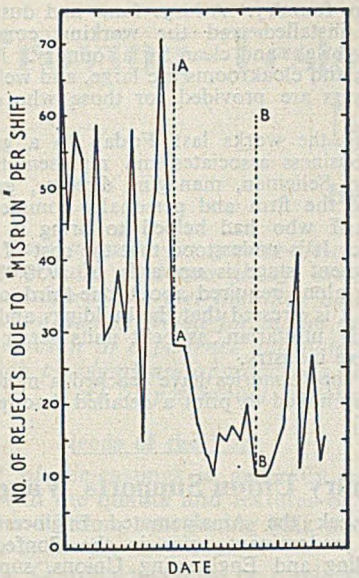

FIG. 11.—*Statistics showing the Day-to-day Rejects due to "Misrun." A-A—Date from which the method of filling the ladle was changed; and B-B—date from which the 9.00 to 9.15 a.m. break was stopped.*

moisture content of the moulding sand tends to reduce the fluidity.

(*c*) In a foundry where the composition of the liquid metal is well controlled, the effect of the compositional factor on the variation of fluidity is almost negligible. The major factor that governs the fluidity of the liquid metal in this case is that of temperature. The damping down of the cupola and receiver, the use of a cold ladle, the displacement of cold metal from the ladle body into the ladle spout, all tend to give rise to the danger of low fluidity and therefore lead to the occurrence of "misrun" castings. Careful control of the metal temperature leads to a considerable reduction in the number of rejects.

(*d*) A particular mould design has a specific critical fluidity value below which "misrun" castings are bound to occur. A routine miniature-spiral test carried out on the liquid metal prior to pouring each batch of castings can ensure the prevention of "mis-run" castings.

Acknowledgment

The author wishes to express his thanks to Mr. J. J. Sheehan, managing director of the Coneygre Foundry Company, Limited, for providing the facilities to enable the present research to be carried out, and for his kind permission to publish this article. Thanks are also due to Professor M. S. Fisher, D.SC., and Dr. D. R. F. West, of the Metallurgy Department, the Royal School of Mines, for their valuable suggestions.

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N.P.L. "Open Day"

The annual "open day" at the National Physical Laboratory, Teddington, Middlesex, on May 15 gave the opportunity to technicians from industry of surveying current research work in their own particular field.* Work in the various divisions covers aerodynamics, electricity, light, mathematics, metallurgy, metrology, physics, ships and electronics. In reviewing this work, and perhaps reflecting on the paucity of research of direct interest to founders and other groupings in the metals industries, it must be borne in mind that the Department of Scientific and Industrial Research quite rightly hold the view that fundamental work in those fields is quite often purely domestic and can be properly looked after by the specialist authorities—the British Cast Iron Research Association, British Non-Ferrous Metals Research Association, British Iron and Steel Research Association, etc.

Metallurgical Research

In metallurgical research, one of the urgent problems under investigation at N.P.L. is that of fatigue at notches. Tests have been made on a mild steel. The plastic deformation occurring was determined from fatigue tests on plain unnotched test-pieces by measuring both the dynamic stress and strain. Fatigue tests were then made on square-section test-pieces with transverse holes. The comparatively high notched fatigue strength of mild steel was shown to be attributable to plastic deformation. Harder materials show little or no plastic deformation, and consequently are more notch sensitive.

The imperfection structures in metal crystals which have been observed microscopically cannot be directly related to the hypothetical crystal imperfections, which figure in current physical theories of plastic deformation. However, one type of observable imperfection, the tilt boundary, which is formed by the slight misorientation of two adjoining regions of a crystal, can be simply related to theory. Thus the experimental behaviour of such boundaries is of interest and is being investigated at N.P.L. In electron microscopy, it has hitherto been found extremely difficult to identify in the electron microscope any particular predetermined area of an original metal specimen. This difficulty has now been overcome by a method which allows repeated study of a marked area of a metal.

Experiments on brittle fracture of iron using small tensile test-pieces, consisting of single crystals, are made by a strain and anneal method, the final dimension over the test-length being obtained by electrolytic machining. Results obtained to date indicate that over a wide range of orientation single crystals of iron are still completely ductile at −196 deg. C., but a change to completely brittle behaviour may occur if the orientation is such that a 100 cleavage plane is inclined to the stress axis at angles not less than about 80 deg.

There is an increasing need in research laboratories for temperatures down to absolute zero (−459 deg. F. or −273 deg. C.). To make an object as cold as this it is necessary to liquefy the light gas helium, which boils at −452 deg. F., and to immerse the object in the liquid. The N.P.L. has now acquired, with the help of E.C.A. funds, a complete Collins Helium Cryostat helium-liquefying plant. This low-temperature plant will be used in the standardization of thermometers and in the study of the crystalline properties of metals, including steel. Although it has been in operation only three weeks, it has already been used to indicate the state of internal strain of metal specimens.

* Further details of recent work at N.P.L. in all the divisions may be obtained from the report for 1952, which was released last week (H.M. Stationery Office, price 2s. 6d.).

New A.P.V. Foundries Opened

Model Factories at Crawley Sussex

Last Friday saw the official opening at Crawley new town, Sussex, of the new foundries and workshops of A.P.V.-Paramount, Limited. The parent firm, A.P.V., Limited, one of the largest manufacturers of plant in stainless steel, aluminium and copper for the dairy, brewery, food, chemical, and associated industries, was founded by Dr. Richard Seligman at Wandsworth, London, in 1910, as the Aluminium Plant and Vessel Company, Limited, for the fabrication of industrial tanks and vessels in aluminium. A.P.V.-Paramount, Limited, was formed in June, 1952, to take over the stainless-steel foundry of the former subsidiary, Paramount Alloys, Limited, of Slough, and the aluminium foundries of the parent company, for the rapid growth of the concern in recent years had resulted in an unwanted dispersal of production among four factories (at Point Pleasant, Garratt Lane, Wandsworth, and White City, London, and at Slough), and the company desired to move to an entirely new factory and foundry to be built in the new town at Crawley.

This move is being carried out in two stages, the first stage, now completed, includes the fitting, machine, press and polishing shops and also the foundries; the head office and the coppersmith shops remain at Wandsworth and will constitute the second stage, soon to be commenced. 1,400 personnel are involved, and houses are being provided in the Crawley new town for all who require them; 500 are already working in the new factory and most of these are already housed. Thus, the move has considerable social implications, as it involves a radical change in the way of life of the employees. From being widely dispersed in and around London they are now concentrated in a single, compact community. A noticeable feature of the move has been the loyalty exhibited by all members of the company, the overwhelming majority of those up to the present affected having moved to Crawley. The loss of skilled personnel has been insignificant.

New Premises

The factory and foundries occupy a 17-acre site at Manor Royal on the industrial estate of the Crawley new town. They cover an area of 200,000 sq. ft. and are by far the largest so far erected in the town. The factory and the foundries form entirely separate blocks, each with their own administrative offices. The factory block covers 128,800 sq. ft. and consists of five 475-ft. bays with parts of three further bays which will be extended later. The frontage is taken up by the works offices. The layout provides for a general flow of production from the front to the rear, the stores take up the front ends of the bays and are served by a large goods entrance. The machine, press and polishing shops stretch across all bays while the fitting shop occupies most of the large 60 ft. bay and one other.

The new foundries can be said to embody most of the applicable modern ideas in planning and equipment. They are mechanized up to the limit possible with the considerable variety of work handled.

The foundry building consists of two 60-ft. main bays 250 ft. long, one for the stainless-steel section and the other for aluminium and copper-base alloys. A 20-ft. middle bay houses the furnaces and their auxiliary equipment including the generators. The stainless-steel furnaces are electric high-frequency and arc types while the aluminium furnaces are oil fired. Offices, stores and patternshops occupy the frontage of the building and the fettling shops the rear end. X-ray and other test rooms run along the side of the aluminium foundry. A large fume and dust extraction plant is installed and the working conditions are unusually bright and clean for a foundry. Here, again, lavatories and cloakrooms are large, and well equipped, and showers are provided for those who care to use them.

Opening the works last Friday to a gathering of friends, business associates and representatives of the Press, Dr. Seligman, managing director, gave a short history of the firm and personally commended those of the staff who had helped to bring it to to-day's eminence. It is understood that the cost of the project at its present stage is upwards of £750,000 and the foundries alone required about one-third of the total. Even so, it is stressed that the buildings and equipment are strictly utilitarian, as befit units serving a highly competitive industry.

[When the foundries have reached a more advanced stage, it is hoped to print a detailed description in the JOURNAL.]

Foundry Union Supports Wage Claim

Last week the Amalgamated Engineering Union, with its predominant voice in the Confederation of Shipbuilding and Engineering Unions, supported the engineers' 15 per cent. wage claim. So has the Electrical Trades Union, and the Amalgamated Union of Foundry Workers declared: "We stand solidly with the Confederation on this claim and will meet our obligations to the full."

The Confederation recognizes that the claim will involve a struggle with the employers and through the constituent unions it has impressed upon the workers the need to stand firm. The undertaking by Mr. J. Gardner, secretary of the foundry workers, quoted above, is typical of the response, and there may well be anxious conjecture about what is involved in meeting "our obligations to the full."

Dismissing the warning by Mr. Watkinson, Parliamentary Secretary to the Ministry of Labour, that the easiest way to destroy Britain's competitive position is to have a round of wage increases entirely unrelated to output and efficiency, Mr. Gardner, like the other union leaders, believes the industry can afford to pay the 15 per cent. claim.

Cost of Claim

The cost of meeting the claim is estimated at £125 m. a year, but that would not be all the cost if the engineers had their way. The Amalgamated Engineering Union recently decided to press for working hours to be reduced from 44 to 40 a week. They maintain that they work excessive hours, though, according to the Ministry of Labour, nationally the average working week last October was 46.1 hours, compared with 46.5 hours in 1938.

REPRESENTATIVES from many parts of the South West attended a meeting of the district committee of the Amalgamated Union of Foundry Works at Bath on May 11, when it was agreed to recommend the executive to press for an increase in wages of at least 15 per cent. and for a similar amount for women and apprentices.

A RECENT ORDER received by the Brush Electrical Engineering Company, Limited, Loughborough, for a 1,000-kw. back-pressure turbo-alternator set for the South Johnstone Sugar Milling Association, Queensland, Australia, is a duplicate of the 1,000-kw. set supplied earlier this year.

Proving Tests and Procedures for New Dies

By W. M. Halliday

Before any new pressure- or gravity-die-casting set-up can be successfully launched into production, numerous important problems always arise. These generally are questions of component or die design; efficient operation of the die; the alloy adopted, or working conditions. Many such problems cannot be wholly foreseen and provided for at the drawing-board stage. Their solution will ordinarily only be feasible as a result of experience and data gained from actual trials on the completed die. The manner in which such problems are approached; the nature of the proving tests applied, and the success attained are of paramount importance to both die-caster and prospective user.

Needs of the User

The user of die-castings is generally primarily concerned with the quality and features of the die-cast article and before sanctioning bulk production requires the following assurances.

Precision.—Components must be produced to the desired tolerances on critical dimensions, holes sizes, etc.

Shape.—The customer is specially interested in checking whether the die-caster has correctly interpreted the shape, form and features required. This is often exceedingly difficult for the die-caster, especially if no actual sample has been supplied at the outset. As a result, the user when viewing first samples may find certain undesirable and unacceptable departures from his original conception. Thus serious die alterations may be incurred.

Strength.—Assurances are required that all physical and mechanical strength properties of castings are consonant with the service or other requirements.

Surface Finish.—The customer is greatly interested also in the quality of surface finish and appearance of castings.

Sample Castings.—The user is most effectively assured on the foregoing points by having several sample castings taken from the new die. By measuring, checking and actually placing such samples into service use, their suitability in every respect can be judged most readily.

Needs of the Die-caster

Unlike the user, who is chiefly concerned with quality, the die-caster has to contend with the component, the die, the alloy, the machine, and all the working conditions. These have to be adjusted in the light of the following requirements:—(1) Wholly-satisfactory castings will have to be produced to customer's tolerances and requirements; (2) die operation has to be determined along most efficient, economical and durable lines to avoid irregularities and tool troubles; and (3) the best working relationship between alloy, die and machine will have to be determined. Thus the die-caster's problems can only be satisfactorily solved by making stringent proving tests. The following are the chief points to be elicited by proving tests if best results are to be obtained.

Feeding the Die

First, any new die must be carefully tested with regard to the capacity for feeding cavities. Customary constructional practice with a new die is to provide runner/gate channels of a known small capacity. This allows for their enlargement or adjustment as revealed necessary by proving tests.

Gate opening and sometimes runner channels have to be increased in size until fully-formed castings are obtained. In some instances gates may have to be inserted at a completely new site around the edge of the cavity to give improved flow, quicker fill, or freedom from porosity due to trapped air. All such runner/gate modifications have to be effected with great care and skill. An excessively large gate may lead to other troubles with castings and die. Subsequent correction may entail costly alterations to the die, for instance by the need to blank-off an imperfect gate. A wrongly-situated gate is also a source of considerable trouble during later production operations, resulting in numerous faulty castings, slower working speed and related defects.

Gate adjustments should always be carried out by stages; at each one of which the opening is increased in width or depth or both by a measured amount. The effects of such alteration at the separate stages are then checked by taking further sample castings.

Sound Castings

The next problem to be overcome is that of the homogeneity of castings. Die-castings are prone to several irregularities which adversely affect their strength and soundness. The chief of those to be eliminated are the various forms of porosity. Sample castings are checked for this condition by weighing; or by sawing into sections across the thickest walls to observe the internal structure. Certain forms of porosity are revealed on the surface of castings by masses of minute "pinholes" distributed over large areas; or by a single, large spongy but sunken patch. This form of porosity will usually be more serious below the surface and extensive cavitation may be revealed if the casting is lightly machined, or heavily mop-polished as for electro-plating. The part will also be seriously weakened.

Other kinds of porosity may occur deep within

casting walls in the form of one or two large voids, located at more or less the same spot in all castings. Generally there will be little indication of this condition on surfaces of castings beyond a slight sink. Such porosity may be detected by X-ray examination, or by fluoroscopic X-ray spectrometer means. The latter is very reliable and accurate for determining internal porosity of the smallest scale. Use of these methods, however, entails costly equipment, which will only be available in the large die-casting foundry. Adoption of the simpler methods of weighing or sectioning will be best applicable in the small foundry on cost grounds.

Venting

The causes of porosity are generally to be associated with the die, and their elimination demands very careful and often prolonged diagnosis. Certain forms of porosity arise from entrapped air-pockets in the die cavity, correction of which call for skilled attention to the following points:—(1) The adequacy of feeding; (2) the velocity of flow of the alloy into the cavity; (3) the capacity and location of the ingate; (4) the need for air vents in the die and (5) die and alloy temperatures.

Venting technique with any new die is often complex. Vents must allow air to escape in a controlled but rapid manner, along selected directions, always in advance of the incoming metal. The determination of the correct size or location of venting channels in the die is only possible on the basis of actual casting and testing of numerous sample castings. If air can escape only very slowly from the cavity it may then act as a cushion to prevent the alloy from completely filling the cavity recesses. Premature chilling of the alloy may occur at such points to leave a large void or masses of "pinholes."

Porosity may be due to compensated shrinkage in the casting prior to its ejection from the cavity. Correction of this condition may involve considerable modification. For instance, great variations in wall thickness may have to be eliminated and ribs, beadings, radius fillets, etc., may have to be incorporated to stiffen weak walls against shrinkage stresses. On the other hand, additional ejection taper may be required on cores or sides of cavity walls to give simpler and quicker release of the castings.

The soundness of castings may also be considerably affected by the ejection methods employed. Unless care be taken in determining these, the casting may be distorted or cracked across some relatively weak portion due to unbalanced ejection pressures. To avoid such undesirable conditions, attention is required to the number, size and distribution of the ejector-rods employed; and to ensure that cores and cavity formations are correctly drafted, free from undercuts, roughness or machining marks.

