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PRINCIPAL CONTENTS

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Our Enquiry Bureau

Though we have never stressed the fact, the enquiry department of the JOURNAL is an important additional function. During the year, many hundreds of enquiries are received from all sorts of people, ranging from Government departments to a harassed guardian anxious to know what would be the prospects if his ward entered the foundry industry. Enquirers are not the least pernickety as to confining their queries to the foundry industry, and the subjects upon which information has been required have included the "constituentyes of Sticking Plaster," the first industrial concern ever to organise a brass band, a good hotel in Paris, the maker of the Old-Man brand of brass sheets, an obscure tinning process, and so forth. Sometimes enquiries are continuously received for months on end. At one time, a large number of people seemed to be interested in finding the makers of dies for the production of tin soldiers, whilst a second period was characterised by a thirst for knowledge as to what foundries could make enormous quantities of electric-iron castings.

One of the problems which gave us the most trouble was a series of enquiries for "Metalock." We had a mental picture of the word appearing in the American Press, so we wrote to several knowledgable friends in the States, but after considerable time no enlightenment was forthcoming. Then *mirabile dictu* we read in the American Press that "Metalock" was a process for hardening steel! By this time, the names of the original enquirers had escaped our memory, so we printed the information. Shortly after publication, a charming, if justly irate, Canadian gentleman called on us to disclose that "Metalock" was a modern process for repairing important broken castings! We still feel our American friends should have been aware of this, as the process had been very extensively advertised.

The organisation of an enquiry bureau is quite simple, and is based on knowing where to obtain information, and we would like to thank the many people who have come to our rescue. The sad thing about answering technical queries is that we seldom learn of the final outcome. However, we have received congratulatory letters in general terms, such as one from South Africa, which informed us that the writer—the owner of a quite important foundry—had built his business from information printed in the JOURNAL. We are always glad to receive enquiries, and the only ones rejected are where we suspect the information required is such that a consultant should be engaged. The laying-out of foundry, or a major re-organisation, is not within the scope of the enquiry bureau of the technical Press.

* * * *

Post Scriptum.—It is interesting to note that whilst writing the above, there have been interruptions to request the telephone number of the C.F.A.; to tell a foundry where to obtain the Report of the Costing Sub-committee of the Institute of British Foundrymen; to indicate where pitch for bonding sands could be obtained; and asking for added information from the writer of a paper on core-blowing.

Correspondence

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

I.B.F. "EDWARD WILLIAMS" LECTURE*

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—I feel that there is little doubt that Dr. Bailey's lecture and choice of subject will have been received with the greatest appreciation by metallurgists and engineers alike. The experience of the works' metallurgist indicates that there is a lack of appreciation of the properties of materials in the form of castings or forgings; the tendency is to take it for granted that the strength in any part of a casting should be equal to that of the cast test-bar as laid down in the appropriate specification.

I would like to refer in particular to that section of Dr. Bailey's lecture in which he discusses retaining rings in high-tensile brass. I have met on a number of occasions cases in which the importance of corroding conditions with these alloys under stress has not been properly appreciated, with the unfortunate results of the type recorded. I feel that the broad impression that high-tensile brass castings are prone to cracking for some reason left unexplained, is undesirable, and that the way in which this type of cracking occurs should be properly appreciated by designers.

The brass selected was one with a zinc equivalent of 48.5 per cent., and thus, clearly, was an alloy in the all-beta range. This alloy was presumably selected for its mechanical strength; on the other hand, it would be well known that alloys of this particular type of high-tensile brass (all-beta) are susceptible to stress-corrosion cracking, and it would appear that the few cases of failure mentioned arose from this cause.

More recent developments in this field include the adoption of high-tensile brasses of suitable composition within the alpha-beta range, which are immune from stress-corrosion cracking, and have properties approaching those of the all-beta high-tensile brasses. Under proper foundry control, typical mechanical properties obtained from standard cast test-bars would be of the order shown below:—

	Alpha-beta.	All-beta.
0.15 per cent. Proof stress	26 tons per sq. in.	30 tons per sq. in.
Ultimate tensile stress ..	47 ,, ,,	50 ,, ,,
Elongation	20 per cent.	20 per cent.

The corresponding typical properties of the all-beta alloy are shown for comparison. I hope that these remarks will assist in the interpretation of Dr. Bailey's comments on the cracking of high-tensile brass castings.
—Yours, etc.,

A. R. FRENCH,
Senior metallurgist (heavy metals),
J. Stone & Company, Limited.

* Printed in the JOURNAL, June 14, 1951.

PNEUMATIC COMPONENTS, LIMITED, of Eyre Street, Sheffield, 1, have sent details of the P.C.L. blow-gun. The illustration shows it to have a particularly pleasing appearance. At the back of the jet there is a knurled control ring, which governs the amount of air delivered. The pressing of the hand lever completely opens the valve, so, rightly, quantity control is by means more exact than manual pressure. The body of the gun is a solid brass pressing, whilst the variable jet is of steel. Normally the tail-piece is designed for use with a ½-in. bore hose, though $\frac{3}{16}$-in. and $\frac{5}{16}$-in. fittings are also stock sizes.

Iron and Steel Institute

Corrosion of Buried Metals

A symposium on the corrosion of buried metals, organised by the Iron and Steel Institute in conjunction with the British Iron and Steel Research Association and the corrosion group of the Society of Chemical Industry, will be held at the offices of the Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1, on December 12. Sir Charles Goodeve, O.B.E., D.Sc., director of the British Iron and Steel Research Association, will be in the chair; sessions will begin at 10.0 a.m. and 2.30 p.m. and will be open to all interested in the subject. The papers will be presented in brief individually and discussed in groups, as indicated in the programme below. A buffet luncheon (tickets 6s. 0d.) will be available in the library of the Institute.

Programme

Morning Session.

10.0 a.m. Opening remarks by the chairman.

10.05 Joint discussion on (i) "Tests on the Corrosion of Buried Iron and Steel Pipes," by J. C. Hudson and G. P. Acock; "Investigations on Underground Corrosion," by K. R. Butlin, W. H. J. Vernon and L. C. Whiskin; and (ii) "Cathodic Protection," by K. A. Spencer; and "Cathodic Protection of Buried Metal Structures," by M. R. de Brouwer.

Afternoon Session.

2.30 p.m. Joint discussions on "Corrosion of Buried Copper and Ferrous Strip in Natural and Salted Soils," by G. Mole; and "Tests on the Corrosion of Buried Aluminium, Copper and Lead," by P. T. Gilbert and F. C. Porter.

There will be no charge for admission, but intending participants are requested to complete a reply form to be obtained from the Secretary of the Institute.

Metals Economy Committee

The Minister of Supply, in conjunction with the Minister of Materials, has appointed an advisory committee on metals economy to help ensure economical use in engineering and the defence programme. Mr. D. A. Oliver, director of research to the B.S.A. group of companies, is chairman, as previously announced. Members of the committee are drawn from industry and government departments. The industrial members are: Dr. G. L. Bailey, British Non-Ferrous Metals Research Association; Mr. H. A. R. Binney, British Standards Institution; Mr. H. H. Burton, English Steel Corporation Limited; Mr. W. C. F. Hessenberg, British Iron and Steel Research Association; Mr. E. Grinham, Standard Motor Company; Dr. Ivor Jenkins, General Electric Company; Dr. L. B. Pfeil, Mond Nickel Company, and Mr. C. J. Smithells, British Aluminium Company.

I.B.F. Golf Meeting

In connection with the golf meeting on September 29 and 30, at Woodhall Spa, members of the Institute of British Foundrymen are reminded that entries, for which the closing date is Friday, August 31, should be sent to the hon. secretary, I.B.F. Golfing Society, Mr. F. Arnold Wilson, care of William Jacks & Company, Limited, Winchester House, Old Broad Street, London, E.C.2. Up to the time of going to press, 40 entries have already been received and the whole party, including Mr. Colin Gresty, president, and Mr. John Sheehan, immediate past-president of the Institute, and spectators, now numbers 65.

British Foundry Training Facilities*

By V. C. Faulkner, Hon. M.I.B.F.

In his Paper[1] to the Institute of British Foundrymen in 1949, Mr. Waeles asked for statements covering the methods of recruitment and training of foundry personnel in other countries. A direct comparison so far as Great Britain is concerned can never be made because of the following factors. (1) *For many educational purposes, Scotland is quite separate from the rest of the country.* (2) *The significance of the words "ingenieur" and "engineer" are by no means the same. When in Great Britain it is qualified to include words like "civil," "mechanical," or "electrical" it may approach the same sense, but not invariably. In other cases, it would not, for a "foundry engineer" would refer to a technician having specialised knowledge of foundry plant.* (3) *The organisations of the foundry employers, whilst connected through a liaison committee, are sectionalised, that is, there are separate bodies for iron castings, for steel, for heavy non-ferrous, and for light alloys.* (4) *There is a complication in that none of the bodies is as yet in direct contact with the trade unions for the establishment of wages to be paid to apprentices and boys; that is done by either the Engineers and Allied Trades Employers' Federation, or the National Light Castings Federation. Thus it is established that there is not a British equivalent to the "Syndicat des Fondeurs."*

Apart from considerations of nomenclature, foundry personnel in Great Britain, as in France, may be divided arbitrarily into supervisory grades (technicians, managers, metallurgists, foremen), craftsmen (moulders, core-makers, patternmakers etc.) and labourers. There is however, no unified system of training under a common authority for any of the categories, although some steps have been taken in recent years in the direction of recognised courses of instruction.

Historical

How then has this country provided itself with its technicians in the past? Foundry managers may be ex-moulders, ex-patternmakers, sons of "patrons," college-trained metallurgists, or mechanical engineers. These people have qualified themselves by the hard way of studying at evening classes, in the case of those with a practical background, or by practical work in the foundry by those whose training was of the university type. The density of population in this country is so great that for the majority of the young men in the industry it is possible to find available evening classes covering their theoretical requirements. Moreover, in Glasgow, Newcastle, Manchester, Sheffield, Birmingham, the East Midland cities and London, foundry technical classes of the highest standard are open at very small cost to the ambitious foundry student.

City and Guilds Examinations

In the early thirties, the writer, in conjunction with Mr. Tom Makemson, M.B.E., pressed for the granting of a certificate to students of foundry practice in the dozens of technical colleges spread all over the country, so that a youth possessing a certificate of proficiency would have the satisfaction of knowing that it would be nationally and not merely regionally recognised. Thus, in 1932, through the ægis of the City and Guilds of London Institute, yearly intermediate examinations in foundry practice and patternmaking were established, together with a final examination in patternmaking. Since 1945 a final examination in foundry practice has been added. (Exhibits A and B†.) The control of these examinations is largely, though not entirely, in the hands of the Institute of British Foundrymen. Before the examination papers are set, they are meticulously scrutinised by a moderating committee. Thirty-two colleges prepare students for examinations in patternmaking and thirty in foundry practice. (Exhibits C and D.) Students unable to attend authorised classes, may, on application to the Committee, be permitted to sit externally for the examination. After the results have been made known, the examiners' reports (Exhibit E) are carefully studied by the Committee, and the recommendations based on these are incorporated in the next set of papers. Medals and book prizes are awarded to those heading the lists. The progress of these examinations is such that since the inception of the scheme, no fewer than 2,423 certificates have been granted, and the number of candidates presenting themselves for examination has steadily increased. (Exhibit F.)