Accuracy of Castings

The degree of precision attained with die-castings very largely depends upon the accuracy of die elements, particularly cores and cavity formations. The final sizing of these can only be determined satisfactorily by making a number of actual castings during the proving tests. The reason for this, is due to the posing of numerous variable or indeterminate factors such as the shrinkage of casting and die, the effects of ejection, alloy or die heat and so on. With new dies required to produce precision-type castings, customary practice is to leave cores slightly larger and cavities slightly smaller than estimated or nominal sizes. This affords facilities for later adjustment to such members as shown necessary by the measurements of sample castings.

Summarizing, attention is required to the following features, all of which may have some effect upon resultant accuracy :—(*a*) The sizes of cores, cavities or other critical portions; (*b*) whether shrinkage in casting is natural, uniform and free over all portions, or grossly unequalized; (*c*) the method of ejection and tendencies towards distortion; (*d*) the interval elapsing between injection and ejection; (*e*) die and alloy temperatures and the thermal balance of the die; (*f*) ejection draft employed on cores, cavities, etc.; (*g*) the quality and purity of the alloy; (*h*) the speed of operation of the die mechanism and character of all movements, and (*i*) injection pressures used, especially the velocity of metal flow into the cavity. In adjusting the die to counteract adverse effects from any of these features many new dies require the provision of water-cooling facilities. The location or extent of these is only determinable at the proving stage; usually after taking between 100 and 150 castings in a continuous manner. Normally, die temperatures are lower or more irregular during such proving tests than when the tool is placed in regular bulk production, due to the frequent interruptions for making slight adjustments to die or working conditions.

A number of sample castings should be submitted for approval, for submission of a single casting to the user will scarcely ever be satisfactory to enable him to assess accuracy and suitability for the purpose. Sending the user a casting of known inaccuracy in some respect, even though assurances are given that such errors will be corrected later, is bad practice. Unless inaccuracies are eliminated at the outset during proving tests, considerable delay, trouble and worry may arise when normal production is started.

Quality of Finish

Attention will always be required to the quality of surface finish attained on castings. This depends upon several factors, *i.e.*, the quality of finish on cavity walls; temperature of alloy and die; the pressure and speed of injection of the alloy; freedom from irregularities arising from unequal shrinkage, trapped air, gas generation in cavity and so forth, as already mentioned.

Venting and water-cooling of the die will usually materially contribute towards improvement. With certain new dies, protective die washes or dressings may be required. Such treatments assist in stabilizing die temperature, improving alloy flow, and in protecting the die against pitting, staining or similar

chemical action resulting from contact with the molten alloy charge. Preferably, such coatings should be sprayed on to cavity walls when the die is suitably heated. Surface finish on die-castings from any new die normally improves as production progresses. After about 750 to 1,000 shots have been taken, surface finish will reach its maximum quality because of the formation of a natural oxide film deposited on the cavity walls. This gives the well-known "matte" finish in castings.

Working Conditions and "Fool-proofing"

Proper sequence of all die movements, especially those for actuating cores, ejectors, slides and so forth is important. In addition, questions of die lubrication, cleaning, ejection of castings, "flash," etc., must similarly be determined. Much of this will be necessary for the later guidance of the machine-operator when bulk production is commenced.

One extremely important matter sometimes overlooked, but which should certainly be settled during initial proving tests, is that of safeguarding the mechanism or movements of the die. Most dies are extremely complicated pieces of precision mechanism. As such they are liable to serious damage by use under improper working conditions, or from careless handling. Serious defects may also be occasioned in the castings from the same causes.

Unfortunately, it is ordinarily impossible for the die designer to foresee many possible hazards of this kind before the tool is completed and put through proving tests. All new die constructions during proving must be considered from this angle and duly modified in the light of all risks so as to be as near "fool-proof" as possible before their completion.

Records

All problems encountered should be diagnosed in proving and should be recorded separately in an orderly fashion so that subsequent procedure will be logical and reliable. This recording should cover such points as:—Cavity and core sizes; runner/gate capacity, lay-outs and locations; optimum die and alloy temperatures; air-venting or water-cooling provisions; ejection requirements; shrinkage and the effects of all these on dimensional accuracy, strength, etc. Such details prove of worthwhile guidance to both die designer and die-caster when making further proving tests on subsequent dies.

Recorded data of this character will prove useful in other ways, not least being that of simplifying any later repair or maintenace work required with a die. It frequently happens a die has to be withdrawn from production service because of severe wear, or damage. This may call for quite extensive machining, or the fitting of new parts, such as cores, core-slides, ejector-rods, etc. If the original sizes of some worn or damaged part requiring replacement can be ascertained merely by referring to the written record, much delay and possible error will be eliminated.

Economic Survey of India

Economic and commercial conditions in India are surveyed by Mr. Rowland Owen, U.K. Senior Trade Commissioner in India, in a recent addition to the series of Overseas Economic Surveys issued by the Board of Trade and published by H.M. Stationery Office (price 11s.). It covers politics, finance, commerce, industry, and social questions in relation to production and trade. The survey is dated September, 1952, and much of the information given concerning developments in the coal and steel industries has already been published. Statistics of production and foreign trade in the volume terminate at the end of 1951.

Mineral Industry Statistics

The latest edition of the "Statistical Summary of the Mineral Industry," published by the Colonial Geological Surveys Mineral Resources Division (H.M. Stationery Office, price £1 8s. by post), and formerly published for the Imperial Institute, covers the seven-year period 1945 to 1951. Comprehensive details are given of the production, imports, and exports of some 60 minerals and metals, arranged in alphabetical order. World totals for a number of minerals not previously totalled are incorporated in this edition. In accordance with previous practice, production tables for copper, lead, tin, and zinc show output of ore in terms of metal as well as smelter production. The section on coal deals also with coke, briquettes, and the chief coal by-products. The tables dealing with iron and steel give information on iron ore, pig-iron, ferro-alloys, and steel. The import and export tables refer not only to the crude minerals and metals, but also to the chief semi-manufactures and in some cases to the principal chemicals and their derivatives.

New Catalogues

Hardness Testing. A leaflet received from C. Tennant Sons & Company, Limited, of 4, Copthall Avenue, London, E.C.2. as agents for the manufacturers—the Cabul Tool Company, Limited—illustrates and describes an apparatus designated "The Indentometer." There are two models, both of which give direct readings of the various Rockwell hardness equivalents.

Gas Cleaning Plant. Gibbons Heurtey, Limited, of Dibdale, Dudley, Worcs, have sent us an eight-page pamphlet which describes and illustrates a gas cleaning plant to fill the need in areas where no town's gas is available. The plant provides a clean gas at the necessary pressure for burning in industrial furnaces. Of French conception and design, two plants have been ordered for use and building in this country. The catalogue is obtainable on application to Dibdale.

Overhead Cranes. A well produced catalogue received from the Clayton Crane and Hoist Company, Limited, Irwell Chambers, Union Street, Liverpool 3, makes a general appeal to all industries. Amongst the excellent illustrations, however, there are pictures of the Rolls Royce and Taylor Brothers & Company, Limited, of Manchester, foundries and in them there are installed overhead cranes, furnished with a creep motion to ensure care in removing patterns from moulds. These are supplemented by views in unnamed moulding shops. A feature which the reviewer much appreciates is a numbered list of spare parts correlated with a page of sketches to facilitate correspondence. This is the second case recently encountered and is one worth emulating by others where appropriate. The catalogue is available to readers on application to Liverpool.

Worshipful Company of Founders

Tour of West Midlands Industries

The Master (Mr. Kenneth H. Adams) and the Upper Warden (Rev. R. B. R. Walker) of the Worshipful Company of Founders, supported by more than 20 members of the Livery, participated in the third annual foundry visit covering the period April 20 to 22, 1953.

The party gathered at Lichfield on the evening of April 20 and, after seeing some of the features of the city and the cathedral, were entertained to dinner by Dr. J. E. Hurst, J.P., and Bradley & Foster, Limited, in the Guildhall, in the presence of the Mayor of Lichfield, the Sheriff of Lichfield, the chairman of the Johnson Society, and the Bishop of Stafford, Dr. J. E. Hurst being in the chair. The party subsequently returned to its base at Chateau Impney, Droitwich.

On the morning of April 21 a visit was paid to the Austin Motor Company, Limited, Longbridge. In the iron foundries, a wide range of automobile castings, particularly cylinder-blocks and cylinder-heads, were seen in production by mechanized methods. In the steel foundry, the blowing of a converter melt by means of oxygen-enriched blast was also seen, together with the pouring of the moulds. The party then saw some of the assembly lines for engine production, axle assemblies and finally in the chassis-assembly building, one of the most impressive factory buildings of its kind in the world, they watched car assembly, in which a car runs off the line under its own power 18½ hrs. after commencement of assembly. By remarkable ingenuity, the arrangements permit the engine unit, axle assemblies and car body for a particular car to arrive at the same point for final assembly, in spite of the fact that on the line were not only the varieties of passenger car produced, but other types of commercial vehicle and station wagon, as well as cars embodying all the required variations as between home and export market demands and the presence or absence of such accessories as heaters and radio sets. In the absence of Mr. L. P. Lord, Mr. G. W. Harriman, director, presided at the luncheon offered by the company.

Visit to B.C.I.R.A.

In the afternoon, the party proceeded to Bordesley Hall, headquarters of the British Cast Iron Research Association, and by courtesy of the Council inspected the laboratories, offices and work in progress. The director, Dr. J. G. Pearce, briefly outlined the history and development of the Association, its functions, and the various departments set up to deal with them. He referred to the research achievements of the Association and in particular to the evolution of nodular-graphite iron—regarded as the major achievement in this field of metallurgy of the present century—and to work on moulding materials, the soundness of castings and to gases in molten metal. He suggested that the visitors gave special attention to the spectrographic laboratory, one of the best-equipped of its kind in the country, and to the design evolved by the Association's Foundry Atmospheres Team for an exhaust system applied to the standard pedestal grinder.

After tea, the party returned to Droitwich, visiting, *en route*, the home of Mr. D. Howard Wood at Barnt Green, where they were entertained with a performance by local hand-bell ringers. In the evening the party received their various hosts at dinner at Chateau Impney.

On the morning of April 22 the party visited the Coneygre Foundry, Limited, of Tipton, by courtesy of Mr. E. P. Major, chairman, and Mr. J. J. Sheehan, managing director, and saw the whole of the processes involved in the preparation of automobile cylinder-blocks, heads and other castings in high-quality grey iron. This foundry's association with the iron trade extends over 300 yrs. Luncheon was provided at the Queen's Hotel, Birmingham, by W. & T. Avery, Limited, by courtesy of Mr. Austin Morley, deputy managing director, after which the well-known Soho works, the original foundry of Boulton & Watt, was visited at Smethwick. This is now devoted to the manufacture of all kinds of machines for weighing, measuring and testing. The plan of the new foundry near Walsall, now under construction, was also seen, as were several 17th- and 18th-century wool weights bearing the Ewer Mark of the Founders' Company, which was entrusted up to the end of the last century with the stamping of weights and measures. The party subsequently entrained for London.

On each occasion, the Master expressed the thanks of the party to those responsible for arranging each event and stressed the value to the members of the Livery of these visits to works, and of the presence among members of the Livery of those actively connected with the industry.

Heavy Damages on Pollution Charge

Proof was opened before Lord Hill Watson in the Court of Session on May 5 in an action by Glasgow Corporation, who claim payment of £28,887 damages from Dixon's Ironworks, Limited, 1, Dixon Street, Glasgow, in respect of loss and damage which the Corporation allege resulted from the discharge of tarry matter from the public sewers by the defenders.

The pursuers aver that on several occasions from January, 1948, quantities of tar or tarry matter from defenders' works at Crown Street entered the main sewer which drains the Polmadie area of Glasgow. The defenders gave assurances that they would endeavour to rectify the fault, but, the pursuers state, further emissions occurred. As a result of the tarry liquid in the sewer two pumps at the Kinning Park pumping station seized up and a third pump became so clogged with tar that it had to be stopped. The station had to be closed, with the result that crude sewage mixed with tar was discharged direct into the River Clyde instead of being pumped to Shieldhall purification works for treatment. It was averred that the defenders failed to take adequate precautions.

The defenders maintained that after complaints in 1948 and 1949 about tarry matter from the plant finding its way into the coke oven sewer (leading to the main sewer), steps were taken to prevent a recurrence and these were completely successful. Tar which subsequently found its way to the sewer leaked through some old drains of whose existence the defenders had been unaware. They argued that they took all reasonable precautions.

Finding that Dixon's Ironworks, Limited, were negligent in allowing tarry matter to enter and damage the Glasgow sewage system, Lord Hill Watson, in the Court of Session on May 13 awarded Glasgow Corporation £27,000 damages against the company.

THE GROUP TRADING SURPLUS of Guest, Keen & Nettlefolds, Limited, Smethwick (Staffs), for the 53 weeks ended January 3, 1953, rose to £9,387,404 from £8,805,719 for the 52 weeks ended December 29, 1951. The group net profit was £2,653,962 (£3,002,098), according to the preliminary statement issued by the directors.

Elevator-type Annealing Furnaces for Blackheart

Accounts have appeared previously concerning the operation of gaseous annealing as applied to white-heart malleable and this present article now gives details of American practice and up-to-date results for blackheart material in furnaces of similar basic design.*

American annealing practice in elevator furnaces with a controlled atmosphere has interest for British foundrymen in view of the smaller extent to which the type has so far been used in this country. A batch-annealing unit of the elevator type consists of two furnaces each with bottom opening, mounted upon an elevated framework in the manner shown in Fig. 1. The charge of work to be handled is not packed but placed upon a car which is then rolled into position beneath the furnace into which the car is then elevated.

Layout

The furnaces are generally of the electric-resistance type, although gas heating with radiant tubes would be equally applicable, and the height at which the furnace body is mounted is such that when a loaded car is inserted into the heating space there is sufficient head-room for another loaded car to pass beneath it. When used for malleable iron annealing, this method enables two furnaces to be installed side-by-side for use as a combined unit, the first serving for the high-temperature portion of the cycle and the second for the low-temperature portion. Usually, the second furnace (in addition to the heating units) is provided also with a cooling system consisting of alloy tubes located in the upper portion of the chamber, by which means any desired period of temperature maintenance or rate of cooling can be effected at will. On completion of the high-temperature portion of the heating cycle, the car with its hot charge is lowered, run beneath the second furnace, and elevated.

From the illustration, it will be seen that the charge does not come into contact with the refractory brickwork of the car, but is placed upon a load platform consisting of heat-resisting alloy grids supported on hollow posts of the same material. This method, besides helping to ensure rapid and uniform heating and cooling, enables insulating refractory to be used on top of the car to give additional insulating value as well as lower heat absorbtion when the car is heated.

* *e.g.*, FOUNDRY TRADE JOURNAL, 91 741.

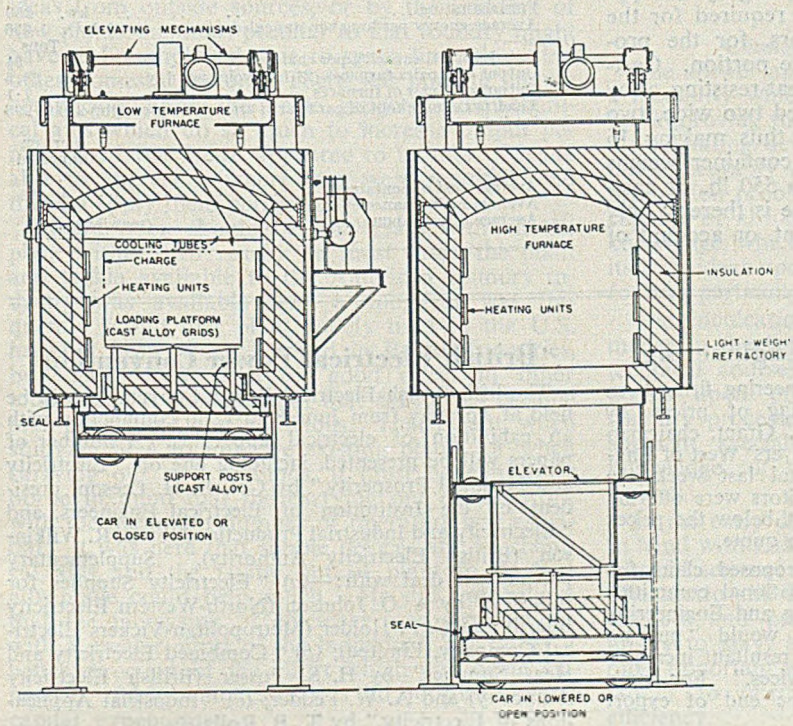

FIG. 1.—*Diagrammatic View of a Pair of Furnaces, High-temperature and Low-temperature, for annealing Blackheart Malleable.*

Advantages

One of the main advantages of using furnaces of this type in sets of two is that the high-temperature portion of the process is always completed in the first furnace and then transferred, thus making it unnecessary to cool the high-temperature unit for the cooling portion of the cycle. The low-temperature furnace having discharged a load at about 675 deg. C. receives a hot charge from the other unit and accelerates the cooling of this to some 760 deg. C. (or a temperature above the critical), thus enabling the slow cooling portion of the cycle to be started in a much shorter time than would be possible if the furnace as well as the charge had to be cooled.