Most of the Universities established in the larger manufacturing centres—Glasgow, Durham (at King's College, Newcastle-upon-Tyne), Sheffield, Manchester, Liverpool, Birmingham and Wales (at Swansea and Cardiff) have provided chairs of Metallurgy. Most of the Professors at these Universities have taken a profound interest in foundry practice, and many ex-students are to be found as executives on the staffs of the larger foundry concerns. In 1933, steps were taken by the University of Sheffield to include in the course of training for the degree of Bachelor of Metallurgy, a special section "Metallurgy (Founding)."

National Foundry College

In 1935, Dr. J. G. Pearce, animated by the excellent work done at the *Ecole Supérieure de Fonderie*,

* A slightly abridged version of the official contribution from the Institute of British Foundrymen to the 24th Annual Congress of the *Association Technique de Fonderie* in Paris.

† A number of exhibits of publications germane to foundry training were available at the Paris meeting; these are listed at the end of the Paper.

in Paris, created—in collaboration with the British Cast Iron Research Association and other bodies and firms—the British Foundry School. This school was centred in the Birmingham Central Technical College, and did excellent work until 1939, when the extraordinarily complete military and industrial conscription caused a suspension of its activities. The course followed fairly closely that created by the "*Ecole Supérieure,*" especially in the extensive use made of external lecturers drawn from the industry.

In 1948, the National Foundry College was established under the ægis of the Minister of Education, but having on its board of governors a preponderating representation from the foundry industry. This college is conducted within the buildings of the Wolverhampton and Staffordshire Technical College at Wolverhampton. Though the syllabus in force is much the same in concept as that established at the British Foundry School, it has been found desirable to create a two-part diploma course. The first six months is designed to focus upon foundry problems, a variety of technical information and training previously acquired, so that students can take full advantage of the subsequent training. Between parts I and II there is a compulsory period of six months for practical work. (Exhibit G.) A splendid hostel, Tor Lodge, has been acquired for the use of the students. An association of "*anciens élèves*" to include those from the earlier "School" has been formed. There are places in the Diploma Course for about 20 students per year.

The graduates from this college are destined to fill mainly executive positions within the foundry industry. While it is too early to judge the worth of the trainees from the post-war college, several men from the pre-war Foundry School have obtained positions of eminence in both managerial and technological spheres.

National Foundry Craft Training Centre

The National Foundry Craft Training Centre[2] is a relatively new enterprise and is unique. The centre is located in a workshop attached to, but isolated from, a large foundry at West Bromwich. To this centre come apprentice moulders from all over the country for a thoroughly practical training under the guidance of an instructor who himself is a highly-skilled craftsman. During their normal apprenticeship period, the lads spend, at intervals, three courses at the Centre, each of a month's duration. They are housed at a well-furnished residential hostel which has been acquired. During their training, the boys visit a number of foundries in the locality and much use is made of film strips and the like. A foundry apprentice training school on somewhat similar lines to the one at West Bromwich is being established in Scotland. This is to be run as a separate department in conjunction with the Burnbank School of Engineering at Falkirk.

Necessarily, the cost, largely borne by the individual foundry owner, of sending a boy to a centre of this sort is somewhat high, and some find it preferable to operate, either alone or co-operatively, schools run on similar lines or more intensively. One such school has recently been established in Scotland, where stress is laid on the training of boys for the light iron castings (builders' casting) industry.

Meehanite School

The co-operative school organised for its licensee foundries by the International Meehanite Metal Corporation, Limited, of London, has been in operation much longer than the Craft Training Centre. It is situated within the Butterley works at Ripley, Derbyshire. Its rural location has many obvious advantages over urban districts. Entrance is, of course, limited to apprentices working in the foundries of the Meehanite licensees (Exhibit H).

Training in Works

Some concerns, large foundries or engineering firms with foundries, have built and equipped special foundry schools; others have allocated special classrooms solely devoted to tuition, whilst many foundries grant full facilities for the boys to receive tuition one full day each week at a technical college.

One of the most interesting developments has been described by Mr. J. B. Longmuir.[3,4] After a medical examination and the suitability of an entrant for an industrial career has been established, all recruits undergo a pre-apprenticeship course held at least four times a year. During this period, every part of the works is visited and no fewer than 50 executives give talks about their personal work to the boys. Every class is divided into four or five teams, and each team has a colour allocated to it. All equipment is distinguished by the team colour. Each day, and each week, the flag of the winning team is displayed, victory being by points awarded for merit in the various exercises undertaken. Each morning, at 7.30, there is personal inspection of the boys, focusing on one aspect each day: *Monday*, boots; *Tuesday*, teeth; *Wednesday*, hands; *Thursday*, hair; *Friday*, finger-nails, and *Saturday*, general. At 7.45 until 9.0 there are lectures, then there is a break for cocoa and cheese rolls. At 9.15, games of the Boy-Scout type are played until 9.45, when practical work is undertaken until noon. Restarting at 1.0 p.m., the afternoon's work is varied to include visits to different sections of the foundry, to learn sketching, to see instructional films, to have lectures or do practical work. At 3.30, in the gymnasium, a special course of physical training correlated with foundry movements is undertaken. After a shower-bath and a short period for rest and quiet recreation, the boys dismiss. (Exhibit I.) Indeed, the whole factory in this respect is probably the most advanced in the country.

Another foundry which has made a worthwhile contribution to the training of its apprentices is the Stanton Ironworks Company, near Nottingham. Here, a special building has been created and a small mechanised unit for castings production has been installed (Exhibit J).

Many other large firms have also created their own schemes and are doing excellent work—amongst these are Harland & Wolff, Metropolitan Vickers;

Allied Ironfoundries; English Electric Company; Manlove & Alliot, of Nottingham. For the medium-size concerns, it is usual, when facilities are available, to send boys for one day a week to the local technical college, where they receive a simple theoretical background knowledge of their craft.

Sponsoring Organisations

The Council of Ironfoundry Associations, an organisation created by the various national and regional manufacturers' associations, plays a leading part in educational activities by the production and distribution of instructional films and film strips, lecture notes, posters, and general propaganda booklets (Exhibit K). Moreover, this body actively supports, both directly and through affiliated bodies, the various national schemes.

The Institute of British Foundrymen has for many years played an important part in the general education scheme of the country, both in an advisory capacity and by the provision of special lecture courses. Issued during the war, and now reprinted, are the Institute's "Notes for the Guidance of Teachers of Foundry Practice"; these take the City and Guilds syllabus, previously quoted, for a basis and deal with each section in detail, but leaving the teacher to supplement from his own experience. Outstanding amongst the general activities of the Institute has been the organisation, annually, of week-end conferences for the discussion of pressing subjects by foremen (Exhibit L). Moreover, the monthly meetings of some 18 branches and sections bring recent developments in foundry technology before a vast audience not reached by an annual convention. Unquestionably, this less-formal interchange of views, both during and after the meetings, is an outstanding and worthwhile feature of British educational technology.

The British Cast Iron Research Association, like the *"Centre Technique,"* plays its part in the general education system by providing lecturers and acting in an advisory capacity to most of the nationally-organised schemes.

Conclusions

Mr. Waeles was wise in asking for information as to what is being done and what has been accomplished in other countries, because a perusal of what has been revealed in this Paper contrasts sharply with French activities. In France, a logical approach has been made to the subject of the training of foundry personnel, whereas in this country very large numbers of independent activities have been undertaken, but have never been correlated into one comprehensive scheme. Where the Frnch are at the moment in advance of this country is in the provision of text-books, and perhaps, also, in the filling of gaps in the overall system; these gaps certainly exist. More stress, too, is laid, both in France and in America, on practical competitions—a phase which has not so far found favour nationally in this country.

Acknowledgments

The Author wishes to express his gratitude to the following for the help given in the presentation of this Paper:—Mr. A. R. Parkes, his chief assistant; the Institute of British Foundrymen; the Council of Ironfoundry Associations; the British Cast Iron Research Association; the University of Sheffield; the City and Guilds of London Institute; Newton Chambers & Company, Limited; the Stanton Ironworks Company, Limited; J. Stone & Company, Limited; and K. & L. Steelfounders & Engineers, Limited, and many other foundries.

REFERENCES

[1] Waeles, D. Organisation for the Training of Apprentices in the French Foundry Industry. Proc. Institute of British Foundrymen, Vol. XLII (1949), A.233.
[2] National Foundry Craft Training Centre. FOUNDRY TRADE JOURNAL, Vol. 86 (1949), 649.
[3] Longmuir, J. B. Apprentice Training in the Foundry. FOUNDRY TRADE JOURNAL, Vol. 79 (1946), 55.
[4] Longmuir, J. B. Education in the Foundry. FOUNDRY TRADE JOURNAL, Vol. 81 (1946), 29.

EXHIBITS DEPOSITED WITH THE PAPER

A.—City and Guilds of London Institute Syllabus for Foundry Practice and Patternmaking Examinations.
B.—Typical Examination Papers of the City and Guilds of London Institute.
C.—List of Schools and Colleges giving Instruction in Patternmaking, and preparing Students for City and Guilds of London Examinations.
D.—List of Schools and Colleges giving Instruction in Foundry Practice and preparing Students for City and Guilds of London Examinations.
E.—City and Guilds Examiners' Reports in Foundry Practice and Patternmaking (1948).
F.—Table of Results of City and Guilds Examinations in Foundry Practice and in Patternmaking, 1932 to 1949.
G.—Prospectus of the National Foundry College, 1950-51.
H.—Mechanite Training Booklet.
I.—Layout of the Foundry Training Centre, and Particulars of the Pre-National Service Course, and of the General Apprentice Training at the Thorncliffe Works of Newton Chambers & Company, Limited, Sheffield.
J.—Stanton Training Centre Brochure.
K.—"Craftsmanship in the Ironfounding Industry"—C.F.A. Handbook.
L.—I.B.F. Foremen's Training Course Programme.

Holidays Hit Steel Production

Steel production in July was affected by the annual holidays, in addition to the continued shortage of scrap and iron ore, with the result that output was at an annual rate of 13,317,000 tons. This compares with an annual rate of 14,367,000 tons in July, 1950. Pig-iron production last month was at an annual rate of 9,484,000 tons, against 9,099,000 tons a year ago.

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.
1951—June ..	182,600	9,497,000	307,800	16,007,000
July ..	182,400	9,484,000	256,100	13,317,000
1950—June ..	182,200	9,474,000	312,500	16,249,000
July ..	175,000	9,099,000	276,300	14,367,000

Record Ore Imports

Imports of iron and manganese ores into the United Kingdom in July totalled 1,007,000 tons. Announcing this, B.I.S.C. (Ore), Limited, states that this is an all-time record.

Book Reviews

General Engineering Workshop Practice. Revised edition. Published by Odhams Press, Limited, 67/68, Long Acre, London, W.C.2. Price 12s. 6d.