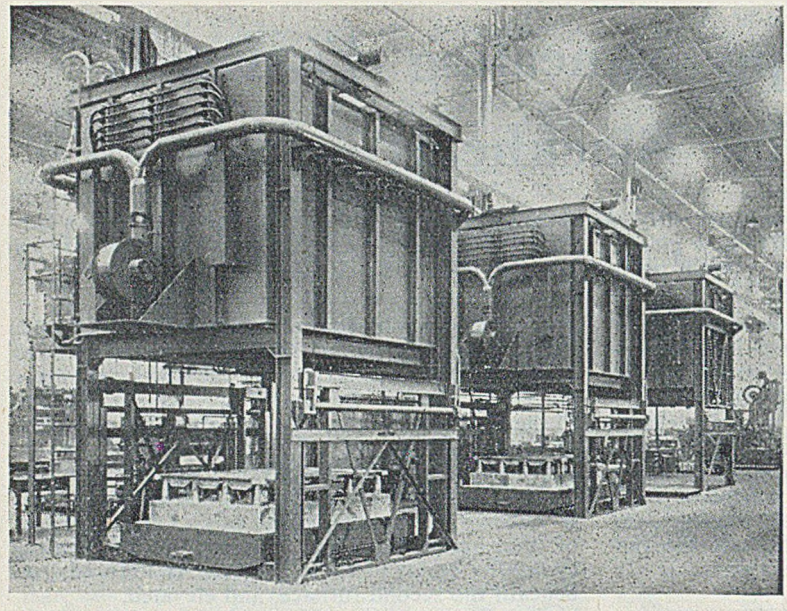

FIG. 2.—*Battery of Three Elevator-type Furnaces, each of 250-kw. loading and equipped with a Cooling System.*

Some Results

Fig. 2 shows a battery of General Electric Company (of America) furnaces of the type installed in an Indiana foundry where since 1939 the whole of the annealing plant has been changed over to this system until there are now five sets of the furnaces installed, and the entire output is processed in this manner. The iron composition maintained is: C 2.3 to 2.4; Si 1.4 to 1.5; Mn 0.4 to 0.5; P, 0.1; and S 0.14 to 0.16 per cent. The annealing cycle occupies 24 hrs., of which 12 hrs. are required for the first portion and a further 12 hrs. for the programme-controlled low-temperature portion. Castings are loaded in light-weight heat-resisting alloy containers which in turn are loaded two wide, two high, and four long on the car, thus making 16 containers per charge. As each container weighs 110 lb. and accommodates 500 to 550 lb. of castings, the net weight of each charge is thereby only increased approximately 20 per cent. on account of containers. Table I summarizes the overall results obtained from the installation.

The figures relating to sundry charges represent averages over nine years' working. Although the results are recorded on the basis of net castings annealed, the containers also form part of the total load which has to be heated by the furnace, and if this is taken into account it will be seen that the installation has an average energy consumption of 269 k.w.h. per gross long ton and each pair of furnaces an output of 8½ tons (gross) per day.

TABLE I.—*Data Sheet for Blackheart Annealing in the Elevator-type Electric Furnace*

Process—Annealing (900 to 950 deg. C.)	*Metal*—Malleable iron (blackheart).
Furnace—4 ft. 3 in. by 8 ft. 6 in. by 3 ft. 2 in. car capacity, each set of furnaces comprising a high-temperature and a low-temperature unit.	*Make*—General Electric Co.
Firing—Electric, resistance-type elements.	

Consumption—		
Furnace rating	kw.	250
Average energy per long ton annealed	(net) kwh.	336
Output—		Tons
Rated normal capacity per charge		3½
Output of 4 pairs furnaces (24-hr. cycle) per day	net	28.5
Output of 1 pair of furnaces	net	7·1
Load per square foot of car hearth area	gross (lb.)	270 to 293

Sundry Data—		Per ton annealed s. d.
Average cost of containers		4 9
Average maintenance charges		4 9
Average direct labour	(man/hr.)	1½

Foreign Competition in Engineering

Never in his experience had engineering firms been faced with such severe undercutting of prices by foreign competitors, said Mr. A. W. Grant, chairman of the Engineering and Allied Employers' West of England Association, speaking at Bristol last week. In countries all over the world competitors were offering goods at 20, 30, and even 50 per cent. below the prices British engineering firms were able to quote.

Mr. Grant was deprecating the proposed claim for a wage increase, approved by the national committee of the Confederation of Shipbuilding and Engineering Unions last week, which, he said, would "put up costs over £100,000,000 a year, with resultant increases in costs of materials and other services." For some firms, he added, it might mean the end of export business.

British Electrical Power Convention

The fifth British Electrical Power Convention will be held at Torquay from June 8 to 12 in conjunction with an exhibition of electrical apparatus. A number of papers will be presented, including one on "Electricity and National Prosperity," by Col. B. H. Leeson, president of the Institution of Electrical Engineers, and "Electricity and Industrial Production," by E. R. Wilkinson (British Electricity Authority). Supplementary papers will deal with:—(*a*) "Electricity Supplies for Industry," by A. O. Johnson (North-Western Electricity Board) and C. P. Holder (Metropolitan-Vickers Electrical Company, Limited); (*b*) "Combined Electricity and Heat Supplies," by H. S. Posser (British Electricity Authority) and A. W. Pedder; (*c*) "Industrial Applications of Electricity," by T. B. Rolls.

Reactions to Productivity

Presidential Address to East Midland Founders

Mr. J. Hill, on assuming office as president of the East Midlands branch of the Institute of British Foundrymen, delivered an address in the course of which he said he had attended several productivity conferences following the publication of "team" reports, when everybody had been most enthusiastic with proposals, resolutions and speeches urging increases in productivity. After the meeting, however, although interest had been stimulated, the enthusiasm gradually simmered down when everyday problems had to be tackled with the plant and capital available.

He suggested that one of the reasons for this falling off in enthusiasm was that the whole subject of improving efficiency, when compared with American methods, appeared to be one of great magnitude, and executives tended to excuse themselves by pointing out the great social and economic advantages enjoyed by the American which enabled him to be so highly productive. This attitude of mind was quite understandable when one considered such matters as the frustration produced when trying to obtain building licences to proceed with development schemes and the loss of incentive to develop such schemes, imposed by the present taxation system, which were not encountered by American firms. Even taking into account these impositions, however, he still felt that much could be done towards solving the problem.

Improvement from Within

To improve personal efficiency in each individual foundry could not always be done by incorporating ideas from outside sources, or by the building of new plants; methods peculiar to that foundry might have to be employed, due to space limitations and other domestic factors. There was nothing unduly complicated about the tackle, gadgets, and mechanical aids which do so much to increase output per man; the basic factor appeared to be that of being able to appreciate where they were required, and then to apply them correctly.

Foundrymen should be conversant with all the plant within their reach. In most cases, the plant and tackle available to the American foundry industry was available here, although it was frequently found that plant widely used in the U.S. had not been widely applied in British foundries, but had been used to good effect in other industries. It was essential that executives became man-power and cost conscious. That meant, when studying how to improve existing plants, or when carrying out new methods, it must be constantly borne in mind that the carrying out of the work with the minimum number of operators was essential. It was here that simple devices and mechanical aids and the laying out of plant to its best advantage could help much. He did not believe that the increasing of efficiency was synonymous with a greater effort of the individual, but rather a better direction of the effort which was being expended, and in many cases this did not mean major capital expenditure.

How many, whether engaged in jobbing work or mass-production founding, had studied carefully in detail the routing and handling of all the raw materials and castings which passed through the foundry? How many, and this still applied to jobbing work, detailed each operation necessary for the production of a pattern, mould, core, or the fettling of a casting? He suggested that it was only when a complete breakdown of the operations had been made that one began to appreciate where "bottlenecks" existed. After locating these "bottlenecks," one could contemplate re-routing of materials, the re-positioning of tools, and the avoidance of double handling. One could study how to improve each detailed operation by reducing the movement of operators to a minimum. This might mean the introduction of plant or modifications to existing plant, and it might be possible to perform some operations automatically.

By these methods, efficiency could often be greatly increased without major capital expenditure. But, if capital had to be expended, it was by these methods that one was best able to assess the number of operations eliminated by the introduction of new plant, and could budget for the increased output to be expected from its installation. This could then, in turn, be assessed against the capital expenditure required.

Although many founders had increased their efficiency by some method observed in the foundries in the U.S.A., or by methods observed in other foundries in this country, and agreeing that interchange of ideas was one of the quickest ways to progress, this type of development did not appear to be the complete answer to the problem.

Changed Mentality Advocated

The answer appeared to lie in the building up of a mentality which was constantly on the look-out for improving methods of production, not only by incorporating developments made by other people, but a mentality which scientifically approached the production problems with which it was confronted, capable of absorbing all the wealth of production knowledge which was available, and building up its own ideas upon which methods were best suited for any particular application.

The inculcation of this mentality should commence in the basic training and he suggested that technical courses should place a far greater emphasis upon production engineering applied to foundry processes, and that a generation of management specialized in applying scientifically a knowledge of production methods should be trained.

In the early days of the Institute "Science hand in hand with Labour" had implied rather the metallurgical sciences hand in hand with the craftsman. The motto still held good to-day, but many more sciences and professions had come into the industry to stay, and he suggested that one of the most important was the science which would enable labour to operate at its maximum production efficiency.

Tuyere Design

German Experiments

A new type of blast-furnace tuyere, which has considerable interest for cupola operators, now that water-cooling on blast-furnace lines is more extensively adopted, is being tried out in Germany*. It is designed to utilize cooling water more efficiently and thus give a longer life without increasing the load on the cooling-water pumps.

Investigations were first carried out on a tuyere of the normal type, and these revealed that in the standard design of tuyere there is not an even flow of cooling water over the whole heated surface of the tuyere. The water tends to flow from the inlet pipe to the outlet orifice by the shortest convenient path and, because of this, there is an unavoidable tendency for eddies and patches of still water to be created. Thus there is, of course, a danger of the water boiling, and in turning to steam, it may set up a blockage and lead to the tuyere being burnt out.

In order to avoid this, a tuyere has been designed and constructed in the manner shown in Fig. 1. The tuyere is divided into three principal parts, an outer spiral and inner spiral and an annular head piece. The two spirals are constructed of drawn copper tubing of rectangular section, and

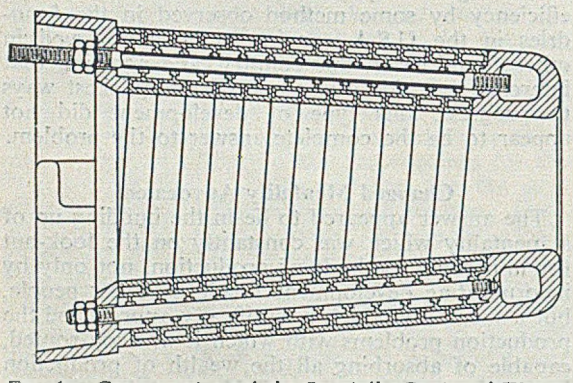

FIG. 1.—*Cross-section of the Specially Designed Water-cooled Blast-furnace Tuyere.*

between these spirals is an annular air space which is partly taken up by the three steel bolts which anchor the head to the tuyere and two pipes which conduct one flow of cooling water directly to and from the head. The spirals are cooled by water entering by another route to the outer spiral, flowing towards the head and then returning along the inner spiral.

Advantages

This form of construction, while it is considerably more complex and expensive than the usual arrangement, clearly possesses a number of advantages. In the first place, the head, which protrudes into the hearth of the furnace and is therefore the most severely treated part, is cooled separately from the remainder of the tuyere. The cooling of the head is thus more efficient, and should the head be burned out, the leakage of water is less and therefore the danger of explosion is reduced. Also, the flow of water cooling the remainder of the tuyere is so arranged that every portion of the surface is cooled to an equal degree. There is no possibility of odd corners not receiving their "fair share" of cooling water. Finally, the dividing-up of the tuyere into three parts means that, should either the head or the inner spiral be burned out (due to the entry of metal), the entire tuyere does not have to be scrapped and replaced, it is only necessary to replace the damaged item.

TABLE 1.—*Comparison of Old and New Types.*

Tuyere type.	Operational conditions.	Part of tuyere.	Cooling water flow, cub. m. per hr.	Temp. increase of cooling water, deg. C.	Heat remove kilo.cal per hr
New type	Position 3. Hot blast 980 cub. m. per min. at 55 cm. Hg. pressure and 750 deg. C. temp.	Spirals	3.74	33.8	126,500
		Head	5.30	14.3	75,800
		Total	9.04	—	202,300
	The same, with cooling water reduced	Spirals	3.08	37.4	115,200
		Head	2.70	22.8	61,600
		Total	5.78	—	176,800
	The same with reduced water and blast temp. raised to 820 deg. C.	Spirals	2.71	41.3	112,000
		Head	2.94	30.8	90,600
		Total	5.65	—	202,600
Standard type	Position 2. Hot-blast temp. 750 deg. C.	Total	7.63	16.5	125,900
	Position 4. Hot-blast temp. 750 deg. C.	Total	9.43	17.5	165,100

Initial Trials

The efficiency of the new design of tuyere compared with that of the standard type was estimated by fitting a blast furnace with the old and new types at adjacent points and measuring the cooling water flows and temperature in both types. The results obtained are shown in Table 1.

This table shows how the heat removed from a tuyere of the new type, through which water is flowing at the rate of some 8 cub. m. per hr. is some 30-50 per cent. more than the heat removed from an ordinary tuyere operating under generally similar conditions. Even with the water "throttled back" to between 5 and 6 cub. m. per hr., the heat extracted from the new-type tuyere is still some 10-20 per cent. greater. It is clear that cutting down the water supply to a new-type tuyere is not so likely to cause a burn-out as is the case with the old type. In the new-type tuyeres, as the water flow is reduced so the temperature increase of the water rises, though, of course, there is a limit set to this by the tendency of the water to vaporize.

On the other hand, if a standard type tuyere is carrying too great a supply of cooling water, much of this is used to no purpose. (See Table II.)

(*Continued on page* 588)

* W. Dehne, "Eine neuartige Hochofenblasform," *Stahl und Eisen* February 12, 1953.

B.I.S.R.A. Research

Much work analogous to foundry research is detailed in the annual report for 1952 of the British Iron & Steel Research Association, which has recently been issued. This article gives brief particulars of work in progress which is of major interest to readers.

Ironmaking

The work of the Ironmaking Division of the British Iron & Steel Research Association is divided into four main sections—geological study and beneficiation of the furnace burden, co-ordination of sinter plant design and the improvement of sinter quality, investigation and control of the processes occurring within the blast furnace, and studying the practical problems of blast-furnace operation.

A programme based on items submitted by various committees has been formulated and, with the co-operation of the industry, full-scale trials on both furnaces and sinter plants have been carried out. A considerable part of the work has been devoted to the study of pelletizing on a pilot scale plant. Recent work has necessitated the extension of this plant, and a further section of the building now occupied has been made available by Dorman, Long & Company, Limited.

A series of vacuum extrusion trials in an experimental plant at Stewarts and Lloyds, Limited, has shown that 50 per cent. Sierra Leone concentrates can successfully be incorporated with Northamptonshire ore fines without dry grinding or wet milling. For the extrusion and subsequent natural curing, no binders were necessary in the mixture of ores and the strength and iron contents of the products were such that a subsequent firing was not necessary.

Laboratory experiments have continued on the desulphurizing of pig iron with solid and powdered lime. The effect on desulphurizing power of adding calcium fluoride to lime has been studied. Some improvement was obtained but it was insufficient to justify using the method in practice. A suitable method of coating coke with lime has been developed and this product has been used to desulphurize various pig irons. Some preliminary trials have been carried out at Stewarts and Lloyds, Limited, at Bilston, and Richard Thomas and Baldwins, Limited, at Redbourn, which showed that this method is sound but certain practical difficulties need further investigation. Further trials will shortly be carried out at other works.

A mechanical exploring device has been used to study the rate of descent of a blast-furnace burden and to record stockline contours. On one furnace, reduction of the blast volume to 25,000 cub. ft. per min. did not disturb the normal V contour. An increase in the blowing rate to 36,000 cub. ft. per min. levelled the V contour and caused the stockline to become unstable.

Radioactive cobalt pellets have been used as tracers to estimate the length of time lumps of material remain in the inactive zone. Gaseous radioactive tracers, also, have been used to measure and compare the transit times of the gases through furnaces.

A technique has been developed in conjunction with the physics department for exploring the tuyere region of blast furnaces by high-speed stereoscopic photography. Photographs have been taken through selected tuyeres at five different works and the size and position in space of particles inside the furnace is being determined by analysis of the film. Work on heat flow through blast-furnace hearths has continued, and six furnaces now have thermocouples installed in the brickwork below the hearth. Calculations show that adequate thermal control of the hearth bottom could be secured by air cooling.

Steelmaking

The field of work in steelmaking research covers factors governing the efficiency of steelmaking plant and processes. At the present time, B.I.S.R.A. is engaged in 35 research projects whose objectives are to improve plant design, operating techniques and quality of products. About four-fifths of these projects are of a practical nature and are carried out in the laboratories and plants of member firms and the Association's laboratories. The remainder are more academic and are carried out both within the Association and extra-murally through other research organizations. The following data relate to the work of some of the principal committees and sub-committees of the steelmaking division.

An important objective is the reduction of the metallurgical load in the open-hearth process and further advances towards attaining it have been concerned with desiliconizing and desulphurizing iron. As reported last year, desiliconizing of blast-furnace metal by oxygen lancing in a ladle has been developed on a small scale as a routine process at The Brymbo Steel Company, Limited, where relatively small quantities of iron, about 20 tons, are produced at a time. Attempts to apply this technique to larger ladles of hot metal have not proved successful although there was a considerable reduction of silicon, because there was a serious loss of manganese from the iron. This loss, together with the fact that metal was ejected in a dangerous manner during the process, led to an early abandonment of the trials. However, as the potential benefits of this method are great it is hoped to arrange further trials.

Pyrometry Techniques

The pyrometry sub-committee has published a short symposium comprising a review of present-day immersion pyrometry techniques in this country. It covers theoretical and practical investigations of the response time of the normal type of rare-metal immersion thermocouple when slight variations are made to the couple wire thickness, type of junction and thickness of the silica protecting sheath. From the review, it is apparent that the quick immersion pyrometer has been developed to the stage where the instrument is now a

B.I.S.R.A. Research

fundamental item of steelmaking equipment. A possible further development is that of continuous or semi-continuous measurements of liquid steel temperatures over the period from clear melt to tapping, and a trial by a member firm has shown that this is quite feasible.

A co-operative investigation of the relation between casting temperature and pouring rate, and the structure of a 3 per cent. nickel, 1 per cent. chromium steel has shown that apart from a greater tendency for surface cracks to form on ingots poured rapidly at high temperature, there was no strong relationship. The ingots representing the extreme conditions of temperature and pouring rate showed only a slight difference in the primary crystal structure as revealed by hot acid and copper etches. The length of the primary crystals was greater in the ingot which was rapidly poured at high temperature. A similar investigation using a steel of such composition that primary crystallization is in the gamma region with freedom from any delta solidification or transformations, is being considered.

Homogeniety of Cast Structures

In the co-operative examination into the structure of balanced steel, seven member firms have completed corner-sampling examinations of the middle ingots of 12 casts and one member firm has also reported on the complete sectioning of two ingots. Preliminary examinations and comparisons of the data have already proved of great interest to the co-operating firms and a complete statistical examination of the data is now being arranged. One member of the sub-committee has derived a useful formula relating skin thickness of rimming ingots to the teeming rate and to the rimming characteristics as indicated by the behaviour of the steel in the mould. The relationship is independent of ingot size and method of teeming and has been shown statistically to account for the major part of the variation in skin thickness at the works in question. Within the range used (1,590 to 1,620 deg. C.), teeming temperature has no apparent effect but it is probably taken into account in the rimming characteristics included in the formula. Recent examinations of killed steel ingots containing small pinholes have indicated that these defects may be caused by high hydrogen content or a carbon-oxygen reaction resulting from insufficient deoxidation.

Research on forging ingots has included experiments in which a member firm has cast ingots into a special mould which was refractory-lined in the top half and set on a heavy cast-iron chill. It was shown conclusively that the slower cooling in the special mould resulted in more intense segregation. Attention is therefore being given to methods of increasing the cooling rate, for instance, by the use of copper bottom-plates or by bridging the air-gap with a conducting material.

Further work of the industry in conjunction with the other Divisions of B.I.S.R.A., including mechanical working, heat-treatment, protective coatings, chemistry, physics and plant engineering is also described.

Tuyere Design

(*Continued from page* 586)

TABLE II.—*Varying the Water Flow in Old-type Tuyere.*

Type of tuyere.	Operating conditions.	Flow of cooling water, cu. m. per hr.	Water temp. increase, deg. C.	Heat removed, k. cals. per hr.
Ordinary	Position 1. Hot blast 980 cu. m. per min. at 38 cm. Hg. pressure and 560 deg. C temp.	17.0 6.6 3.73	6.4 15.4 17.9	108,000 101,700 66,800

In this case reducing the flow of water to nearly one-fifth of its former value only reduces the heat extracted by about 40 per cent.

When considering the question of tuyere cooling, it must also be borne in mind that cooling the tuyere also cools the hot blast to something of the order of 10 per cent., which represents about 150-250 cub. m. of gas burned in the stoves per hr. per tuyere. If this loss of heat can in any way be reduced it is clear that this would lead to improved efficiency and better yield. It is suggested that the inside face of the tuyere in contact with the blast might be coated with a form of refractory cement and the indications from laboratory experiments are that if this were done the heat loss could be reduced by some 60 per cent.

THE AIRCRAFT CARRIER H.M.S. Formidable, of 23,000 tons, is on her way to be broken up at the Inverkeithing yard of T. W. Ward, Limited. The Formidable, one of the navy's oldest carriers, is expected to arrive early this week.

SEVENTY MEMBERS of the Institute of Welding, visiting Sheffield for their Spring conference, opening on May 8, were welcomed at the works of Steel, Peech and Tozer, Limited, by Mr. A. Jollie, general manager. Mr. Robert Jenkins, president of the Institute, and managing director of Robert Jenkins & Company, Limited, Rotherham, was with the party, who were shown the atomic-hydrogen welding process on low-carbon manganese-steel to produce a homogeneous weld.

A CONTRACT for the construction of three dredgers for the Burmese Government has been secured by Lobnitz & Company, Limited, Renfrew. The vessels, which will be shipped out to Burma in parts after they have been completed, are self-propelled cutter suction dredgers, each 134 ft. in length. According to information made available, the total new contracts received on the Clyde this year do not exceed 35,000 tons, whereas during the first quarter of 1952 the total was over 300,000 tons. One or two inquiries are circulating, however, and it is expected that the Clyde will be considered when the Canadian Pacific place the order for the second of their two 22,500-ton liners. The first of these, placed last November, is to be built by the Fairfield Shipbuilding & Engineering Company, Limited, Glasgow.

Steel Bill Becomes Law

Lords Admendments Approved

There was only one division when the 13 amendments made by the House of Lords to the Iron and Steel Bill were considered by the House of Commons on May 13. The Bill was given Royal Assent last Thursday afternoon, and the Minister is expected to proceed without delay in establishing the Iron and Steel Board and in setting up the Realization Agency.

MR. A. ALBU (Edmonton, Lab.) moved an amendment to a Lords amendment adding manganese to the raw materials which could be produced by the Board on the advice of the Minister. Mr. Albu's amendment proposed to add tungsten and molybdenum to those materials.

MR. SANDYS, replying after debate, said that the powers which the Opposition wished to be vested in the Ministry of Supply were already vested in the Ministry of Materials. It was not a good thing that two ministries should do the same job, and there was no advantage in transferring the powers in question. The amendment was negatived and the Lords amendment was agreed to.

Membership of the Board

MR. JACK JONES (Rotherham, Lab.) moved an amendment to a Lords amendment defining the term "whole-time member" of the Board. This provided that a whole-time member should devote himself exclusively to his duties as a member of the Board, subject only to the performance of such public or other unpaid duties as would not occupy more than an insignificant part of his time.

He had read with interest, and he had not seen it contradicted, that the new chairman of the Board would be Sir Archibald Forbes, that he had had some conversations with the Government but did not wish to give his final decision unless certain provisions could be given to him. The Government was seeking to establish a position where a person could consent to serve full time on this Board and at the same time retain appointments on other important Boards.

MR. GEORGE STRAUSS (Vauxhall, Lab.) said this was the first time a definition clause of this kind had been written into a Bill. In the nationalization Bills there had been no need for one because it was obvious common sense that a whole-time member of a Board would devote all his time to his task. Under this definition clause he was free to devote, if he wanted to, 49 per cent. of his time to another job for which he might be getting a bigger salary than he received as the member of a board. That would be one of the wicked consequences of inserting this new definition into the Bill.

The Opposition suspected that the Lords amendment had been put forward for the purpose of allowing the gentleman proposed as chairman of the Iron and Steel Board, Sir Archibald Forbes, who had other industrial interests, to retain his existing directorships.

MR. SANDYS said he agreed that whole-time members of the Board should completely sever their connection with the industry. In some cases it should be possible to find suitable people who were willing to devote themselves exclusively to the work of the Board, but there might be cases where the services of a particular person of outstanding qualifications could not be obtained if he was required to sever absolutely all his industrial and commercial connections.

When Mr. Strauss was Minister of Supply he wrote letters of appointment to the members of the Board which showed that, in his opinion, the holding of other appointments was not necessarily inconsistent with whole-time membership of the Board. In appointing the whole-time chairman, Mr. Strauss had authorized him to retain directorships in two companies. He (Mr. Sandys) intended, when he came to appoint the whole-time members of the Board, to all intents and purposes to follow the same formula.

Mr. Sandys said that he recognized that in fixing the emoluments of members it was proper to take into account the fact that they were doing other work in addition to their work on the Board. He would not be responsible for appointing anyone except on the condition that they gave every bit as much time as was necessary to the Board and that that was going to be first call on their time and energies, and that they would not accept or retain any outside appointments which were in any sense incompatible or raised a conflict of loyalties with their work as members of the Board.

After further reflection on the composition of the Board, he had come to the conclusion that the ratio he had previously suggested, of one-quarter whole-time members to three-quarters part-time, was probably just about right. That was the kind of pattern he had in mind for the original appointments to the Board.

The amendment to the Lords amendment was negatived by 239 votes to 220 and the Lords amendment was agreed to.

During discussion on a Lords amendment removing from the Bill the Minister's power to own, build, or operate seagoing ships, Mr. Sandys gave an assurance that if it became necessary for the Government to ensure the availability of ships for the shipment of ore to this country the Government would use the powers it already possessed over shipping, which were quite sufficient for the purpose.

First Disposals

Appointments to the Realization Agency are expected to be made immediately. Discussions with issuing houses and the industry have already taken place and it is thought that the first offer to the public will take place before the summer holidays. The total operation is likely to be spread over a considerable time and is to involve some £300m.-£350m.

At the top of the list of companies which are expected to be dealt with this year are Dorman Long, Colvilles, South Durham, Stewarts and Lloyds, John Summers & Sons, United Steel and probably also Whitehead.

In another category is the English Steel Company which, before nationalization, was jointly owned by Vickers and Cammell Laird. Negotiations for the return of the company to its former owners can now be pushed ahead on a firmer basis than was possible before the Bill was actually on the Statute Book.

The disposal of Ordinary shares will be by public offer for sale. Preference shares may be sold by placing or simply by making them available through the market.

Under the Socialists' Nationalization Bill, over 90 companies were bought out. There may be some minor regroupings of some of the smaller units prior to sale to the public.

THE GOVERNMENT had decided to appoint a committee, under an independent chairman, to undertake a comprehensive review of the causes and effects of air pollution, said Mr. A. E. Marples, Secretary to the Ministry of Housing and Local Government recently. It would also consider what further preventive methods were practicable. He hoped shortly to make a further announcement on the membership and terms of reference of this committee.

British Blast Furnaces in the March 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 first 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	—	—	3	—	3	3	4
Kettering Iron & Coal	—	1	1	—	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	—	4	—	—	4	4	4
Wellingboro' Iron	—	2	—	—	2	2	3
TOTAL	—	8	19	—	27	27	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	0.4	1
TOTAL	—	4	—	2	6	5.4	6

North-West Coast.

Barrow Ironworks	2	—	—	—	2	2	4
Charcoal Iron	—	—	—	—	—	0.15	1
Millom & Askam	2	—	—	—	2	2	3
United Steel: Workington	3	—	—	—	3	3	3
TOTAL	7	—	—	—	7	7.15	11

Lincolnshire.

Appleby-Frodingham	—	7	—	—	7	7	7
Lysaght, J.: Scunthorpe	—	4	—	—	4	4	5
Thomas, R., & Baldwins: Redbourn	—	2	—	—	2	2	3
TOTAL	—	13	—	—	13	13	15

North-East Coast.

Cargo Fleet Iron	—	2	—	—	2	2	3
Consett Iron	—	2	—	—	2	2·8	3
Dorman, Long: Acklam	—	3	—	—	3	3	4
Redcar	—	2	—	—	2	2	2
Cleveland	—	3	—	—	3	3	4
Bessemer	—	2	—	—	2	2	3
South Bank	—	—	—	2	2	2	3
Gjers, Mills & Co.	2	—	—	—	2	2	5
Pease & Partners	2	—	—	—	2	2	3
Skinningrove Iron	—	2	—	—	2	2	3
South Durham Steel & Iron	—	2	—	—	2	2	2
TOTAL	4	18	—	2	24	24·8	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	—	3	—	—	3	3	3
TOTAL	1	8	—	—	9	9	10

Action Against Fife Foundry

A former furnaceman has raised an action for £300 in Cupar Sheriff Court against Henry Balfour & Company, Limited, Durie Foundry, Leven. The furnaceman, Frederick Anderson, now a miner, claims damages in respect of loss of wages and injury to health incurred when he was off work in March and April, 1951, due to the effects of coal-gas poisoning from a furnace.

In evidence Anderson said his job had been to charge the melting furnace. During 1950, he complained about the fumes to the foreman of the moulding shop and also to the shop steward. Nothing was done. One day in March, 1951, he felt sick and dizzy. He was helped to the ambulance room and then to a doctor. He was off work for three weeks, and when he resumed was not allowed to start again in the furnace-room. He left his job seven weeks later.