On the rather dull dust-jacket of this book, the information is given that it contains "576 pages, 180,000 words, over 600 technical drawings and diagrams." When this is related to the cost, good value for money is indicated as judged by to-day's standards. This book contains 17 chapters by virtually 17 different authors. Of these the reviewer from his special knowledge can only criticise a few, so his final appreciation may well be unbalanced. Starting off with Chapter 2, "Metals in Engineering Production," by John D. Watson, the reviewer, though well aware the author has drawn on some well-known published work, thinks that he has succeeded in presenting to the young engineer a story of modern cast iron which is very commendable. This author is also partly responsible for Chapter 11, "Heat-treatment of Metals," which again is good. A second edition of a book should be revised, however, and attention given to such phrases as "a relatively-new development," for, surely, this is no longer true of nitrogen hardening. Naturally enough, it was Chapter 14, "Foundry Work," by E. D. Howard, which was particularly studied. The small section on coal-dust is really interesting as an imaginative piece of writing. Whilst the reviewer has quite a different theory, he certainly appreciates the idea of the coal-dust cooling the sand by some strange inter-reaction with the steam. The incorporation of horse-manure into sand mixtures, cited by the Author as being used to the extent of 6 per cent., is rapidly and rightly becoming obsolete. The paragraph on parting sand needs rewriting in view of new legislation, whilst the section dealing with permanent moulds requires fresh treatment because of the extended use of more modern practices. The cupola illustrated is about the poorest specimen of a melting plant the reviewer has encountered in a text book for many years. It has a solid bottom and no windbelt. The ladles illustrated are somewhat too Victorian to be accepted as representing current practice. Chapter 17 covers die-casting, but again it is suggested the section on the die-casting of cast iron should be replaced by a description of the Eaton-Erb process, as being of greater industrial importance. The figures given for the yearly production are hopelessly out of date. However, if it can be presumed, and there is no reason why it should not, that the material covering machine shop practice is informative, then at the published price it is still good value for money.

Hochwertiges Gusseisen (Grauguss) Seine Eigenschaften und die Physikalische Metallurgie Seiner Herstellung (High-duty Cast Iron (Grey Iron), its Properties and the Physical Metallurgy of its Manufacture), by Professor E. Piwowarsky. Second enlarged and revised edition. Published by Springer-Verlag, 20, Reichpietschufer, Berlin, W.35, Germany. Price (Inland) 135 D Marks.

It was in 1929 that the Author wrote his first book on high-duty iron. It was a modest little book of 336 pages and dealt with the then popular Lanz & Thyssen Emmel processes. In 1942, the first edition of this work appeared, but few copies reached this country. This new edition runs to nearly 1,100 pages and throughout is well illustrated.

In the introductory chapter, the Author has printed a chronological list of developments in the history of cast iron since the end of the 14th century. A similar list prepared by a British author would, one can assume, include the pioneer researches of Turner on the influence of silicon on cast iron. Some mention would no doubt be made to the development of the centrifugal casting of pipes by Fox and Wilson. It is probable that a British writer might also include the German Schürrmann (dealt with in the text) as the first designer of a hot-blast cupola. The list printed in the book being reviewed does not meet with the entire approbation of the reviewer. The contents of the book are very logically set out in 22 chapters and an appendix. Each chapter is again divided and sub-divided so that in the case of chapter 19—Alloyed Cast Iron—there are no fewer than 40 sub-sections. So comprehensive is the contents list, that reference to the index (which is subject only, no name index being included, itself a regrettable omission) is unnecessary. At the end of each section there is a bibliography to enable the student to prosecute his researches more deeply.

In dealing with the Meehanite process, the Author still, as he did in 1939, refers to the Patent position in Germany and elsewhere, before giving a well-balanced description of "how it is done." Reference to Patents quite often does not mean much—only too frequently it is a case of a notion put on paper as against a finished economic process. Patents taken out before 1930 have only academic or legal interest to-day.

The general structure of the book has been designed to give insight into the fundamental nature of cast iron, and the influence of almost everything—heat-treatment, gases, alloy additions, etc., on the properties of the material. There are reviews of all the tests which are made on cast iron—tensile, hardness, magnetic, electric, surface treatment, heat and acid resistance, and even hot and cold working. The cupola comes in for extensive treatment, especially as the Author, either by himself or in association with his colleagues at the Aachen Foundry Institute, has done much original work on the subject. The reviewer was pleased to see a short section on cast-iron art castings. Despite the size of this book it should be clearly understood that the subject is cast iron and not foundry practice, so that for information on sand or mechanisation one must look elsewhere. The major interest of the book is the theoretical and practical development of high-duty irons together with all the metallurgical factors necessary for their production. Naturally it has been written for German foundrymen and perhaps it is just as well to make reference to literature which is easily available to them. For those who can read German, the reviewer unhesitatingly recommends it as a major contribution to the foundry literature of the world.

V. C. F.

House Organ

Tin and Its Uses, No. 24. Published by the Tin Research Institute, Fraser Road, Greenford, Middlesex.

The current issue carries illustrations of the opening of the Tin Research Institute's new laboratories by H.R.H. the Duke of Gloucester. During the past decade the demand for the Institute's technical service has expanded steadily and the range and scale of its researches have grown accordingly. The tin-mining industry in the Belgian Congo is described and illustrated. Alloy plating, in which the Tin Research Institute is a pioneer, is represented by articles on the new tin/nickel alloy coating and on tin/zinc coating. Some years of research have culminated in the discovery of a new tin/nickel alloy which can be plated bright, has a beautiful colour and is as tarnish resistant as chromium. The coating is arousing wide interest as an attractive method of economising in nickel consumption.

Observation and Control of Dust in Foundry Dressing Operations*

Part I. Control of Dust—By R. F. Ottignon

Part II. Observation of Dust—By W. B. Lawrie, M.Sc., F.R.M.S.

(*Continued from page* 137)

Floor-stand Grinder

Floor-stand grinders are normally fitted with local exhaust ventilation systems of the well-known type in which the dust is extracted by a fan through ducting at the back of the machine. A typical double-headed grinder which appeared to be in good condition was examined during the investigations. The results obtained will be seen from Fig. 20. An appreciable amount of dust followed the wheel round and was delivered at high velocity from the space between the top of the guard and the top of the wheel. It was obvious that the inlet velocity was insufficient to overcome the fan effect of the wheel, and the observation throws great doubt on the general efficiency of this type of dust extraction.

One attempt has been made to use the wheel itself to control dust, and to take advantage of the fact that the dust is delivered through the guard opening by the wheel. This was patented by the inventor and is described in patent specification No. 595105 by Muller and Richartz. The system was designed for specific work which is not really comparable with steelfoundry dressing, but by the kindness of Mr. Muller and the directors of Richards Bros. & Sons (1946), Limited, Sheffield, one of the Authors† was permitted to make investigations using a casting showing burnt-on sand. With excessive quantities of dust being generated, the dust suppression appliance appeared to be overloaded and dust was seen to rise into the atmosphere in a diffuse cloud, as will be seen from Fig. 21.

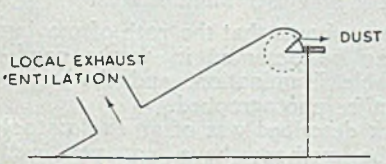
With smaller quantities of dust when grinding clean metal there appeared to be only relatively slight puffs thrown into the atmosphere. (See Fig. 22.) Insufficient work has been done to express an opinion on the efficiency of the apparatus in foundry conditions, but it must be said that this extremely interesting device seems to be well worth investigating.

Swing-frame Grinder

Many swing-frame grinders are worked without any attempt at dust control, and so it seemed desirable to photograph a machine in these conditions. It was found that large quantities of small particle dust rise in a diffuse cloud from the area all around the machine head, and that this cloud moves past the face of the operator. It is quite clear that the smaller size ranges do not follow the line of the

† Mr. W. B. Lawrie.

* Paper presented at the Newcastle-upon-Tyne Conference of the Institute of British Foundrymen. The Authors are respectively Development and Foundry Director, K. & L. Steelfounders & Engineers, Limited, Letchworth, and H.M. Engineering Inspector of Factories, Factory Department, Ministry of Labour and National Service.



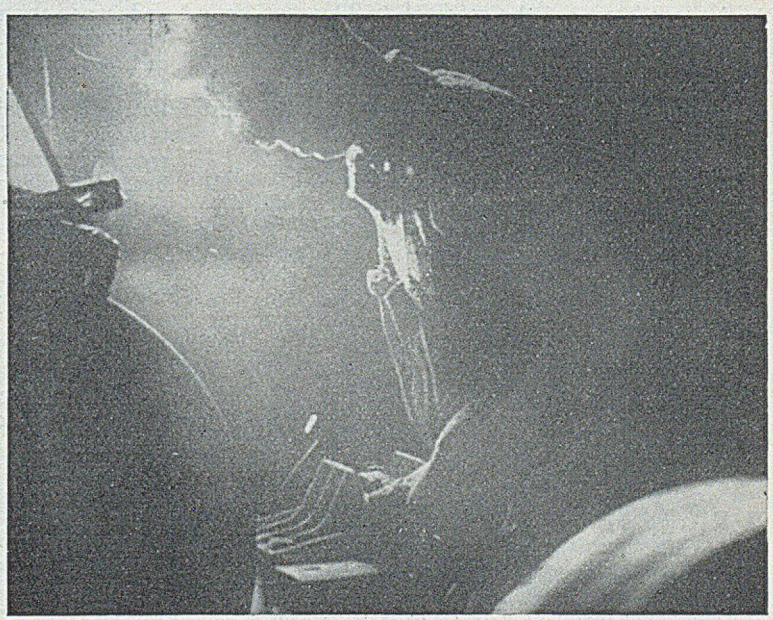
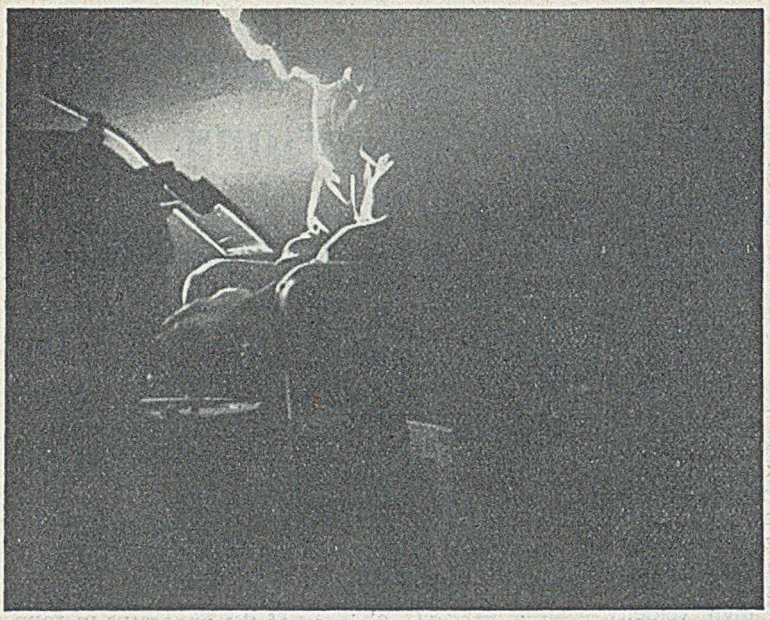


FIG. 20.—*Dust Photograph and Diagram for Floor-stand Grinder Operation; Dust is delivered between the Wheel and Guard; Local Exhaust Ventilation is fitted and Operating.*



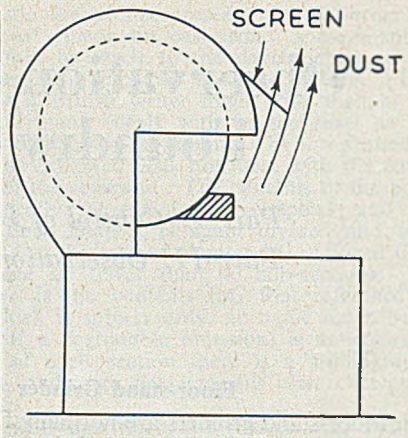


FIG. 21.—*Floor-stand Grinder; Dust Control without Fan; some Leakage of Dust occurs from Heavy Cloud Generated.*

sparks and that, whilst hoods placed at the back of the machine may catch these sparks, they represent a very inefficient method of control for the particles of respirable sizes. Some impression of the very general nature of the dust cloud may be formed from Fig. 23, which represents a machine working without dust control appliances. Fig. 24 indicates the result obtained by fitting exhaust draught at the back of the swing frame. It will be seen that this has very little effect on the fine dust.

Development work was undertaken by the English Steel Corporation, Limited, where attempts were made to strip the dust from the wheel by a mechanical stripper placed close to the back of the wheel and exhaust the dust so collected through the hollow beam of the machine. This has been patented by English Steel Corporation, Limited, who permitted experimental work on the prototype. The results appear in Fig. 25. Quantitative estimations have not yet been completed but the dust

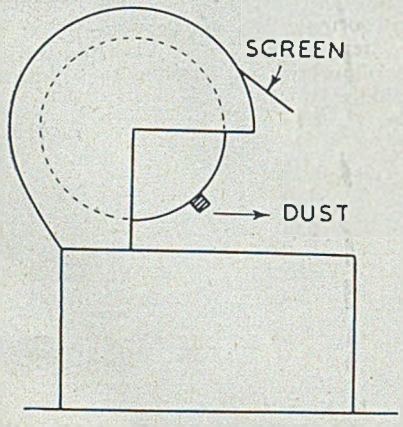


FIG. 22.—*Floor-stand Grinder—Dust Control without Fan. Very Slight Puff of Dust follows Operator's Hand when removing Casting from the Wheel.*

cloud emitted from the wheel appeared to be considerably reduced, although it was still visible. Similar effects were evident on a second machine (see Fig. 26).

Two other systems were also investigated. In the first of these a hood was placed over the machine but on heavy dust clouds the air velocity proved insufficient to collect the dust (see Fig. 27). This provided another instance of the relative inefficiency of remote hoods. It is of interest to note that this grinder was also fitted with local exhaust ventilation under the wheel at the back, placed and designed to collect the heavier particles.

The second of these systems consisted of a sheet-metal hood which enclosed the head of the grinder and was connected to a flexible local exhaust ventilation duct. This was tested under very heavy dust clouds, when there was some leakage of dust from the hood. This leakage was obviously caused by the dust being delivered from the guard by the fan action of the wheel. Nevertheless the quantity escaping appeared to be much less than would have been the case in the absence of the almost complete enclosure of the hood. Results are illustrated in Fig. 28.

Conclusions on Observation of Dust

(1) It has been shown that the path of moving dust clouds can be observed in works conditions by suitable illumination, and that these dust clouds can be photographed.

(2) The work described was of an exploratory nature and the methods have not yet been standardised. For this reason no theoretical considerations have been examined in the Paper, but the practical experience obtained is published in the hope of assisting in the development work which is proceeding in the steelfounding industry.

(3) In certain conditions, the dust from the

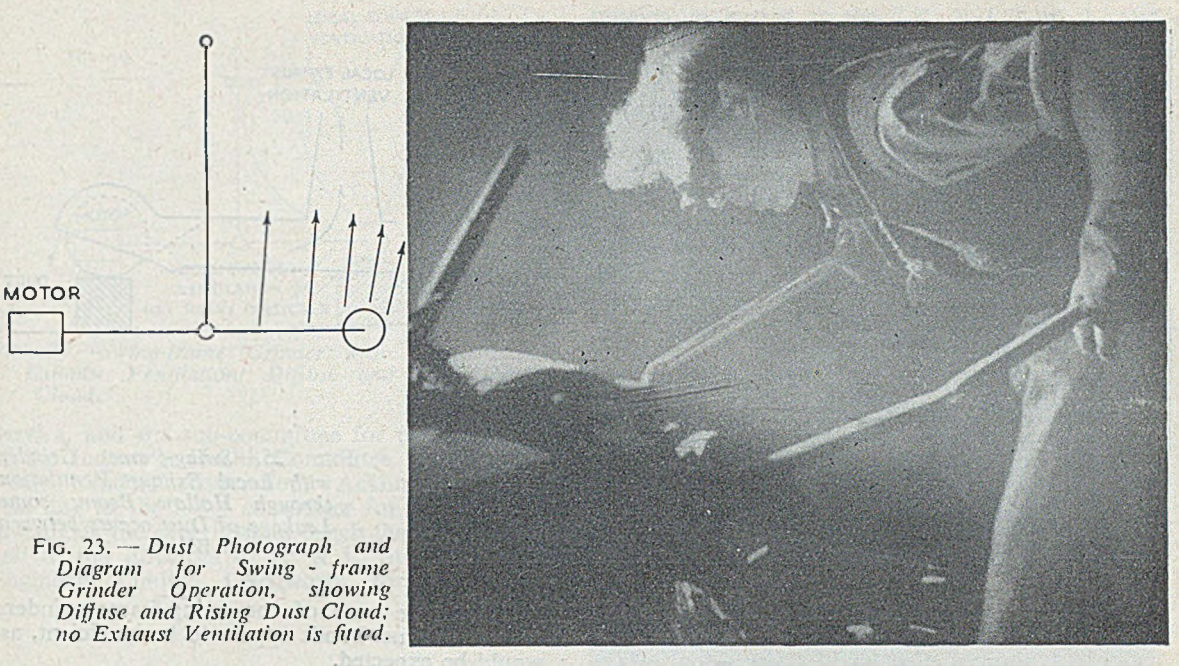


FIG. 23. — *Dust Photograph and Diagram for Swing - frame Grinder Operation, showing Diffuse and Rising Dust Cloud; no Exhaust Ventilation is fitted.*

point of a pneumatic chisel rises in a concentrated plume which might well be inhaled by the operator.

(4) In the experimental conditions imposed, the exhaust of the pneumatic chisel appears to have less effect on the dust distribution than had been anticipated.

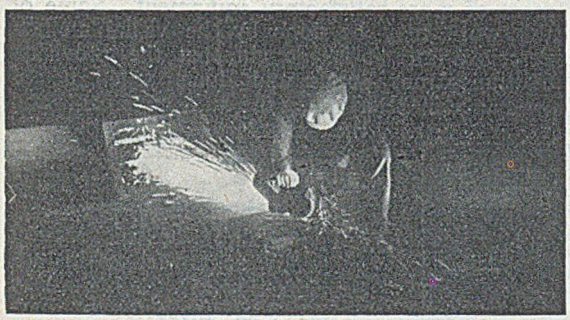
(5) The dust cloud from an abrasive wheel, without guard, used on a flat horizontal surface, forms above and behind the centre of the wheel and appears in some cases as a vortex. From this rotating cloud there is a general upwards diffusion of dust which passes the face of the operator.

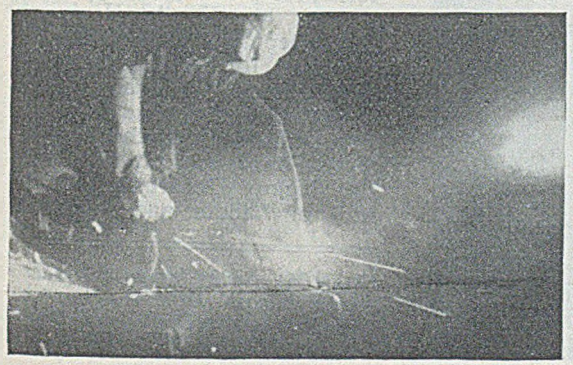
(6) In general, the dust of the respirable size, range does not follow the path taken by heavier particles so that exhaust devices so placed that they intercept these heavier particles cannot be expected to collect the smaller size-ranges. This holds for both wheels, and chisels in the conditions of the experiments.

(7) The provision of an air jet to direct the dust into an exhaust hood on a fettling bench appears to have marked advantages over a simple exhaust system.

(8) The velocity of the jet must be carefully adjusted to the exhaust system to avoid turbulence which might dissipate the dust.

(9) The normal exhaust ventilation on a floor-stand grinder appears to be inefficient in that fine dust follows the wheel round and is delivered at high velocity from the space between the guard and the wheel. This stream then strikes





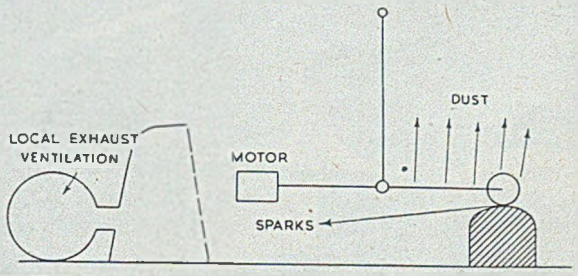
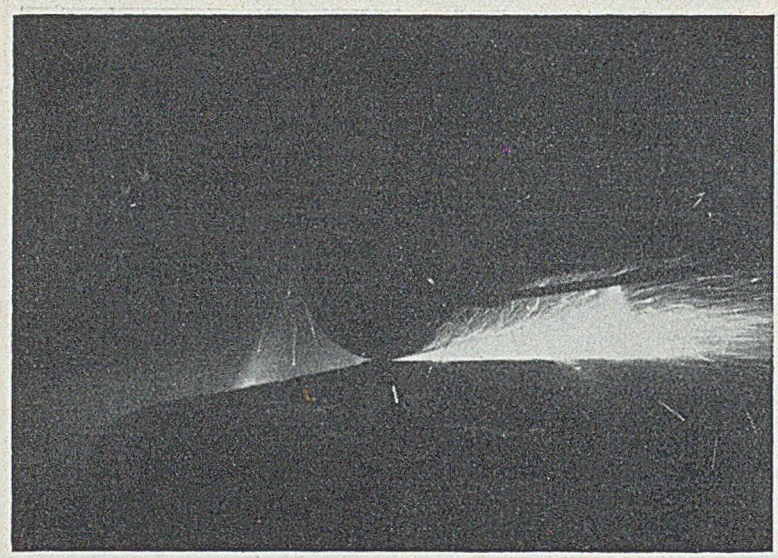


FIG. 24.—*Swing-frame Grinder with Remote Local Ventilation; a Diffuse, Rising Dust Cloud is produced.*



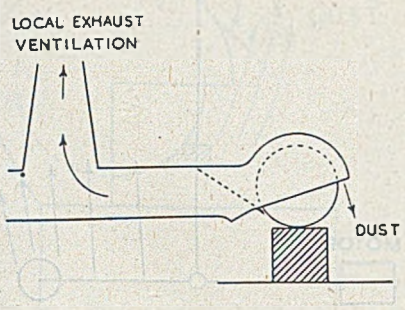


FIG. 25.—*Swing-frame Grinder with Local Exhaust Ventilation through Hollow Beam; some Leakage of Dust occurs between Guard and Wheel.*

the operator's chest and diffuses upwards past his face.