Dr. A. F. Muir, consulting civil engineer, said he inspected the furnace in August, 1951. Repairs were being carried out, and he concluded fumes had been escaping because of the burnt plates on the door. Before the repairs were carried out the furnace might have been dangerous to work. Dr. R. W. Todd and his partner, Dr. A. I. Pirie, Leven, said they found Anderson to be suffering from the effects of coal-gas poisoning. James Birrell, the new furnaceman, said the furnace was now giving no trouble, although he occasionally suffered from headaches. Sheriff J. W. More continued the "proof" until July 9.

Scottish Iron and Steel Production

Scottish steel output, which has been rising steadily since the year began, continues to show improvement according to the latest figures released by the British Iron & Steel Federation. Unlike the output for the country as a whole, however, Scottish production established no new records. Steel produced in Scotland during April was at the weekly average rate of 47,830 tons compared with 41,780 tons during the same month of last year, but pig-iron was lower at 16,410 tons compared with 17,660 tons. Despite this, one of the biggest producers reported that their weekly average for April was the highest for some considerable time. Figures released for the U.K. show that steel production in April was 348,500 tons a week, the highest rate ever recorded during that month, and 43,000 tons up on the 1952 figure.

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

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of the first quarter, 1953.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	1	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	—	2	—	—	2	2.1	3
TOTAL	—	5	3	—	8	8·1	12
Sheffield.							
Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	13	63	25	4	105	105.45	140

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

District.	1952.				1953.
	March.	June.	Sept.	Dec.	March.
Derby, Leics., Notts., Northants, and Essex	24.5	23.6	25.8	24.8	27
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	4	4	4	4.5	5.4
Lincolnshire	13.1	12.8	13.4	13.4	13
North-East Coast	24	24.3	25	25.2	24.8
Scotland	9	9	9	9	9
Staffs., Shrops., Worcs., and Warwicks.	8.4	8.7	8	8	8.1
S. Wales and Monmouth	7.8	8	9	8.8	9
Sheffield	2	2	2	2	2
North-West Coast	8	8	8	8	7.15
TOTAL	100.8	100.4	104.2	103.7	105.45

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 & Lloyds (Bilston).

B.I.F. Luncheon

The non-ferrous metals' industry was now in sight of freedom from the last major Government control said Mr. H. E. Jackson, president of the British Non-Ferrous Metals Federation, when he spoke at the official luncheon at the British Industries Fair, Castle Bromwich, on May 7. "We are looking forward to that with high hopes," he added, "and it cannot come a day too soon for we can see no valid reason why the free play of the open market should not bring to the industry the much-needed stimulus of lower-priced copper."

Mr. Jackson went on to say that British manufacturers are up against competition abroad that is not always fair, but if countries which are content with a lower standard of living cannot be beaten on price, efficiency, service and quality must be the criteria. There is, however, every reason to take steps to check the artificial devices adopted in some countries to give inducement to exports. Governments and employers' organizations overseas should be encouraged to outlaw these devices so that competition can proceed on the normal basis of giving best value for money. Other official visitors at the luncheon included other members of the Federation and the British Bronze and Brass Ingot Manufacturers' Association.

DARWINS, LIMITED—Mr. F. Caffrey has ceased to be a director.

British Standard B.S.1010: 1953

Draw-off Taps and Stop-valves for Water Services

The British Standards Institution has just issued a revised standard, B.S. 1010:1953, for draw-off taps and stop-valves for water. The main object was to meet the demand for lighter fittings and this has been achieved with minimum disturbance of manufacture by fitting headwork of smaller sizes in normal bodies, thereby enabling most of the existing tools and gauges to be used for the lighter models. Opportunity has been taken to clarify points of doubt in the interpretation of some of the clauses, particularly in regard to "rate of flow" restrictors embodied in taps controlling the feed to a water heater or similar apparatus, and the use of interlocking devices. The standard applies only to the ordinary screw-down type of tap and stop-valve for water services. It is not intended to apply, even in part, to any other types. Draw-off taps and stop-valves manufactured to this specification may bear the certification marks of the British Standards Institution and the British Waterworks Association under a joint arrangement operated by these two bodies. Copies of the standard may be obtained from the British Standards Institution, sales branch, 24, Victoria Street, London, S.W.1 (price 6s.).

ACCORDING to the American Iron and Steel Institute, production in the United States of alloy steels, other than stainless, was 916,149 tons in March, the highest since early in the last war.

Capper Pass Awards

The Capper Pass awards adjudicating committee, on behalf of the Councils of the Institution of Mining and Metallurgy and the Institute of Metals, have made the following awards for papers published in 1952:—£50 to Mr. Edwin Davis, M.SC., F.I.M., and Mr. S. G. Temple, M.SC., A.I.M., for their paper on "Batch and Continuous Annealing of Copper and Copper Alloys"; to Mr. C. P. Paton, B.ENG., for "Batch Thermal Treatment of Light Alloys"; to Dr. E. C. Ellwood, F.I.M., and Mr. T. A. Henderson, B.SC., for their paper on "Some Exploratory Experiments on the Formation and Control of Magnetite During Copper Smelting Operations" and to Mr. P. M. J. Gray, B.SC., A.R.S.M., for "The Production of Pure Cerium Metal by Electrolytic and Thermal Reduction Processes." A further award of £25 was made to Mr. E. A. Hontoir, B.SC., A.I.M., for his paper "Determination of Sulphur in Iron Pyrites."

Terms of Awards

These awards are made annually from a sum of £200 placed each year at the disposal of the Councils of the Institution of Mining and Metallurgy and of the Institute of Metals, by the directors of Capper Pass & Son, Limited, Bristol. They are intended to encourage the publication of papers in the proceedings of those bodies, particularly on processes and plant used in extraction metallurgy and on the subject of assaying and of papers and processes and plant used in all branches of the non-ferrous metal industry. Authors should note that applications should not be addressed to the adjudicating committee requesting that their papers should be considered. All papers published by both societies will be examined annually, and notices of the awards will be published in the Press.

International Scientific Film Association

The Council of the International Scientific Film Association have announced that this year's congress will be held from September 18 to 27, in the National Film Theatre and Royal Festival Hall, London, S.E.1. During this period there will be meetings of the general assembly of the Association, meetings of the permanent committees dealing with medical, research, technical and industrial films, as well as the usual film shows. A special committee of the British Scientific Film Association will be set up to consider and recommend films for submission to this congress. This committee would be glad to have, as soon as possible, information about suitable films for this purpose. Full details about films for submission should be sent—including title, running-time, gauge, date of production, brief synopsis, etc.—to, The Scientific Film Association, 164, Shaftesbury Avenue, London, W.C.2.

The first issue of a new quarterly publication, "Scientific Film Review" has now appeared containing full details of 17 new films. A specimen copy can be obtained on application to the Association.

Steel Scrap Stocks Highest for Two Years

Stocks of iron and steel scrap continue to increase, and are now at their highest level for two years. Stocks at the end of March amounted to 448,000 tons, an increase of 9,000 tons since the end of February, according to the latest issue of the Monthly Digest of Statistics.

This total is more than twice that of a year ago, when stocks reached their lowest ebb, at 203,000 tons.

Steel Output Highest Ever for April

Steel production in April was at the highest rate ever recorded for that month, with an average of 348,500 tons a week. This figure is a little below the rate for March, owing to the effect of the Easter holiday, but the fall is not so marked as the Easter decline last year, when output fell to the rate of 305,100 tons a week.

Production of pig-iron averaged 212,000 tons a week, compared with 201,400 tons a week in April, 1952.

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

	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1953—March ..	215,700	11,216,000	351,400	18,272,000
April ..	212,800	11,063,000	348,500	18,124,000
1st quarter	214,500	11,152,000	350,100	18,207,000
1952—March ..	201,700	10,490,000	320,200	16,648,000
April ..	201,400	10,472,000	305,100	15,866,000
1st quarter	199,100	10,335,000	307,500	15,991,000

Cargo Fleet Works' Expansion

The Cargo Fleet Iron Company, Limited, Middlesbrough, has launched a second five-year plan designed to raise the ingot capacity of the works to 500,000 tons per annum. Mr. G. Barry Thomas, director and general works manager, giving the first details of this proposal, said that the company had just lighted a re-built furnace and another of its old furnaces was being replaced by a new one capable of producing 4,000-5,000 tons a week.

Referring to the company's steel capacity, Mr. Thomas said that further rebuilding would raise output to 10,000 tons a week. The order had been placed for new automatically-controlled soaking pits, each able to heat about 2,500 tons a week. The section mill, he claimed, was the best in the country, and it would be even better in August when the introduction of a fifth stand would enable it to produce an even greater variation of rolled material.

B.W.R.A. Summer School

The School of Welding organized by the British Welding Research Association was held at Ashorne Hill, near Leamington Spa, from April 27, to May 2, and attracted 160 students. Each student attended one of five groups of lectures representing the aircraft, shipbuilding, car and sheet metal, structural engineering and general engineering industries. During the week, each group attended nineteen lectures, some of the lectures being common to all students. An exhibition showing major all-welded components pertinent to the various industrial groups was shown at the school, and these components, combined with many illustrations, models, etc., provided a background for subsequent discussion for the students. The exhibits included an aluminium bedplate for a marine Diesel engine and a base for a mobile crane.

A BROCHURE has been produced for distribution to the 17,000 employees of K. & L. Steelfounders & Engineers, Limited, Letchworth (Herts), containing the history of the firm's 25 years' association with the "600" Group of companies.

Personal

THE COUNCIL of the Institute of Transport has elected MR. JOHN ELLIOT president for 1953-54, and he will assume office on October 1 upon the retirement of MR. C. T. BRUNNER.

MR. FREDERICK FRANKS, managing director of the Furnival Steel Company, Limited, Sheffield, has recently returned from a two-months' visit to Brazil, Uruguay, and the Argentine.

MR. WILFRID MALLINSON, chairman of Henry Brook & Company, Limited, ironfounders and structural engineers, of Huddersfield, is to be Mayor of Huddersfield during Coronation year.

SHEEPBRIDGE ENGINEERING, LIMITED, announce the appointment of Mr. R. E. Dawtrey as chief engineer. Mr. Dawtrey will be responsible for all metallurgical, chemical and engineering research and development.

MR. T. W. TURNER, production manager of R. H. Neal & Company, Limited, crane and constructors' plant manufacturers, of Grantham, has been appointed to an executive position with an American engineering firm.

MR. HARRY HOGG, assistant mill manager of the Cargo Fleet Iron Company, Limited, Middlesbrough, has retired after 43 years with the firm. He has been presented with a clock and a perpetual calendar mounted in a framework of sections rolled at the works.

MR. R. W. LADBROOKE, industrial sales manager of David Brown Tractors (Engineering), Limited, Meltham (Yorks), is scheduled to begin an extensive tour of the Middle East next month to investigate possible markets for industrial tractors and allied equipment.

MR. JAMES TAYLOR, who at the age of 64 has completed 50 years' service with Geo. Whitehouse & Company, Limited, brassfounders and tube makers, of Balsall Heath, Birmingham, has been presented with a wristlet watch from fellow-workers and a cheque from his employers.

MR. JOHN ALCOCK, chairman and managing director of the Hunslet Engine Company, Limited, Leeds, has been elected president of the Locomotive Manufacturers' Association, the official organization of the ten principal locomotive builders and 17 Diesel locomotive builders in the United Kingdom.

HERBERT MORRIS, LIMITED, mechanical handling engineers and founders, of Loughborough, announce that Mr. Harold Flavell, chief buyer, has been elected a director of the company. Mr. Flavell received his early training with Lee Howl & Company, Limited, Tipton, Staffs and joined the staff of Herbert Morris, Limited, in 1935.

MR. J. ROBINSON, secretary of Darwins, Limited, steelmakers, of Sheffield, was among recent recipients of long service awards to the group's employees with 25 years' service or over. Others included MR. W. H. BIFFIN, chief accountant; MR. W. E. STANLEY, chief purchasing officer; MR. E. BULL, assistant sales manager; and MR. C. A. BELLAMY, forge manager.

MR. ARTHUR MOULD, who has retired after 60 years' service with the Birmingham metal firm of J. F. Ratcliff, Limited, New Summer Street, was presented with the gift of a greenhouse from his co-directors. Mr. Mould joined the firm at the age of 16 as a junior clerk (he still treasures the chit that accompanied his first week's wages of 6s.) and was later made outside representative. He was appointed a director in 1938.

MR. J. STANLEIGH TURNER has been elected to represent the Trent Valley Branch of the Ballast, Sand and Allied Trades Association on the National Council of that Association. Mr. Turner is managing director of the Donington Company, Trent Gravels, the Lower Midway Sanitary Pottery, and Trucks. He is also a director of Glazed Ware Pipes (Overseas), Limited. Since 1949 he has been president of the Coal Utilisation Council.

The following have been appointed by the Minister of Fuel and Power to be part-time members of regional gas boards: MR. DAVID HELY-HUTCHINSON, a director of Ingersoll-Rand Company, Limited, mining machinery manufacturers, of London, E.C.4 (South-Western); SIR ARTHUR SMOUT, chairman of Murex, Limited (West Midlands); and MR. E. NEVILLE DUFFIELD, a director of Yorkshire Copper Works, Limited, Stourton, Leeds (North-Eastern).

AMONG THE TWELVE distinguished people on whom the Princess Royal, as Chancellor of Leeds University, conferred honorary degrees in Leeds last Thursday were Prof. John F. Baker, professor of mechanical sciences and head of the Department of Engineering, University of Cambridge; Mr. Eugene Freyssinet, the French civil engineer, who received Doctor of Science degrees; Mr. W. Hunter Rose, a Hull research engineer; and Mr. J. Wilkinson, chief metallurgist at the Yorkshire Copper Works, Leeds, who received Master of Science degrees.

DR. ALEXANDER FLECK, a deputy-chairman of Imperial Chemical Industries, Limited, has been elected chairman, with effect from July 1. He will succeed Mr. John Rogers, who intends to relinquish the chairmanship and resign from the Board of the company at the end of June. Dr. Fleck is 63 and has been associated with the company and its predecessors since 1917. He was appointed to the I.C.I. Board in 1944 and elected a deputy-chairman in 1950. From 1937 till 1945 he was chairman of the Billingham Division.

MR. WILLIAM B. JOHNSTONE, a director of Alexander Stephen & Sons, Limited, shipbuilders and marine engineers, of Glasgow, was elected chairman of the Dry Dock Owners' and Repairers' Central Council for 1953-54 at the annual general meeting held in Edinburgh on May 6. MR. A. C. WADDY, a director of William Gray & Company, Limited, shipbuilders, etc., of West Hartlepool, was elected senior vice-chairman, and ENGR. CAPT. G. VILLAR, a director of John I. Thornycroft & Company, Limited, engineers, shipbuilders, etc., of London, S.W.1, was appointed junior vice-chairman.

THREE YEARS AGO, Mr. Tom Richards joined the Dudley Foundry Company, Limited, at Brierley Hill as foundry manager; a year ago he was appointed general manager, and now it is announced that he has been appointed a director. Mr. Richards, who is only 46, has literally worked himself up from the shop floor. He began as a coremaker with Bean Cars, of Tipton, and later joined W. H. Dorman, Limited, of Stafford. After that, he became coreshop foreman at John Harper and Company, Limited, Willenhall, where he was eventually foundry superintendent before moving to the Dudley Foundry Company, Limited.

THE TYNESIDE PHILANTHROPIST, Sir Arthur Munro Sutherland, who died on March 29 at the age of 85, left £2,013,169 gross, net value £1,953,833. Duty paid amounted to £1,583,890. Sir Arthur was governing director of B. J. Sutherland & Company, Limited, shipowners, and a director of Donkin & Company, Limited, engineers, of Newcastle-upon Tyne, and other companies.

News in Brief

TWELVE THOUSAND FIRMS are this year exhibiting at the *Foire de Paris*, May 9 to 25, which is expected to break all records.

THE ANNUAL REPORT of the Catering Wages Commission for 1952 was published on May 15, 1953, and is obtainable from H.M. Stationery Office or through any bookseller, price 3d.

W. J. BITHELL, LIMITED, 41, Whitehall, London, S.W.1, have been appointed agents in the London and home counties area for Mason & Burns, Limited, malleable ironfounders, of Walsall.

PRECISION casting of cutting tools for metal-working machines has been successfully introduced in Hungary, according to reports in the Press. Up to 1952, this method was not in use.

THE INSTITUTE OF PHYSICS, 47, Belgrave Square, London, S.W.1, have issued a catalogue of recent publications which, presumably, is available to readers on writing to Belgrave Square.

A EUROPEAN CONFERENCE OF CHEMICAL ENGINEERING will be held in Paris in connection with the *II^e Salon de la Chimie* and the *XXVI^e Congrès International de Chimie Industrielle*. It will open on Monday, June 22.

BROWN, LENOX & COMPANY, LIMITED, of Pontypridd and Millwall, London, E.14, have appointed Mr. Charles J. Porteous as London sales manager in charge of their new sales office at 157, Victoria Street, London, S.W.1 (Tel.; TATe Gallery 9191).

AN ORDER worth Dm. 100 m. (£8.5 m.) for the installation of a modern telephone system in Venezuela has been obtained by Siemens. This was stated by Dr. Hermann von Siemens at the annual meeting of Siemens & Halske in Munich.

MR. R. W. LADBROOKE, industrial sales manager, David Brown Tractors (Engineering), Limited, is scheduled to begin an extensive tour of the Middle East next month to investigate possible markets for tractors and allied equipment.

THE BRITISH THOMSON-HOUSTON COMPANY, Rugby, announces that it is to establish a new factory at Larne, Northern Ireland, for the "manufacture of components associated with turbine production." About 250 operators will be employed at the start.

RECENTLY, at the Sherburn-in-Elmet works of W. & T. Avery, Limited, weighing-machine makers, the Leeds section of the Institute of Industrial Supervisors held a conference on "The Foreman and Work Study." Following a tour of the works there was a number of lectures, discussions and film shows.

A MINOR EXPLOSION at the Long Ing works of Ouzeldale Foundry, Limited, Barnoldswick, last week, scattered red-hot cinders, molten metal and other debris, and also blew away a number of asbestos sheets on the roof. Fortunately no one was injured, and it is reported that production will not be impaired.

A MUSEUM has been established at the Heath Street works of Guest, Keen & Nettlefolds (Midlands), Limited. Among the 51 exhibits are some wooden screws from the roof of St. James's Church, Piccadilly, built by Sir Christopher Wren, and a microscope dated 1857, originally made for James Nasmyth, inventor of the steam hammer.

HAVING ACQUIRED the premises and plant of the International Tools Company, at Windsor, Ont., Canada, R. W. Crabtree & Sons, Limited, printing-machine manufacturers, Water Lane, Leeds, intend to establish a new branch there. Mr. P. Hedgewick, of the Canadian company, has been appointed president and managing director.

SEVENTY-NINE countries have been represented at Castle Bromwich according to an official survey taken at the end of the British Industries Fair. A rough check of each of the sections showed that twice as many enquiries and calls have been made in the building and the electrical sections as in the engineering or hardware and hollow-ware sections.

PIECE BY PIECE, section by section, Colvilles' Mossend Engineering Works are in process of moving a new mill to a site now being prepared for it at Dalzell Steel Works, Motherwell. The final assembly will take place during Glasgow Fair holidays without interruption to work production. The mill consists of three stands and weighs almost 1,100 tons.

DERBY FIRMS on holiday from July 25 until August 10 include: Rolls-Royce, Limited; Ley's Malleable Castings Company, Limited; Ewart Chainbelt Company, Limited; Qualcast, Limited; Aiton Company, Limited; G. Fletcher Company, Limited; Parker Foundry, Limited; Spiral Tube & Components Company, Limited; and E. W. Bliss (England), Limited.

AT A CORONATION DINNER given by J. Brockhouse & Company, Limited, West Bromwich, in Birmingham on May 14, Mr. J. L. Brockhouse, chairman of the company, welcomed some 300 business friends. Mr. Sidney Vernon proposed "The Company," and response was made by Mr. Frank Brockhouse, deputy chairman, who has been associated with the firm for 64 yrs.

HUNGARY'S STEEL PRODUCTION will be raised from 2,200,000 tons to 3,500,000 or 4,000,000 tons annually during the second five-year plan due to start in January, 1955, stated the Hungarian prime minister recently. A large hydro-electric station is to be constructed on the Danube and the area of irrigated land will be increased to 741,320,000 acres. In addition, 250,000 new dwellings will be constructed.

PEGLERS, LIMITED, brassfounders, Doncaster, state that they are now feeling the result of competition from countries such as Germany, Italy and Japan, and that production is being curtailed in consequence. Stocks have been increased in an attempt to continue full-time working, but it is now necessary to adopt short-time. Import restrictions and over-ordering by customers when goods were in short supply, are also blamed for the present position.

SIR PERCY LISTER, head of R. A. Lister & Company, Dursley, Glos., has gone to Australia for the opening of the new plant, a large foundry at St. Peter's New South Wales, which the Australian subsidiary of the company has built to speed production of castings for Australian industry. The parent firm was started in 1867 when Robert Ashton began manufacturing farm implements at Dursley. The new plant will considerably cut the cost of castings for Australian industry and eliminate the need for imports.

SIR PERCY MILLS, managing director of W. & T. Avery, Limited, who returned from a 35,000-mile tour on May 14, summed up his impressions by saying that there is no sign of a slump but business is going to be harder and more difficult for Britain. Sir Percy had visited Pakistan, India, Malaya, Australia, New Zealand and America. Competition in world markets, he said, was more intensive to-day, especially from Germany and Japan. The sellers' market had gone and there was a growing sense in the world of the value of money.

We've proved it pays!

Loading scrap metal for cupola

Sand from stock-pile to mixer

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THE Winget POWER BARROW

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Rotates completely in a 6-ft. roadway.
Eight hours running on 1¼ gallons of petrol.
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Raw Material Markets

Iron and Steel

While the foundries welcome the ending of licensing control over supplies of pig-iron, the freedom from allocation procedure has not so far resulted in increased buying, and is not likely to do so under present conditions. For some time purchases have been limited to the orders on hand and forward bookings, and foundries have rarely had any difficulty in acquiring adequate tonnages to meet these needs. The licensed tonnages have in the main been sufficient, and in many instances have not been taken up to the full extent, owing to shortage of work and consequent reduction in outputs. For the present, it is unlikely that there will be any appreciable change in demands for pig-iron. There are more hopeful signs of an improvement in trade, but they have yet to be translated into actual business, and until the time arrives when larger quantities are essential, it is unlikely that the foundries will carry large stocks—for economic reasons, and also because of the unstable position in regard to prices.

Most establishments are striving to secure more work in order to step up their lagging production. The light foundries, particularly, are badly in need of orders, and the engineering foundries connected with the motor, tractor, and Diesel-engine industries are working at well below capacity levels. Castings for the steel trade, the collieries, and the machine-tool makers are in good demand, and the foundries catering for these home trades are employed on a better scale than those which rely chiefly on the export markets. This is the position also of the jobbing foundries.

Pig-iron producers continue to reach high levels of output, because of the heavy demands from the steelworks. Of the 105 furnaces in blast in the March quarter, 63 were producing basic pig-iron, 38 hematite and foundry and forge pig-iron, and the remaining four ferro-alloys. Although priority is given to the needs of the steelworks, it is still necessary to augment the tonnages from home furnaces with imported pig-iron. On present levels of production the furnaces would be unable to increase appreciably the tonnages which they are sending to the foundries, although demands are on a much reduced scale.

The supply of light scrap is good, as the light-casting foundries are not taking up their usual tonnages, but there is a good demand for heavy cast-iron and machinery scrap. Foundry and furnace coke, ganister, limestone, and firebricks are coming forward in the required tonnages.

Managements of some of the big steelworks on the North-East Coast have already issued an intimation that there will be no interruption of production during Whitsuntide and the ensuing week, when the Coronation festivities will be in full swing. Herein lies a positive assurance of the healthy state of the steelmakers' order-books. If the market for certain light products has become a trifle patchy, the pressure for heavy steel is overwhelming. Shipbuilders, wagon and locomotive builders, power-plant producers, and boilermakers have contracts in hand which will ensure full employment for several years ahead, and a considerable acceleration of production will be possible as soon as adequate supplies of steel are forthcoming. Steel plates are being loaded and despatched to the limits of works' capacity, and almost as relentless is the pressure for heavy sections and joists. Bookings for heavy sheets are also extensive, but there is less interest in the lighter gauges, and export business in bars and light sections is still difficult.

Non-ferrous Metals

Particulars issued by the Bureau of Non-ferrous Metal Statistics of consumption and stocks in this country for the month of March show that, for the first time this year, and even beyond, there was a definite slowing down in the rate of stock increase in copper, for at 149,175 tons stocks at March 31 compared with 146,910 tons a month earlier. The country's usage of virgin copper was 20,517 tons, some 900 tons lower than in February, but consumption of secondary copper increased from 16,249 tons to 18,842 tons, so that overall there was an appreciable increase. In lead, stocks declined from 16,518 tons at February 28 to 13,781 tons at the end of March, while consumption of virgin and scrap was rather higher than in February at 25,226 tons. Zinc stocks registered a gain of nearly 3,400 tons at 23,783 tons, while consumption, all grades, at 21,662 tons, compared with 20,311 tons a month earlier. Consumption of tin was up to the January level at 1,726 tons, showing an improvement of 121 tons on February.

According to recent reports, the Ministry of Materials found demand for copper exceptionally poor in April, and presumably not much better in May. There appears to be a firm conviction among consumers in the U.K. that a further big fall in the price is coming soon, an idea shared by users in the United States, who are also buying cautiously. In the States it is, of course, customary not to sell far ahead, so that it may well be that the producers are not unduly embarrassed by this policy. Business in copper there is active, but a recent pronouncement on the price outlook for this metal from the other side suggested that a lower price in due course is inevitable, a statement with which probably very few people would quarrel.

Chile's policy seems to be in some doubt and there has been a suggestion of official contact with the United States. In the long run it can hardly be doubted that a price of 35½ cents, f.o.b., will be found to be untenable, but it now seems as if Chile's intention is to hold on to this quotation for the present. It is, of course, a long way above the world price which to-day may be said to be about 30 cents per lb., and this is the basis on which our Government, is now buying from the producers. The great puzzle, of course, is to determine at what price copper will be on offer when the Metal Exchange begins trading on August 5. In the meanwhile the other metals dealt in there keep fairly steady.

Official quotations for tin during the past week were:—

Cash—May 14, £757 10s. to £760; May 15, £757 10s. to £760; May 18, £755 to £757 10s.; May 19, £765 to £770; May 20, £747 10s. to £750.

Three Months—May 14, £742 10s. to £747 10s.; May 15, £745 to £747 10s.; May 18, £745 to £747 10s.; May 19, £755 to £760; May 20, £742 10s. to £745.

Official prices of refined pig-lead:—

May—May 14, £81 5s. to £81 15s.; May 15, £80 to £80 10s.; May 18, £82 to £82 5s.; May 19, £84 10s. to £84 15s.; May 20, £86 10s. to £87.

August—May 14, £80 to £80 5s.; May 15, £79 to £79 5s.; May 18, £80 15s. to £81; May 19, £83 to £83 5s.; May 20, £83 5s. to £83 10s.

The week's official zinc quotations were as follow:—

May—May 14, £69 15s. to £70; May 15, £69 5s. to £69 7s. 6d.; May 18, £70 7s. 6d. to £70 10s.; May 19, £71 to £71 2s. 6d.; May 20, £72 to £72 5s.

August—May 14, £69 17s. 6d. to £70 2s. 6d.; May 15, £69 5s. to £69 10s.; May 18, £70 7s. 6d. to £70 10s.; May 19, £71 5s. to £71 7s. 6d.; May 20, £72 to £72 5s.

F.&M. FERRO-SILICON BRIQUETTES

F. & M. SILICON BRIQUETTES

It is well known that the hardness of ordinary cast iron depends to a large degree on the Silicon content of the metal. Silicon acts as a softening agent in cast iron by its action in reducing the amount of combined carbon, which is liberated in the form of free graphite. The presence of free graphite and a low combined carbon content contribute towards easy machineability.

In these days of restricted supplies of good machinery scrap iron and also of pig irons with a wide range in chemical composition, F. & M. Ferro Silicon Briquettes provide a practical and economical means of increasing the amount of Silicon in a cast iron. The necessary number of Briquettes is added to the charge in the Cupola and all the Silicon contained in the Briquettes passes into the molten metal with only a negligible loss *because the element is protected during its progress through the oxidising zone.*

An important function of **F. & M. Ferro Silicon Briquettes** is in the production of dense iron castings with high tensile strength. The foundryman usually ensures sufficient "softness" in his castings by using a pig iron with 3 to 4 per cent. Silicon. Such pig irons are frequently coarse-grained with large graphite flakes and, when used in ordinary cupola mixtures of pig and scrap iron, are apt to give rise to castings containing large graphitic flakes. This coarse-grained structure, which is particularly developed in the thicker parts of the section, results in an iron of comparatively low tensile strength.

By using pig irons of medium Silicon content (2 to 2·5 per cent. Silicon) which possesses a denser structure owing to their smaller graphite flakes, and increasing the Silicon content of the metal by an appropriate addition of **F. & M. Ferro Silicon Briquettes** to the cupola mixture, an iron with much smaller graphite flakes, and therefore, with a denser structure, is produced. At the same time, the metal is readily machineable, although it is denser and stronger, ***as the composition of the metal remains unaltered from that obtained by the use of higher Silicon coarse-grained pig irons.***

Technical advice for any special working conditions gladly given on request

DIRECT FROM MANUFACTURER TO YOUR FOUNDRY

F. & M. SUPPLIES LTD

4, BROAD STREET PLACE, LONDON, E.C.2

Telephone: LONDON WALL 7222 (5 lines)

also

SILICOMANGANESE, FERRO MANGANESE AND FERRO CHROMIUM

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

(Delivered unless otherwise stated)

May 20, 1953

PIG-IRON

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

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £16 14s. 6d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £17 0s. 3d.

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

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

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

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. Coast and N.-W. Coast of England, £16 12s.; Scotland (Scotch iron), £16 18s. 6d.; Sheffield, £17 13s.; Birmingham, £17 19s. 6d.; Wales (Welsh iron), £16 18s. 6d.

Basic Pig-iron.—£14 6s. 6d. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered).

Ferro-silicon (6-ton lots).—40/55 per cent., £57 10s., basis 45 per cent. Si, scale 21s. 6d. per unit; 70/84 per cent., £86, basis 75 per cent. Si, scale 23s. per unit.

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

Ferro-molybdenum.—65/75 per cent., carbon-free, 10s. to 11s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £204 to £210 per ton; 38/40 per cent., £235 to £265 per ton.

Ferro-tungsten.—80/85 per cent., 22s. 10d. to 23s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 25s. 9d. to 28s. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent. C, £85 4s., basis 60 per cent. Cr, scale 28s. 3d. per unit: 6/8 per cent. C, £80 17s., basis 60 per cent. Cr, scale 26s. 9d. per unit; max. 2 per cent. C, 2s. per lb. Cr; max. 1 per cent. C, 2s. 2½d. per lb. Cr; max. 0.15 per cent. C, 2s. 3½d. per lb. Cr; max. 0.10 per cent. C, 2s. 3¾d. per lb. Cr; max. 0.06 per cent. C, 2s. 4d. per lb. Cr.

Cobalt.—98/99 per cent., 20s. per lb.

Metallic Chromium.—98/99 per cent., 6s. 5d. to 7s. 6d. per lb.

Metallic Manganese.—93/95 per cent., carbon-free, £262 to £275 per ton; 96/98 per cent., £280 to £295 per ton.

Ferro-columbium.—60/75 per cent., Nb + Ta, 40s. to 70s. per lb., Nb + Ta.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £25 12s. 6d.; tested, 0.08 to 0.25 per cent. C (100-ton lots), £26 2s. 6d.; hard (0.42 to 0.60 per cent. C), £28; silico-manganese, £33 16s.; free-cutting, £28 16s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £32 12s.; case-hardening, £33; silico-manganese, £34 17s. 6d.