(10) A similar effect was observed on swing frame grinders where the dust was delivered from under the guard in a downward direction. The cloud subsequently rose all around the machine, and was especially accentuated if the machine was being worked over a dusty floor.

(11) It is evident that the fan effect of rotating wheels must be used to assist in control of the dust, or means must be devised to strip the moving dust cloud from the periphery of the wheel.

(12) New methods have been tried in an attempt to obtain efficient dust control at the floor-stand grinder and the swing-frame grinder and early experimental work has been done on these methods.

(13) In the case of the swing-frame grinder, remote exhaust hoods appear to be inefficient, as would be expected.

(14) Much more work remains to be done in order to ascertain the habit of dust-cloud formation in the great variety of conditions which the dressing shop presents.

(15) From the preliminary experiments it appears that considerable changes in the design of local exhaust ventilation systems will be needed to attain efficient dust control, and that careful aerodynamic studies are essential to the development of more satisfactory equipment. Some of this work may be done by the visual method described and it is thought that the provision of transparent hoods and ducts might be of assistance in determining the dust movements and the means to be adopted to control them.

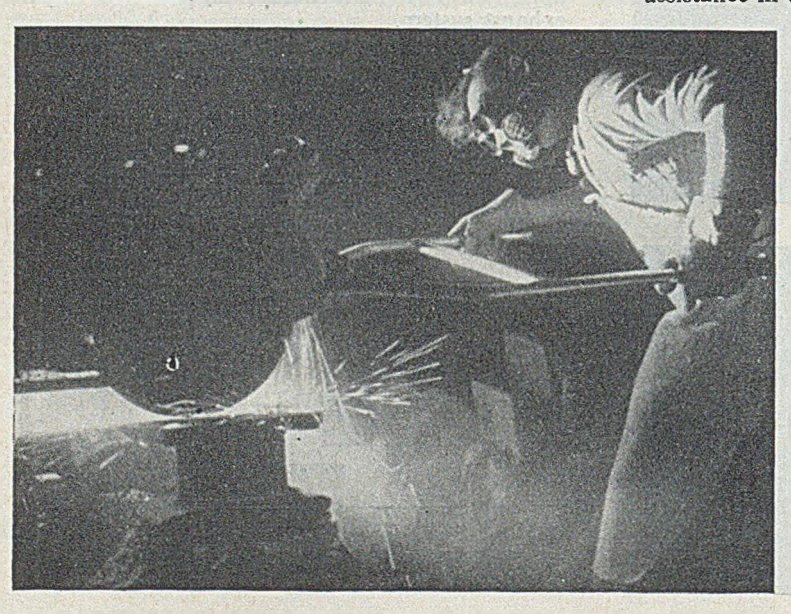


FIG. 26.—*Swing-frame Grinder with Local Exhaust through Hollow Beam; Leakage of Dust between Guard and Wheel.*

Acknowledgments

The Author of this section gratefully acknowledges his indebtedness to Mr. G. P. Barnett, H.M. Chief Inspector of Factories, for permission to publish, and to Mr. H. A. Hepburn, H.M. Deputy Chief Inspector of Factories, for his continued encouragement throughout the work, which was done for, and in conjunction with, the Dust in Steel Foundries Committee of the Factory Department, Ministry of Labour and National

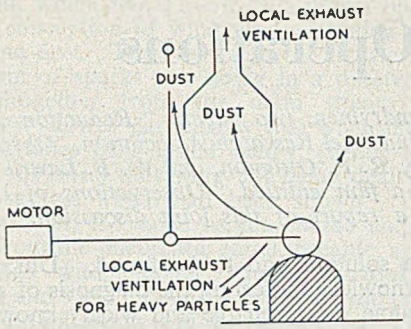


FIG. 27.—*Swing-frame Grinder with Remote Local Exhaust Ventilation; Diffuse and Rising Dust Cloud.*

Service, and the sub-committee for practical work of the Industrial Health Committee of the British Steel Founders' Association. Acknowledgment is also due to the latter committee for permission to investigate the experimental bench they constructed, and to the directors of K. & L. Steelfounders & Engineers, Limited, Letchworth, for similar permission in regard to the "K. & L." bench, and other machines in the works.

The Author is also indebted to Mr. Basil Gray and Dr. Cyril Dadswell of the English Steel Corporation Limited, for their continued interest and assistance, and to the directors of the firm for permission to work on the swing-frame grinder and publish the results. Edgar Allen and Company, Limited, Sheffield, Arthur Balfour Limited, Sheffield, and Richards Bros. and Sons (1946) Limited, Sheffield have all allowed free access to various machines and kindly granted permission to publish the results.

Finally the thanks of the Author are due to Mr. J. E. Stevenson for the line sketches and to the staff of the photographic reproductions branch of the Air Ministry who were responsible for the film and photographs, and in particular to Mr. S. R. Finbow and his colleagues, Mr. Mercer, Mr. Haybittle and Mr. Ward, without whose skill and patience the work could not have been completed.

REFERENCE

[1] Dust in Steel Foundries Second Report. Appendix No. 10. H.M. Stationery Office, London.

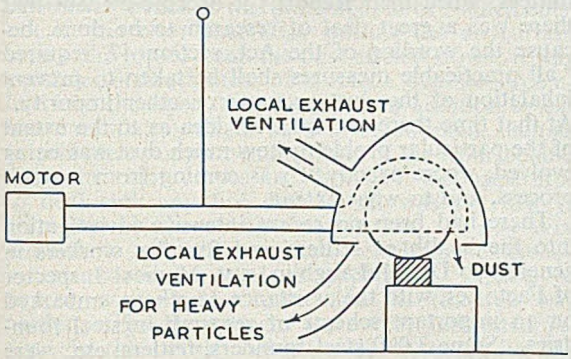
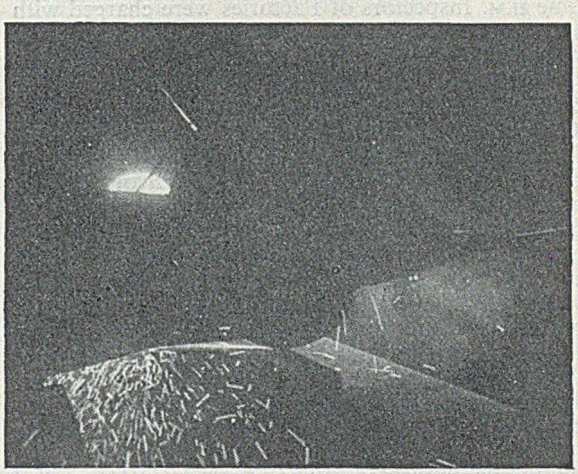


FIG. 28.—*Swing-frame Grinder fitted with Close Local Exhaust Ventilation. Separate Systems are arranged for Small and Large Particles but some Dust escapes between Guard and Wheel.*



Discussion of this Paper is printed on page 186 of this issue.

Minister Opposes Nationalisation

The Parliamentary Secretary to the Ministry of Food, Mr. Stanley Evans, who is one of four members of the British Commonwealth Parliamentary Association team touring Africa, told a meeting between the leaders of the Northern Rhodesia African Congress and the team: "I say bluntly I think it would be a shameful thing to nationalise the Northern Rhodesia copper industry at this moment."

Nationalisation, he said, would only be judged in relation to the general considerations peculiar to one country. Anything that went to retard capital investment in Northern Rhodesia would be the very worst thing possible.

THE DURIE FOUNDRY, Leven, of Henry Balfour & Company, Limited, has been visited by 38 welding experts from ten different countries, who were participating in the International Welding Congress.

European Industry's Higher Output

In the first quarter of this year, industrial production in western Europe showed a gain of 39 per cent. above the pre-war period and a gain of 13 per cent. over the first quarter of 1950, according to the Economic Co-operation Administration's quarterly report to the American Congress. Steel production was more than 10 per cent. higher than in the same quarter of 1950, and close to the highest quarterly rate on record.

The outlook for a further increase in steel production is clouded, however, by a scarcity of high-grade iron ore, coal, steel scrap, and alloying materials, the report said.

THE EMPLOYEES of Qualcast, Limited, of Derby and elsewhere, who have been engaged for a full year, received a bonus of a week's pay on the night before the annual close-down for the holidays.

Dust in Foundry Operations

At the Newcastle Conference of the Institute of British Foundrymen, two papers, "Reduction of Dust in Steelfoundry Operation," by W. A. Bloor, British Iron and Steel Research Association, "Observation and Control of Dust in Foundry Dressing Operations,"† by R. F. Ottignon, and W. B. Lawrie M.Sc., F.R.M.S., A.I.M., were discussed jointly, after a showing of a film entitled "Observations of Dust in Foundry Dressing Operations." What follows is a report of this joint discussion.*

Opening the discussion, the CHAIRMAN (Mr. Colin Gresty) said he thought that after seeing the film, the members would appreciate that they had something new in technique which would help in the investigation of the dust problem. He thought they would also realise that it was a very difficult problem that they were up against. He had already seen the film and to some extent discussed it, but there was present Mr. H. A. Hepburn, C.B.E., H.M. Deputy Chief Inspector of Factories, and he would like him to open the discussion.

MR. HEPBURN said in his position in the Factories Department he knew the difficult problems which were constantly arising in foundries, but at the same time H.M. Inspectors of Factories were charged with seeing that the requirements of the Factory Acts were complied with.

He thought members might be interested in the history behind the film which they had just seen. The whole problem, of course, had been considered for many years, but it was not until the passing of the Factories Act of 1937 that the various powers of the Department were made much stronger than they had been under the 1901 Act, and the opportunity was given of raising the standards of safety and health in foundries. Among the requirements of the 1937 Act which foundrymen had to carry out particularly were those contained in sections 4 and 47, which stated briefly that all practicable measures should be taken to prevent the inhalation of toxic dust, gas and vapours. At the same time it was required that the inhalation of any dust given off in substantial quantities of any kind from any plant should be prevented. The Act not only applied to dust which gave rise to silicosis, but to any kind of dust, whether it was toxic or not, which caused respiratory troubles.

Silicosis

The extent of the incidence of silicosis could be seen from the figures*‡ for 1931 to 1947. During that period there were 187 applications for disablement certificates granted by the Silicosis Medical Board, and 94 known deaths from silicosis with or without tuberculosis among fettlers and dressers of castings. These were conservative figures, and there was every reason to believe that the total might be higher. That gave an average of about six deaths a year of fettlers and dressers, and in recent years the figure had risen. In 1946 there were 15 deaths and in 1947 there were nine. The problem was one for which a solution had to be found. During that period knowledge affecting the diagnosis of silicosis had become more reliable and widely known, and the decision was arrived at that something must be done to control the dust generated in all processes. The Factory Department began to take an interest in this foundry problem prior to the war, but then, unfortunately, the pressing production needs prevented all development work, and so Sir Wilfred Garrett, H.M. Chief Inspector of Factories at the time, decided to set up committees to examine what should be done and to advise him as to what could be done. There was a committee for steel foundries and another for iron foundries and, when those two committees issued their Report,* it became evident that there was a great deal of research to be done, because the wording of the Act, section 47, required "all practicable measures shall be taken to prevent inhalation of the dust or fume or other impurity." At that time there was no clear idea as to the extent of the particular problem; how much dust was being evolved, where exactly it was coming from in each process, and to what extent.