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

Sheet and Tinplate Bars.—£25 11s. 6d.

FINISHED STEEL

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

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

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

Tinplates.—57s. 9d. per basis box.

NON-FERROUS METALS

Copper.—Electrolytic, £253; high-grade fire-refined, £252 10s.; fire-refined of not less than 99.7 per cent., £252; ditto, 99.2 per cent., £251 10s.; black hot-rolled wire rods, £262 12s. 6d.

Tin.—Cash, £747 10s. to £750; three months, £742 10s. to £745; settlement, £747 10s.

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

Refined Pig-lead—May, £86 10s. to £87; August, £83 5s. to £83 10s.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £97 15s.; rolled zinc (boiler plates), all English destinations, £95 15s.; zinc oxide (Red Seal), d/d buyers' premises, £99.

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

Brass.—Solid-drawn tubes, 23d. per lb.; rods, drawn, 32⅜d.; sheets to 10 w.g., 255s. 3d. per cwt.; wire, 30¼d.; rolled metal, 242s. per cwt.

Copper Tubes, etc.—Solid-drawn tubes, 28¼d. per lb.; wire, 282s. 9d. per cwt. basis; 20 s.w.g., 311s. 9d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £160 to £218; BS. 1400—LG3—1 (86/7/5/2), £172 to £238; BS. 1400—G1—1 (88/10/2), £254 to £375; Admiralty GM (88/10/2), virgin quality, £265 to £380 per ton, delivered.

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

Phosphor Bronze.—Strip, 368s. per cwt.; sheets to 10 w.g., 389s. 9d. per cwt.; wire, 43⅜d. per lb.; rods, 40d.; tubes, 38¼d.; chill cast bars: solids 3s. 3d., cored 3s. 4d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 2s. 5¾d. per lb. (7 per cent.) to 3s. 8¾d. (30 per cent.); rolled metal, 3 in. to 9 in. wide × .056, 2s. 11¾d. (7 per cent.) to 4s. 2¾d. (30 per cent.); to 12 in. wide × .056, 3s. to 4s. 3d.; to 25 in. wide × .056, 3s. 2d. to 4s. 5d. Spoon and fork metal, unsheared, 2s. 8¾d. to 3s. 11¾d. Wire, 10 g., in coils, 3s. 6½d. (10 per cent.) to 4s. 8¾d. (30 per cent.). Special quality turning rod, 10 per cent., 3s. 5½d.; 15 per cent., 3s. 11¼d.; 18 per cent., 4s. 4d. All prices are net.

Obituary

MR. JOSEPH HENRY BANKS, senior partner of Jonah Banks & Sons, door bolt manufacturers, of Willenhall (Staffs), died last week at the age of 77.

THE DEATH has occurred of MR. THOMAS NORMAN SMAILES, secretary and chief cashier for many years for Douglass Brothers, Limited, engineers, ironfounders, etc., of Blaydon (Co. Durham). He was 56.

THE BOARD OF TRADE announce that they have under consideration an application to restore the 10 per cent. general *ad valorem* duty, under the Import Duties Act of 1932, on sulphuric acid: oleum which was removed on May 24, 1951. Any representations which interested parties may desire to make with regard to this application should be addressed to the Board of Trade, Industries and Manufactures Department, Division 1, Horse Guards Avenue, Whitehall, London, S.W.1, not later than June 5, 1953.

BAKELITE, LIMITED, at the British Plastics Exhibition at Olympia, from June 8 to 18, will use a large painting by Henry Collins, M.S.I.A., to illustrate foundry casting by the shell-moulding method using Bakelite resins. Behind these will be displayed the company's products and a wide selection of applications for them drawn from the fields of electrical and general engineering.

MR. PORTER HART, president of the Instrument Society of America, and chief instrument engineer of the Dow Chemical Company's Freeport, Texas, plant, and RICHARD RIMBACH, managing director of the First International Instrument Congress and Exposition, are leaving America for Europe on June 26, to return on July 24. They will visit London, Birmingham, Hanover, Düsseldorf, Frankfurt, Stuttgart, Munich, Milan, Zurich, Geneva and Paris. The First International Instrument Congress and Exposition will be held in Philadelphia, Pennsylvania, U.S.A., September 13 to 25, 1954.

THE COMMITTEE OF INQUIRY on the "Rehabilitation of Disabled Persons" which was set up by the Minister of Labour and National Service, the Minister of Health and the Secretary of State for Scotland, under the chairmanship of Lord Piercy, is now ready to receive evidence from interested persons and organizations. Any persons or organizations wishing to give evidence should give notice as soon as possible to the Joint Secretaries, Committee of Inquiry on the Rehabilitation of Disabled Persons, Ministry of Labour and National Service, 32, St. James's Square, S.W.1, with a memorandum of the views they wish to bring to the notice of the Committee.

SPEAKING at the dinner of the Birmingham and West Midlands branch of the Institute of Directors on May 8, Mr. Guy Chantrey, chairman of the branch, referred to his recent world tour to study export problems, and said that in the main he found conditions in the sterling bloc unfavourable to British exporters. The chief adverse factors were currency restrictions and import licences. The United States market was "wide open" to British manufacturers. The essential qualifications for success there were forcible salesmanship, fine quality and design at competitive prices and, above all, prompt delivery dates. Mr. Chantrey also told the assembly that Birmingham had added more than 100 new members since the autumn, bringing up its total to 795. The guest of honour at the dinner was the Home Secretary, Sir David Maxwell Fyfe, who spoke on "whether the second half of the 20th century will be able to avoid the major lunacies of the first half."

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

POSITION with prospects as Foreman/Manager required, West Midlands Area; fully experienced practical Foundryman; 43; M.I.B.F.; Grey, Malleable, Non-ferrous, Sales, Commercial, full responsibility; technical training; not afraid of work; commencing salary secondary if prospects good; proven ability, excellent record; Small Foundry preferred.—Box 3484, FOUNDRY TRADE JOURNAL.

PRACTICAL SENIOR FOUNDRY EXECUTIVE offers assistance to director running Midland Foundry. 44; accustomed full administration, development sales; technical expert all departments; car owner; take responsibility; A.M.I.P.E., M.I.B.F.; highest references; wide experience.—Box 3485, 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.

WORKS MANAGER (Working) for Malleable Iron Foundry and Machine Shops. Must have practical experience and be capable of controlling labour. West Midlands.—Box 3483, FOUNDRY TRADE JOURNAL.

WORKING FOREMAN required for small Non-ferrous Jobbing Foundry and Pressure/Gravity Diecasting Department. Previous experience controlling labour essential. Permanent position with excellent prospects for suitable applicant. South Coast area.—Write, first instance, stating previous experience, age, and salary required, to Box 3486, FOUNDRY TRADE JOURNAL.

DEPUTY CHIEF RADIOLOGIST required for large X-ray Laboratory examining aircraft castings. Applicants should have sound knowledge of radiology and metallurgy and must possess drive, initiative and organising ability. Applicants will be treated in strict confidence. Salary according to experience and ability. —Apply to Box 3467, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER: Assistant Manager required for Iron Foundry producing castings up to 25 tons. Applicants must be experienced in the control of labour and operation of incentive schemes, and possess the technical knowledge necessary to assume full responsibility for all branches of the Foundry. Age 30-40. Superannuation scheme operates.—Write with full details of training, experience and positions held indicating salary required to the Commercial Manager, G. & J. WEIR, LIMITED, Coltness Foundries, Newmains, Wishaw.

SITUATIONS VACANT—*Contd.*

INVESTMENT FOUNDRY, South of England. Vacancies exist for the following personnel: Fettling Shop Foreman, Chief Inspector A.I.D., Furnace Man used to Incandescent Furnaces on temperatures up to 1,050 deg. C.; Chargehand, Fettling Shop, to take charge of night-shift. Good wages paid for the right type of man.—Apply Box 3491, FOUNDRY TRADE JOURNAL.

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

FIRST CLASS REPRESENTATIVE wanted by Iron Founders to sell Castings, Bristol, South Wales and West Country Area. Live connection engineering and electrical industries essential. Remuneration commission basis. Full details apply Box 3489, FOUNDRY TRADE JOURNAL.

LABORATORY ASSISTANT (Female) required with experience of routine Chemical Analysis for work in Foundry Laboratory. Please give full details of qualifications, experience, and salary required to H. WALLWORK & Co., LTD., Red Bank, Manchester, 4.

FOUNDRY FOREMAN required, for large Midland Foundry. Must have first-class practical knowledge of the Light Casting Trade and General Engineering Castings. Knowledge of Rate-fixing, and must be first-class disciplinarian, preferably a resident in the Midland area.—Box 3492, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required, to take charge of Pattern Shop and Foundry manufacturing Cast Iron and Non-ferrous Castings for Machine Tools. Age 32 to 50. Only applicants who have excellent practical and technical qualifications and who have held a similar position of authority will be considered.—Applications in writing to THOMAS WHITE & SONS, LTD., Laighpark Works, Paisley.

REPRESENTATIVE required for first-class Non-ferrous Foundry in the London area. Able to introduce substantial business. Good connections essential. Excellent possibilities and remuneration to right man. State full particulars in the first instance in confidence.—Apply Box 3478, FOUNDRY TRADE JOURNAL.

DRAUGHTSMAN (PLANT).—Experienced Mechanical Draughtsman required, with knowledge of foundry layout. Prospects of taking charge of Works Drawing Office of large well-known Engineers and Founders in South London area. Applicants should be between 25 and 40 years of age. Give details of experience.—Box 3479, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd*

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

HOOVER (ELECTRIC MOTORS), LTD., Cambuslang, Scotland, invite applications for the post of METALLURGIST. Candidates must possess a Degree or Higher National Certificate in Metallurgy. Experience of pressure die-casting and chemistry preferred. Salary will be commensurate with training and experience. — Applications should be addressed to the PERSONNEL MANAGER.

FOUNDRY FOREMAN (35/45) required for Iron Foundry producing castings in grey and high duty iron up to 3 tons in weight. Sand Slinger and Machine Moulding experience essential. Gloucestershire; modern house available. Applicants should state in confidence their complete experience, age, and salary required.—Box 3476, FOUNDRY TRADE JOURNAL.

SOUTH AFRICA.—An important concern in the Midlands requires a METALLURGIST, with a knowledge of chemical analysis, aged about 25 to 30, for a permanent position in Johannesburg. There is considerable scope for advancement for a keen young man. A knowledge of general foundry practice is desirable but not essential.—Reply Box 3472, FOUNDRY TRADE JOURNAL.

SALES MANAGER.—Applications are invited for the post of Sales Manager for modern foundry producing ferrous and non-ferrous castings. South of England. Experience of Sales in foundry and engineering industry essential. Mechanical or metallurgical background an advantage. Housing available. Good salary and excellent prospects.—Box 3473, FOUNDRY TRADE JOURNAL.

PARTNERSHIP

FOUNDRY PLANT ENGINEER, young, energetic, executive experience of design, development, maintenance, and technical sales, seeks working Partnership.—Box 3454, FOUNDRY TRADE JOURNAL.

PROPERTY

IRON FOUNDRY for sale as going concern, Manchester area, freehold land and building, capacity for castings up to 25 cwt.—NORMAN RAMSDEN, Estate Agent, 15, Clegg Street, Oldham. Mai. 4911.

PROPERTY—*Contd.*

EAST WORKS, OLDHAM.
EXTENSIVE RAIL CONNECTED FACTORIES OR WAREHOUSES.

1—FLOOR SPACE 278,000 sq. ft.; Site area 51,000 sq. yds. Mainly Three Storeys—Concrete Floors. Five Electric Lifts, Overhead Travelling Cranes, Road and Rail Loading Docks. Fixed Foundry equipment including Cupolas, Core Drying Furnaces, etc. Suitable for heavy engineering, storage, etc. Undeveloped land approx. 4½ acres. Price: £50,000

2—Floor Space 302,000 sq. ft.; Site Area 17,000 sq. yds. Part modern, mainly multi-storied. Concrete on Brick Arch Floors. Covered Loading Yards, Road and Rail Docks. Price £40,000.

Sole Agents.—HILLIER PARKER MAY & ROWDEN, 77, Grosvenor Street, London, W.1 (Mayfair 7666.)

FOR SALE
BY PRIVATE TREATY
THE WELL EQUIPPED FREEHOLD FOUNDRY AND ENGINEERING WORKS
of
T. BAKER & SONS
(COMPTON) LIMITED
(Established over 100 years)
situate and known as
WHITEWALL IRONWORKS, COMPTON, BERKS.
comprising
Mainly Single Storey Buildings
FLOOR SPACE ABOUT 50,000 SQ. FT.
Extensive Yard Space,
together with the
FOUNDRY PLANT, MACHINE TOOLS AND EQUIPMENT
Managers Residence
Cottages and Vacant Land.
Full particulars, and orders to view of the SOLE AGENTS:
HENRY BUTCHER & CO.
73, Chancery Lane, London, W.C.2
Tel.: HOLborn 8411

IRONFOUNDRY PREMISES and plant for sale; Yorkshire, (W.R.); freehold; 2-ton Cupola; 2-ton Crane, Pneulec Royer, etc.—Box 3470, FOUNDRY TRADE JOURNAL.

MACHINERY WANTED

WANTED: Full set of Patterns for 4 ft. 0 in. underdriven stationary Pan Mill for sand, etc.—Full details to Box 3462.

TENSILE TEST MACHINE required for non-ferrous test bars. Capacity up to 10 tons load. Must be in good condition in view of subsequent A.I.D. Approval. Full particulars to Box 3446, FOUNDRY TRADE JOURNAL.

SANDBLAST, CENTRIBLAST or WHEELABRATOR wanted, new or secondhand, in good condition. Private buyer.—Details and where to be seen to Box 3487, FOUNDRY TRADE JOURNAL.

MACHINERY FOR SALE

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

PLANT FOR SALE.—2 Sklenar ½-ton Aluminium Furnaces; 2 Colman Core Blowers; 1 Selas Gas Mixer; 2 Diesel Generators; 1 75-h.p. Holman Compressor; 3 Stone Wallwork Moulding Machines.—Apply MAGNAL PRODUCTS, LTD., Warmley, Bristol.

"FORDATH" OIL-SAND MIXER available for immediate disposal. 1-cwt. capacity; complete with a.c. Motor, 440 volts, 6.3 amps., 50-ohms, 4-h.p. continuous rating, 945 r.p.m. Mounted on bedplate, slide rail adjustment. In good condition.—Can be inspected, and offers made to ARTHUR LYON & Co. (ENGRS.), LTD., Park Works, Stamford, Lincs.

2—COLEMAN - WALLWORK Jolt Squeeze pattern draw machines, type CN. 7 Coleman-Wallwork Shockless Jolt Squeeze pin lift machines, type WT.563C. Overhauled by makers and since unused. 2 Coleman - Wallwork Shockless Jolt Squeeze Turnover draw machines, type WT.562C. Dismantled and part complete. West Midlands Area.—Box 3488, FOUNDRY TRADE JOURNAL.

STEEL FACING SAND MIXING PLANT for Sale comprising: No. 3 Size August Simpson Intensive Mixer complete with Oil Bath Worm Box Drive 40 h.p. Motor, Starter, Water Meter and Spray, Safety Grid, Platform, Air Operated Discharge Door, and Pin Type Aerator of By-Pass Type. No. 3 Size August Bucket Loader with 7½ h.p. Motor, Reversing Starter and Push Button Control. All suitable for 400 v., 3 phase, 50 cycle. A.C. Supply. Entire plant installed new December 1949. Little used, extremely well maintained in thoroughly sound mechanical condition. —Apply BROCKHOUSE CASTINGS, LIMITED, Hall Street, Wednesfield. Tel. No. Wolverhampton 31221.

ONE low pressure Air Compressor, by Tilghman's Patent Sand Blast, 30 lbs. pressure, 11 in. by 8 in., 330 r.p.m. Type F.C.6.B. Date 26/5/42. Three years' use only since purchase. Completely overhauled with new main bearings, big end bearings and con-rod fitted, and is in excellent running order. Complete with Laurence Scott 35 h.p. slip ring Motor, 1,450 r.p.m., 400/3/50, with slide rails and vee ropes. Ellison rotary type starter, 45 amps. capacity. Water pump driven off flywheel.—Price and further particulars from WORKS ENGINEER, Dartmouth Auto Castings, Ltd., Dartmouth Road, Smethwick, 40. Can be viewed by appointment.

FOR SALE.

NO. 16 ATRITOR CRUSHER by Alfred Herbert, complete with Feed Hopper, overhauled and with a quantity of spares. Also a No. 12 Atritor by Alfred Herbert, for which we have available about 6 tons of spares. Both these machines are offered at extremely low prices for quick clearance.

SAVILLE-CALVERT (MACHINERY) LIMITED.
BIRMINGHAM ROAD, STRATFORD-ON-AVON
Tel.: Stratford-on-Avon 3681.

MACHINERY FOR SALE—*Contd.*

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

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

ALBION TWW WORKS

RUMBLING BARRELS—FROM STOCK:

"FORWARD" MOTOR DRIVEN RUMBLING BARREL, Model 23J. Approx. ½-ton capacity; length 4 ft. 7½ in., width A/F. 1 ft. 10¾ in.; speed of barrel, 36 r.p.m.; 3 h.p. S.C. Motor, 400/3/50. TOTALLY ENCLOSED trunnion mounted, driven through Totally Enclosed Worm Gear Reduction unit.

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

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

EXHAUST FANS:

SIZE 9 PADDLE BLADE. 450 c.f.m., 3 in. w.g. .75 h.p. Motor, inlet 5⅞ in. dia., outlet 5⅞ in. by 4½ in.

SIZE 12 PADDLE BLADE. 1,000 c.f.m. against 5 in. w.g. 2 h.h.p. S.C. Motor, 8 in. dia. inlet, outlet 9 in. by 9⅞ in.

SIZE 15 PADDLE BLADE FAN. 2,000 c.f.m. against 6 in. w.g. 5 h.p. S.C. Motor, outlet 8¼ in. by 8 in., inlet 9 in. dia.

SIZE 17 PEERLESS EXHAUST FAN. Capacity 6/7,000 c.f.m., 3 in. w.g. 10 h.p. S.C. Motor, Starter, slide rails, 17 in. inlet; outlet 12 in. by 15 in.

THOS W. WARD LTD.
ALBION WORKS : SHEFFIELD
Phone 26311 'Grams: "Forward."
Remember . Words might have It!

- IMMEDIATE DELIVERY.

Cupolettes, new and secondhand.
Geared Foundry Ladles. Six in stock, up to 2 tons capacity; very good condition; cheap for quick clearance.
200 pairs genuine Sterling Moulding Boxes. Excellent condition; cheap for quick sale.
Fordath Senior Sand Drier. £85.
Morgan Tilting and Bale-out Furnaces—over 50 in stock, all sizes.
New Broomwade Compressors at list prices, all sizes up to 30 h.p.
New Broomwade Air Receivers, all sizes up to 6 ft. by 3 ft.
Over 100 new Keith Blackman Fans in stock; all sizes.
Shot Blast Equipment and General Plant.
Immediate attention to all enquiries.

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

MACHINERY FOR SALE—*Contd.*

600

FANS.

36-IN. Keith Blackman Fan, discharge 45 deg. downcast; multivane impeller; 12,620-c.f.m., 1½ in. w.g.; belt driven from 7½-h.p. S/C Motor, 400/3/50.

Ten 25-in. Air Impeller & Eng., Ltd., Fans; horiz. bottom discharge; multivane impeller; 5,000-c.f.m., 2¾ in. w.g.; direct coupled to 3½-h.p. T.E. S/C Motor, 400/3/50.

Two 21-in. Keith Blackman Fans; horiz. bottom discharge; 3,250/800-c.f.m., ¾ in. w.g.

Cast Iron Blower, by Alldays & Onions; horiz. bottom discharge; 4,050/5,300-c.f.m., 14/25 in. w.g.; 1,440/1,880 r.p.m.; belt drive.

High Pressure Fan, by Keith Blackman; horiz. bottom discharge; 745-c.f.m., 28 in. w.g.; direct coupled 7-h.p. S/C Motor, 400/3/50.

GEORGE COHEN
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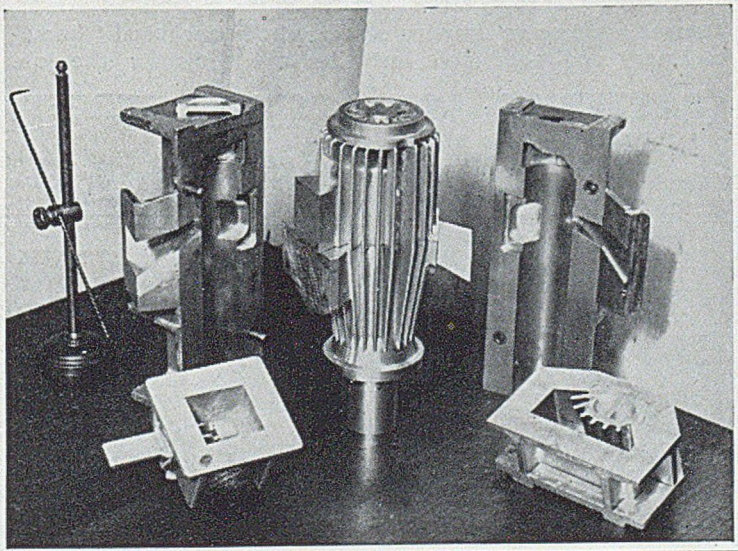

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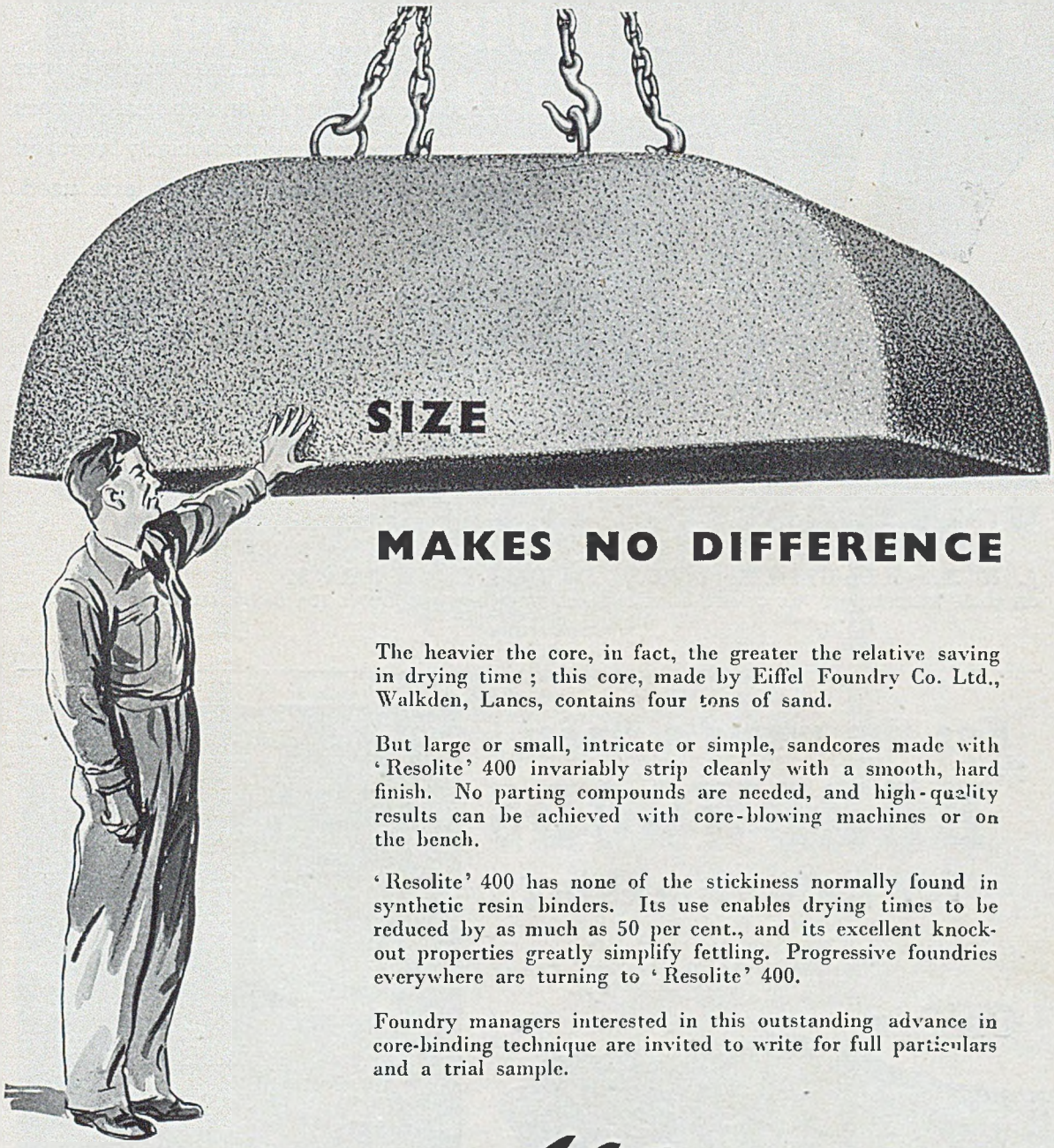

MAKES NO DIFFERENCE

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

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

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

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3 Ton Model Illustrated

Larger and smaller machines available

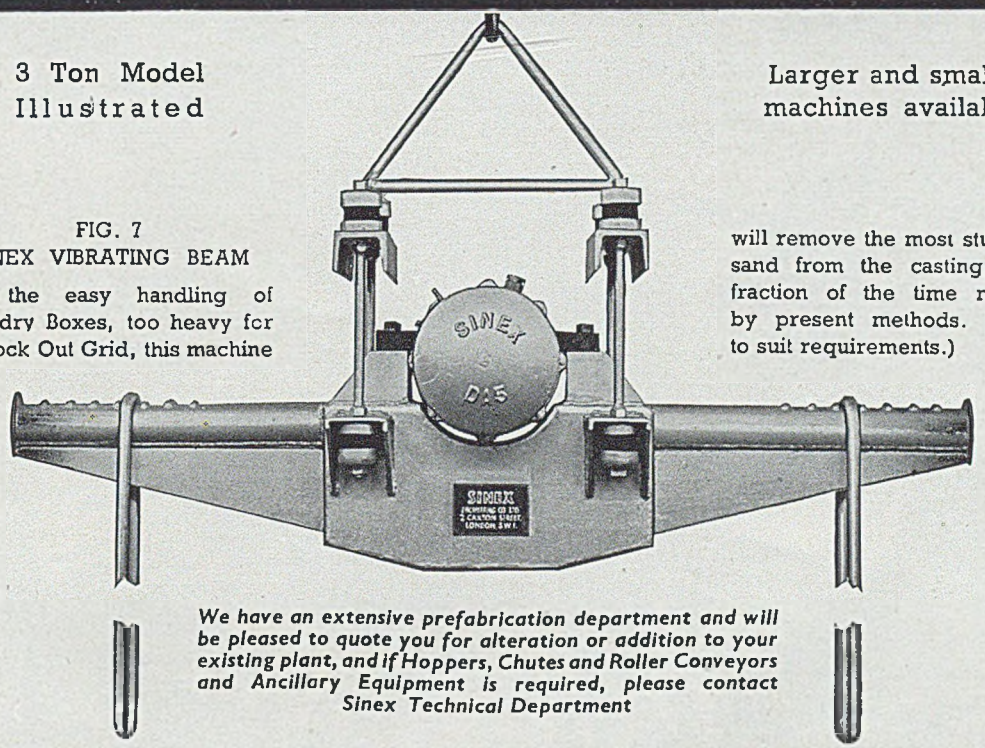


FIG. 7
SINEX VIBRATING BEAM

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

We have an extensive prefabrication department and will be pleased to quote you for alteration or addition to your existing plant, and if Hoppers, Chutes and Roller Conveyors and Ancillary Equipment is required, please contact Sinex Technical Department

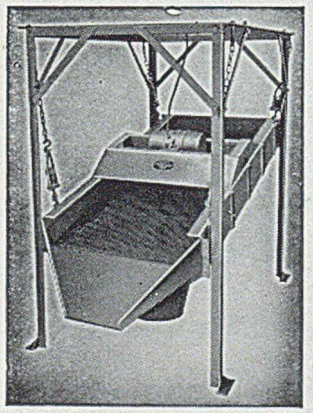


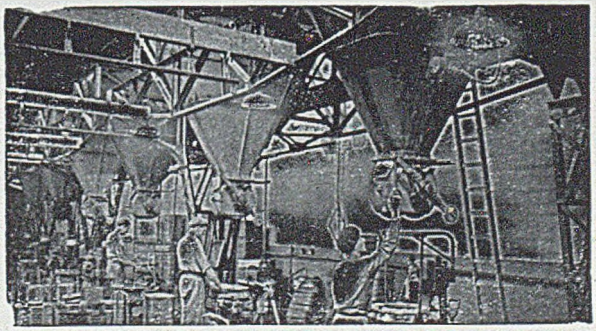
FIG. 10 (on left)

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

This screen is also manufactured in sizes to suit requirements

FIG. 8 (illustrated below)

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



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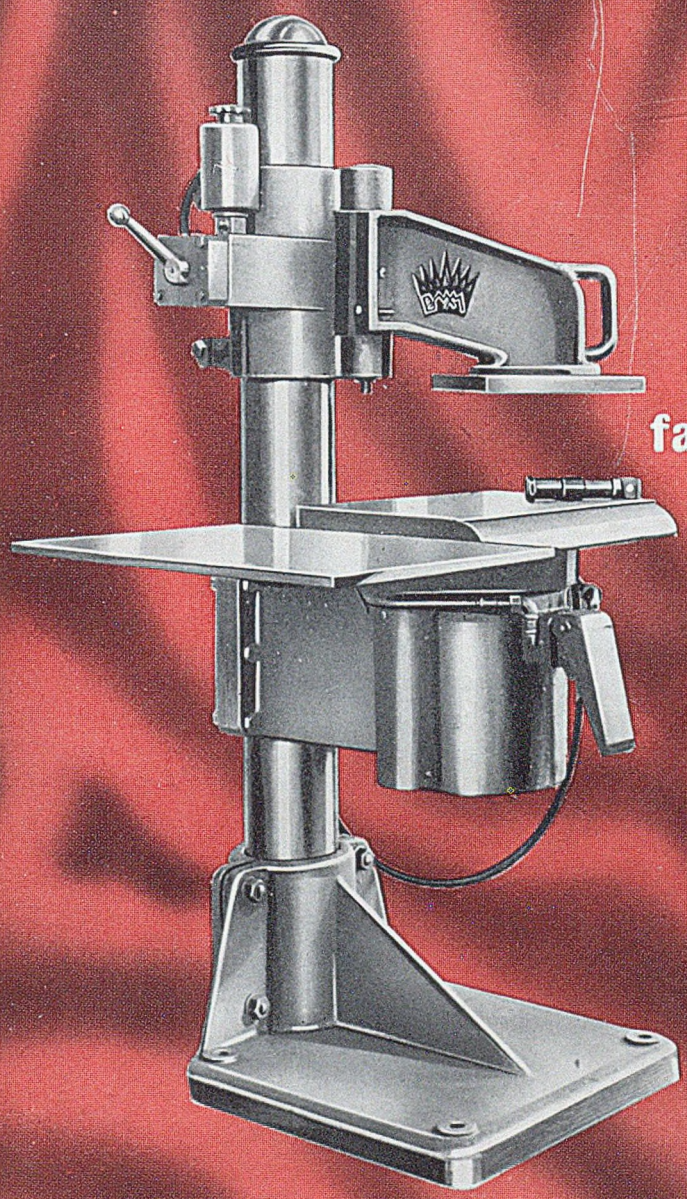

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