There had been no recent intensive investigation into the health of fettlers and foundry workers in general, so Dr. McLaughlin, H.M. Medical Inspector of Factories, with the assistance of others, embarked on an important scheme of research in steel foundries. Some 3,000 steel founders, fettlers, etc., were X-rayed, and the result showed that there was a real, serious risk. But then they did not know anything more about the fundamentals, of which one was the amount of dust in each process being generated. The Dust in Foundries Committee recommended that something should be done to devise a rapid method dust estimation. Practical methods of dealing with dust could not be found until the nature of the problem, the amount of dust and so on were known. They were fortunate in the Factory Department in that Mr. Lawrie had developed the idea of rapid dust estimation on a comparative basis. With the old method, which they might call a refined method of physics, only about 4 to 5 dust counts could be made in a day, but Mr. Lawrie was able, with his method, to take up to 300 a day. This was a great improvement in research methods and together with the medical researches of Dr. McLaughlin showed very clearly the extent of the problem.

Practical Measures

The next thing to be done was, of course, the devising of practical measures for dust suppression.

* Printed in the JOURNAL, July 12, 1951.
† Printed in the JOURNAL, July 26, August 2, and concluded in this issue.
‡ Second Report of "Dust in Steel Foundries Committee." H.M. Stationery Office. Now being printed.

* Industrial Lung Diseases of Iron and Steel Foundry Workers. H.M. Stationery Office, 1951. £1 1s. net.

The film which Mr. Lawrie had shown opened up a new conception of what was happening with the very fine dust. They saw that the heavier dust in the form of sparks was going in a different direction altogether from the main stream of the air and it showed particularly that when there were dust particles of 5 μ and below, (which were the dangerous ones) they were not being dealt with by the apparatus which had been shown. The very fine particles, the same as the smoke and the exhaust from the pneumatic chisel, became, as it were, integrated with the air stream, partook of its motion and were influenced by the elastic properties of the air following it in the turbulence. The finest dust particles had not sufficient momentum of their own to follow an independent path, so the problem arose of preventing the undirected flow of (and turbulence in) the air stream and to re-design the hoods and ducts on better aerodynamic lines to give better suction. Simple shapes as usually designed were obviously not suitable, and the film has immediately put into the minds of ventilating engineers some important ideas on modified design. He did not know what the final solution would be, because from what they had seen of the K. & L. experimental bench it was still capable of refinements, but it was clear that after putting the air-curtain across the top to keep the dust stream down, it was possible to direct most of it into a definite streamline into the hood. Some method in addition to exhaust ventilation might have to be adopted, such as to provide a supplementary flow of air from behind the man right across the front of the apparatus to deal with any fine dust which was not always entrained by the exhaust ventilation. It was very difficult to get 100 per cent. ventilation efficiency in one particular kind of apparatus. That, of course, was where a great deal of research was needed. His Department were very interested indeed in that work and were co-operating to the fullest possible extent with the employers and research associations, and he took the opportunity of expressing the appreciation of the Factory Department for the work done by the British Iron and Steel Research Association, the British Steel Founders' Association and the Council of Iron-foundry Associations.

There was no doubt that the industry was tackling this problem with the greatest of energy. In the Factory Department they looked at the work in hand from a selfish point of view because so often Inspectors of Factories were told by factory managements "All right, you tell us we have to take all this dust away. How is it to be done?" At present, the reply was difficult; all that could be said was " Put a hood around and put an exhaust pipe in " and so on, but this film showed that one could not be so confident, and so his Department were doing all they could to assist in this work, because results would eventually enable advice to be given to the benefit of all engaged in the foundry industry.

When the film was made originally there was no sound track to it. Through the kindness and generosity of the British Steel Founders' Association the sound track was added.

Wet Water

A MEMBER asked had any work been done on the use of the newer detergents as wetting agents and their application to humidify the atmosphere in which dust arose.

Dealing with this, MR. LAWRIE said a good deal of work was being done on the use of wetting agents, although the Authors were not in any position to give complete information. Quite a lot had been done on the use of ordinary water projected as a mist into the atmosphere. At the present time, what might almost be called a pilot experiment was under way. Samples had been taken in two foundries, at five points, every quarter of an hour for a week. His organisation were now arranging for the second step where the work would be repeated in the same foundries, but on this occasion every casting that went through the dressing shop would have been treated with " wet water." When that stage had been completed, there would be several thousand samples requiring statistical analysis, but he hoped in the long run something would come of it.

Swedish Developments

DR. C. J. DADSWELL said the K. & L. bench seemed to him to offer great possibilities for castings that were handled on a bench, but he wondered if a similar solution might be possible for larger castings. When in Sweden recently he had seen a new mass-production foundry, where the castings went through fettling and grinding cubicles measuring 8 ft. by 10 ft., suitable for one man.

By means of rough drawings on the blackboard Dr. Dadswell explained the operation of the fettling cubicle so arranged that there would be a steady current of air coming from above the workman's head across the work and into an exhaust opening in the lower part of the back wall of the cubicle. The exhaust chamber at the back was made just wide enough for a man to enter for cleaning purposes and was without filters of any kind, reliance being placed on a change in velocity to cause the dust particles to fall out of the air stream. The exhaust was directed outside the building, but Dr. Dadswell thought a good deal of fine dust would be passed out to the atmosphere.

Another thing he had seen in the same factory in connection with ventilation was in the knock-out chamber. It was a big room provided with perforated walls at the back, through which clean air entered the chamber, the exhaust being on the opposite wall. There was thus created a current of air across the knock-out positions, the dust being generally exhausted from the room.

Dr. Dadswell thought that heating and ventilating engineers and foundrymen had much still to learn about the problem of dust removal. Finally he wanted to add his thanks and praise to Mr. Ottigon and Mr. Lawrie for their Paper and said he thought the film was a remarkable example of how a Government department could collaborate with industry in a manner constructive to industry and productive of results.

Olivine

MR. J. SISSENER (Norway) pointed out that in Norway they had very strict factory inspection for dust. Foundries had for some time now been using a material which did not cause silicosis; this was olivine. It was a very refractory material for which he understood the formula was Mg_2SiO_4. It cost about 40s. a ton and seemed very promising. He was not advertising olivine, and mentioned it merely as a matter of fact.

The work done in preparing the film he thought was remarkable. He wondered if foundrymen in England had the same experience as in America in the use of the Hydroblast as a means of preventing dust.

MR. OTTIGNON said there was still some controversy over olivine in this country, but he thought he would be stating the general feeling of the trade when he said that it was impossible, economically, at the moment in this country. There were still faint hopes that a deposit might be found and work started here, but to import it was out of the question. Moreover, some of the tests had not confirmed all the hopes held out for it. It might be due to faults in the material, but that discovery had killed some of the enthusiasm.

The Hydroblast was not used in his factory, but there were a number installed in British foundries. It seemed that such plant had a very definite and extensive field in freeing castings from sand, but appeared to be more of a knock-out tool than a fettling tool. In addition, all large castings would have to be shot-blasted afterwards as the Hydroblast did not remove the burnt-on sand where the metal had penetrated, and it was that burnt-on sand and metal penetration which produced the real dust danger in fettling operations. It was when that mass of metal and sand was attacked by a chisel that the sharp particles of dust, which were the lethal ones, were produced.

Filters

Mr. F. A. Martin said one of the advantages of the Paper was that it had taken the matter to a stage where principles had been enunciated. It would help founders if they could have a little more technical detail. He had not been able to find the area of the filters used to handle 900 cub. ft. of air per min., and the velocity of the air through the filter medium was a most important function. On that velocity depended the back pressure of the filter and the decision as to what other filter materials could safely be used without putting up power requirements too high.

So far, cotton-wool filters had been used and Mr. Ottignon had said that other things were being tried. He had mentioned "blanketing in grease." He believed it was a woollen material out of which the lanoline had not been washed. He understood it had been used locally for dust filtration since 1922 and did not offer a great resistance and further had a surface to which silica dust would cling.

Mr. Ottignon said he thought he had given the filter area in the Paper. There were two filters measuring 2 ft. by 18 in. so that they had nearly 6 sq. ft. of filter area which gave about 100 ft. per min. The two gave a total resistance of only about $\frac{1}{4}$ in. of water.

With regard to the suggestion that "blanket in grease" might be used, that was the type of material which would, he thought, offer additional filtration. The injection of water into the air stream had been suggested also, and was worth trying, although it would complicate all aspects of the bench.

The Chairman, closing the discussion, said he was in difficulty, for he knew that they would like it to continue. However, there was another Paper and they dare not over-run their time any further; he suggested, therefore, as the Papers had been of such great interest, that those who had not been able to take part should send in their contribution to the secretary of the Institute. He knew that was often a thing that people thought they would do, but never did. Nevertheless, the matter was of such great importance that he would impress on them the desirability of doing it on this occasion. As he had mentioned in his Address the previous day, there was a tremendous scope for individual ingenuity. A splendid lead had been given by the three Authors whose Papers had been heard, but members must not leave it all to them or to the research associations. All had their own problems in their own foundries and there were so many of them that the more who could tackle even a little bit of that particular problem the better.

He asked that a vote of thanks to the Authors should be accorded, with a special vote to Mr. Lawrie for the film. He did not think it was any injustice to the others if he mentioned that Mr. Lawrie was the leader in the investigations. He was on all the committees and was the chief liaison man dealing with that work. Members should certainly give due credit for all the work he had done.

Mr. Lawrie thanked the members for their interest and said he hoped they would not hesitate to do any individual work that might be open to them, and, perhaps more important still, they would co-operate by letting the committees know what they did. These committees were anxious to pick as many brains as they could because they knew that there was no monopoly of genius.

Mr. Ottignon and Mr. Bloor also thanked the members for the interest they had shown and from their own angle emphasised the importance of everyone looking into the dust problem and collaborating, for there was too much disease and trouble in the foundry which they knew could be overcome.

[*Several written contributions to these Papers have been received and will be printed shortly, along with the Authors' replies.*]

Platinum-Platinum/Rhodium Thermocouples and their Industrial Applications*

By Marcel Chaussain

Official Exchange Paper from the Association Technique de Fonderie

(*Continued from page* 156)

Industrial Uses in Determining the Temperature of Steel Baths

The results of the above experiments, evaluating the influence of various media and agents on the thermo-electric characteristics of Pt-PtRh thermocouples and thermocouple wires, enable the problems arising in their industrial application to be considered. Bearing in mind, particularly, the three following points, (*a*) that magnesia has no pronounced action on platinum, (*b*) that silica has no pronounced action on platinum-rhodium, and (*c*) that thoria has little or no effective action on either Pt or Pt-Rh, the problem of the behaviour of thermocouples in service can now be approached by endeavouring to use these three substances as protective agents to prevent contamination of the thermocouple wires.

Envisaging such conditions, a rational solution of the problem of thermocouple assembly and arrangement should be found in the diagrammatic scheme shown in Fig. 14. In the region of very high temperatures, the hot joint and the wires inside their refractory sheath are placed in close contact with powdered thorium oxide (thoria). In the ordinary high-temperature region, the platinum wire is protected by an insulation of magnesia, and the platinum-rhodium wire by silica. In the medium-temperature range, where contamination is no longer to be feared, ordinary two-hole insulating sheaths are sufficient for the protection of the wires. In the low-temperature zone below 80 deg. C., the thermocouple wires are extended as far as the measuring instrument by compensating leads.

This scheme, initially founded on pure speculation, now required checking for practical application; particular consideration was given to the problem of temperature measurements in molten steel baths, in the presence of violent contamination at

* Prepared by the Cie. des Forges de Chatillon, Commentry et Neuves Maisons, Usines Saint-Jacques, Montlucon, and presented at the Newcastle-upon-Tyne conference of the Institute of British Foundrymen by Dr. A. B. Everest.

TABLE V.—*Contamination Tests on Thermocouple Wires, in Alumina.*

Test No.	Heating time at 1,300 deg., hours.		Test Temperatures, millivolts.	Δe, microvolts.		Δe, μv, extrapolated to 1,300 deg. (13.120 mv.)
	Partial.	Total.		Pt	Pt/Rh	
1	0	0	7.33	+ 2	− 10	Pt = + 13.5
			9.58	+ 6.5	− 12	—
			11.9-	+ 11.5	− 13.5	Pt/Rh = − 14
2	2	2	7.33	+ 9.5	− 6	Pt = + 14.5
			9.58	+ 11.5	− 9.5	—
			11.94	+ 13.5	− 13	Pt/Rh = − 14.5
3	2	4	7.33	+ 13	− 9	Pt = + 18
			9.58	+ 15	− 12.5	—
			11.94	+ 17	− 16	Pt/Rh = − 17.5
4	2	6	7.33	+ 15.5	− 15	Pt = + 21
			9.58	+ 17.5	− 19	—
			11.94	+ 20	− 22	Pt/Rh = − 23.5
5	2	8	7.33	+ 20.5	− 21	Pt = + 30.5
			9.58	+ 24.5	− 24.5	—
			11.94	+ 28.5	− 27.5	Pt/Rh = − 29.5
6	2	10	7.33	+ 29	− 20.5	Pt = + 48
			9.58	+ 39.5	− 25	—
			11.94	+ 44	− 29.5	Pt/Rh = − 32
7	2	12	7.33	+ 34	− 21	Pt = + 50
			9.58	+ 40.5	− 26	—
			11.94	+ 47	− 32.5	Pt/Rh = − 35.5
8	2	14	7.33	+ 38.5	− 23	Pt = + 57
			9.58	+ 46.5	− 27.5	—
			11.94	+ 53	− 35	Pt/Rh = − 38
9	2	16	7.33	+ 43	− 27	Pt = + 69.5
			9.58	+ 53.5	− 33.5	—
			11.94	+ 64	− 38.5	Pt/Rh = − 41.5
10	2	18	7.33	+ 48	− 28.5	Pt = + 72
			9.58	+ 57.5	− 34.5	—
			11.94	+ 67	− 41.5	Pt/Rh = − 44.5
11	2	20	7.33	+ 51.5	− 30	Pt = + 84
			9.58	+ 64	− 37	—
			11.94	+ 77.5	− 45	Pt/Rh = − 48

Platinum—Platinum/Rhodium Thermocouples

temperatures in the neighbourhood of 1,600 deg., in which case thorium oxide could form an effective protecting screen. Consequently, a test was arranged in which a thermocouple contained in a silica tube and further protected by a layer of thorium oxide, was twice immersed for 3 min. in the steel bath of an electric high-frequency furnace, the silica tube being renewed after immersion.

The variation in e.m.f. measured by the method of reference standards indicated for the particular thermocouple a decrease of 10.5 microvolts, corresponding to a final deviation of −0.9 deg. from the standard curve. An identical thermocouple unprotected by thoria, showed after similar immersions a drop of 152.5 microvolts, or a deviation of − 12.5 deg. from the standard curve. It will thus be seen that in the first case the effect of the protection is a practically negligible error well below the limits of accuracy of the measuring instruments, while in the second case the error is considerable and inadmissible in practice.

This practical result of the tests having confirmed

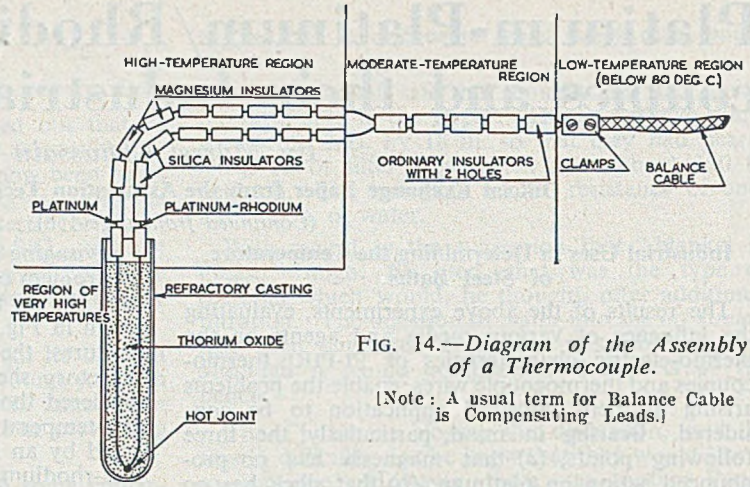


FIG. 14.—*Diagram of the Assembly of a Thermocouple.*

[Note: A usual term for Balance Cable is Compensating Leads.]

TABLE VI.—*Contamination Tests on Thermo-Couple Wires, in Thoria.*

Test No.	Heating time at 1,300deg., hours.		Test Temperatures, millivolts.	Δe, microvolts.		Δe, μv, exterpolated to 1,300 deg. (13.120 mv.)
	Partial.	Total.		Pt	Pt/Rh	
1	0	0	7.33	+ 3	− 11	Pt = + 13.5
			9.58	+ 6	− 12	
			11.94	+ 10.5	− 12	Pt/Rh = − 13
2	2	2	7.33	+ 10	− 3	Pt = + 14
			9.58	+ 11	− 3.5	
			11.94	+ 13	− 6	Pt/Rh = − 5
3	2	4	7.33	+ 10	− 1.5	Pt = + 15
			9.58	+ 12	− 3.5	
			11.94	+ 14	− 5	Pt/Rh = − 6
4	2	6	7.33	+ 8	− 1.5	Pt = + 12
			9.58	+ 9.5	− 4	
			11.94	+ 11	− 5.5	Pt/Rh = − 6.5
5	2	8	7.33	+ 10	− 4	Pt = + 13.5
			9.58	+ 11	− 4.5	
			11.94	+ 12.5	− 6.5	Pt/Rh = − 7
6	2	10	7.33	+ 8	− 3	Pt = + 11.5
			9.58	+ 9.5	− 5	
			11.94	+ 11	− 5.5	Pt/Rh = − 6
7	2	12	7.33	+ 11	− 3.5	Pt = + 17.5
			9.58	+ 13.5	− 4.5	
			11.94	+ 16	− 7	Pt/Rh = − 7
8	2	14	7.33	+ 15	− 1.5	Pt = + 19.5
			9.58	+ 18	− 4	
			11.94	+ 17.5	− 7	Pt/Rh = − 8.5
9	2	16	7.33	+ 14	− 5	Pt = + 20
			9.58	+ 17	− 7.5	
			11.94	+ 18.5	− 10.5	Pt/Rh = − 12
10	2	18	7.33	+ 21.5	− 4	Pt = + 29.5
			9.58	+ 25	− 7	
			11.94	+ 27.5	− 11	Pt/Rh = − 13
11	2	20	7.33	+ 22.5	− 7.5	Pt = + 35
			9.58	+ 27.5	− 10	
			11.94	+ 32.5	− 12.5	Pt/Rh = − 14
12	2 + 2 + 2	26	7.33	+ 26.5	− 6.5	Pt = + 38.5
			9.58	+ 31	− 9	
			11.94	+ 36	− 12.5	Pt/Rh = − 13.5
13	2 + 2 + 2	32	7.33	+ 34.5	− 7.5	Pt = + 48
			9.58	+ 39.5	− 10	
			11.94	+ 45.5	− 12.5	Pt/Rh = − 14

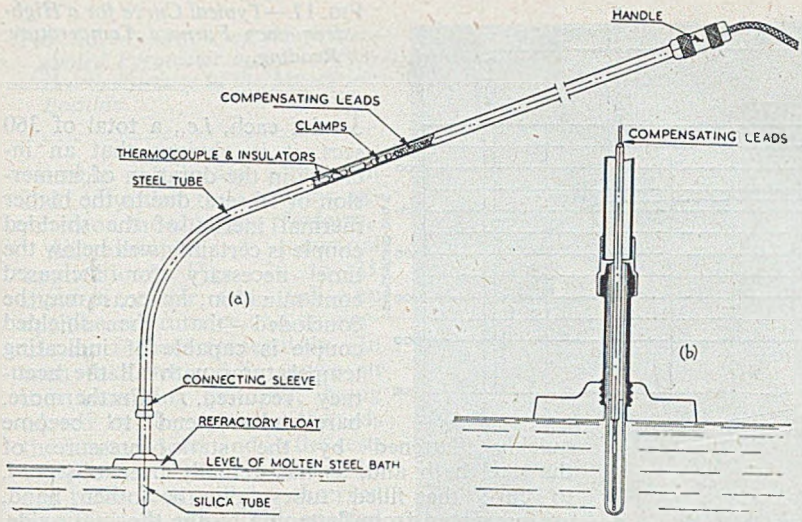


FIG. 15.—(a) *Immersion Pyrometer for a High-frequency Electric Furnace for Steel, and* (b) *Details of the Thermocouple Assembly.*

expectations, a special pyrometer rod was constructed on the principle already set forth, intended for temperature control in the steel baths of electric high frequency furnaces. This light and portable pyrometer rod is shown on the sketch in Fig. 15 and the photograph in Fig. 16. It can equally well be used in casting ladles and ingot moulds.

The thermo-electric couple, the wires of which are protected by porcelain insulators, is connected by a clamp to the compensating leads. The couple and lead can slide inside the hollow rod, enabling the position of the hot junction in the silica tube to be adjusted as required; the handle of the rod is provided with a locking device, by which the wires can be held fast. At the other end of the rod, a screw thread carries a float of refractory aluminium silicate. The silica tube has an external diameter of 7 mm. and a wall thickness of 0.5 mm. For the assembly shown in detail in Fig. 15, the silica tube is charged with powdered thorium oxide, and a small silica rod inserted; the oxide coheres sufficiently to leave a central hole after withdrawal of the silica rod, into which the hot-joint and the thermocouple wires are inserted until the silica tube is in the correct position. The tube is now secured to the rod by a clamp with a copper wire locking ring. Close contact between the wires and the powder (which is important) is ensured by tapping the tube lightly after assembling. The thorium oxide should be dry, and a necessary precaution is to heat it before use for some minutes, at 1,100 deg. C., in an electric furnace.

To take a temperature measurement the wires of the compensating leads are connected to a potentiometer. In the tests described, a recording potentiometer was used, with a paper speed of 25.4 mm. (1 in.) per 20 secs. The thermocouple is immersed in the steel bath until the float rests on the surface of the molten metal. The length of the silica tube projecting beyond the float represents the depth of immersion in the metal. For high-frequency furnaces, this depth is regulated at about 50 mm. Fig. 17 represents a temperature record curve for 3 min. immersion of the couple. The curve presents three sections:—(*a*) Temperature rising to 1,620 deg. in 36 secs.; (*b*) temperature maintained for 2 min. 24 secs. (the furnace current being cut, the temperature falls from 1,620 to 1,615 deg. C.); and (*c*) temperature falling with withdrawal of the couple from the furnace.

This test was essentially a duration test. For an ordinary temperature measurement, obviously, the couple an be withdrawn as soon as the potentiometer indicates a constant temperature. It may be objected that the presence of thorium oxide in the silica tube decreases the rate of heating by increasing the heat-absorbing mass, and thus requires a longer immersion time than with a bare tube. Actually, at 1,620 deg., the rate of increase in the bare tube is 20 secs., while with a thorium-oxide-filled tube, 36 secs. must be allowed.

Considering that the thermo-electric properties of the shielded couple remained practically constant during two immersions of

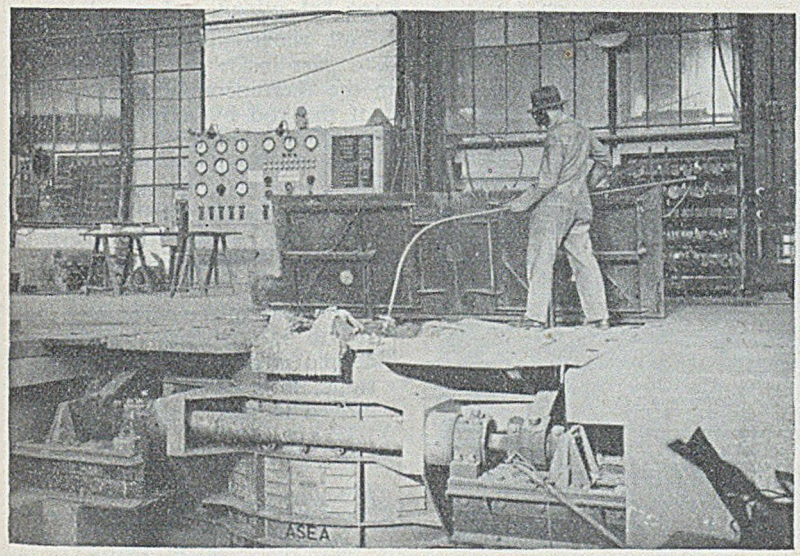


FIG. 16.—*Using the Immersion Pyrometer in a High-frequency Electric Steel Furnace.*

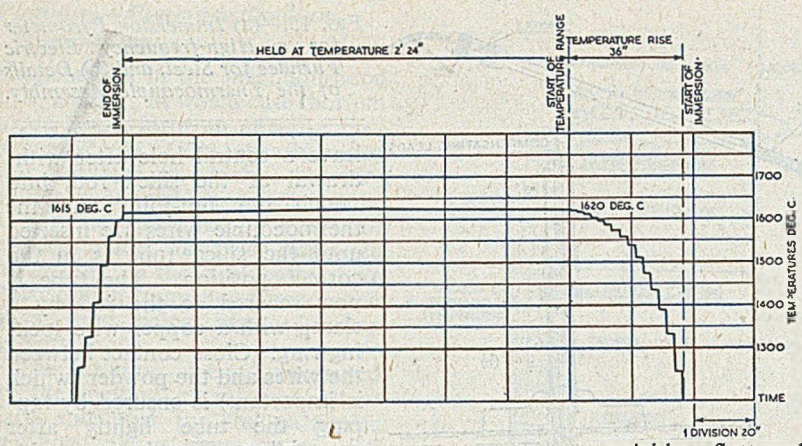


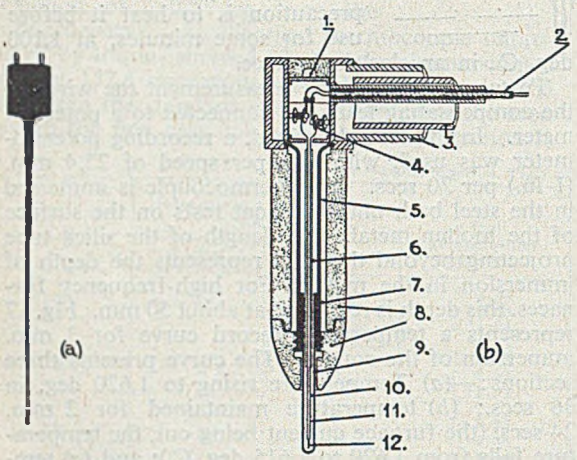
FIG. 17.—*Typical Curve for a High-frequency Furnace Temperature Reading.*

3 min. each, *i.e.*, a total of 360 secs., it is obvious that an increase in the duration of immersion of 16 secs. due to the higher thermal inertia of the shielded couple is certainly well below the time necessary for increased contamination; hence, it may be concluded that the shielded couple is capable of indicating temperatures with all the accuracy required. Furthermore, bare tubes tend to become quickly flattened by the static pressure of the steel bath and, as has actually been observed, to curl; the filled tubes, on the other hand, are prevented from flattening by the thorium oxide, while the greater weight opposes curling; in such manner the shielded couple is better able to withstand longer immersion periods.

The above remarks apply to temperature measurements in electric high-frequency furnaces. When, however, measurements have to be made in furnaces with high-temperature atmosphere such as electric-arc or open-hearth furnaces, longer immersion is harmful to the rod, which, even if protected by refractory sleeves or bushes, becomes dangerously heated. This difficulty could be overcome by the construction of a water-cooled pyrometer rod, such as shown in Fig. 18. This rod is carried by a slewing jib which allows the pyrometer to be inserted in the furnace for taking a measurement, through any door required, and withdrawn thereafter in such manner as not to interfere with the work of the furnacemen. The water supply and discharge pipes are permanently attached on the jib, a cock being provided for starting or stopping the water circulation.

The thermocouple is a separate and interchangeable element. A small, watertight tube allows the compensating lead to pass inside the rod, the lead being connected to the thermocouple wires in the water-cooled head of the rod by terminal screws; a metal bush protected by refractory collars connects the head of the rod with the silica tube, filled with thorium oxide, protecting the hot-joint.

Fig. 19 shows the thermocouple and the diagram indicates the manner in which it is fitted in the head of the pyrometer rod. It will be seen that the thermocouple is of very small dimensions; it is easily fitted and removed in such manner that the



1. Heat-insulating plug.
2. Compensating leads.
3. Circulating water pipes.
4. Extra wire.
5. Metal casing.
6. Silica insulator.
7. Gasket.
8. Protecting jackets.
9. Silica tube.
10. Thorium oxide.
11. Thermocouple wire.
12. Hot joint.

FIG. 19.—*Illustrations of* (a) *the Actual Couple, and* (b) *the Couple Assembly of a Water-cooled Immersion Pyrometer.*

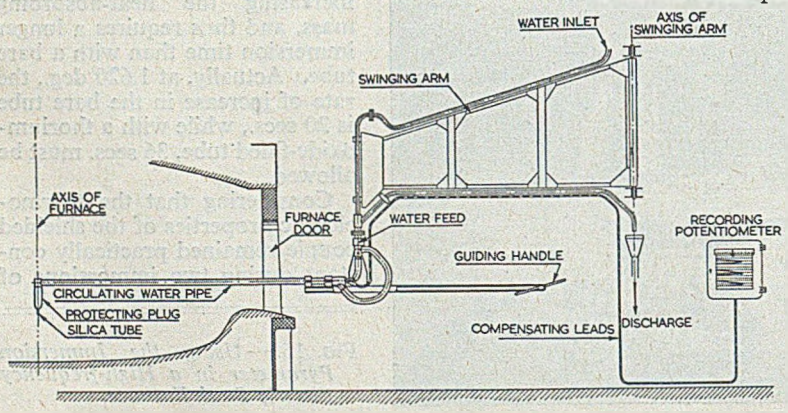


FIG. 18.—*Diagram of a Water-cooled Immersion Thermocouple for Use on a Bath-type Furnace.*

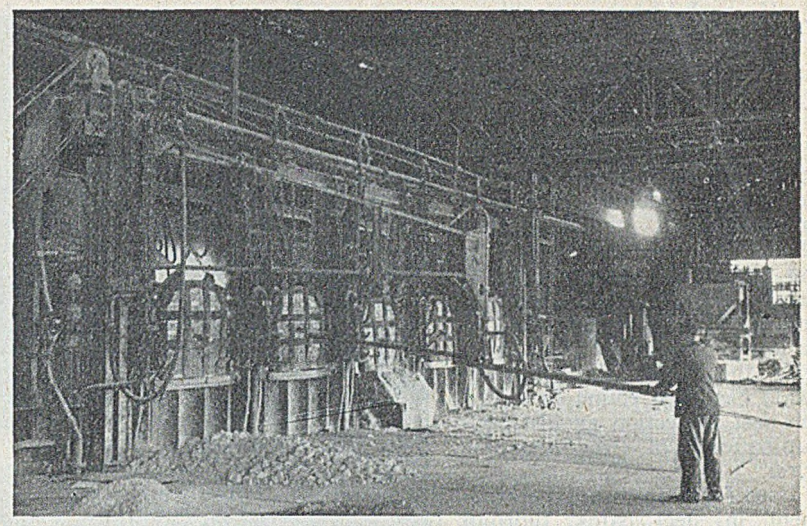


FIG. 20.—*Insertion of the Water-cooled Pyrometer into an Open-hearth Furnace in the Measuring Position.*

valuable metals are withdrawn and only the rod remains exposed on the charging platform.

As examples of industrial applications, Figs. 20 to 23 show pyrometer rods fitted to an open-hearth furnace and an electric arc furnace respectively. In each case the rod is shown in the measuring position, being moved by the operator towards the furnace door, and in the resting position. In the case of the arc furnace, it will be observed that the jib post is connected with the ram of a hydraulic jack and in the resting position the rod is raised to a height sufficient to prevent interference with work at the furnace.

Fig. 24 shows a specimen temperature chart from a 100-ton open-hearth furnace working on mild steel for a sheet mill. The instrument used was a recording potentiometer graduated from 800 to 1,720 deg. The paper speed is 1 in. in 5 min. The duration of a temperature measurement with this apparatus is about 40 seconds. The protection afforded by the thorium oxide reduces wire wear to such an extent that it has been found possible to establish the following operating rule, based on numerous inspection tests: to remain within the limits of accuracy of the recording instruments it is sufficient to cut the hot junction and clip off 8 mm. of wire, after every 15 immersions.

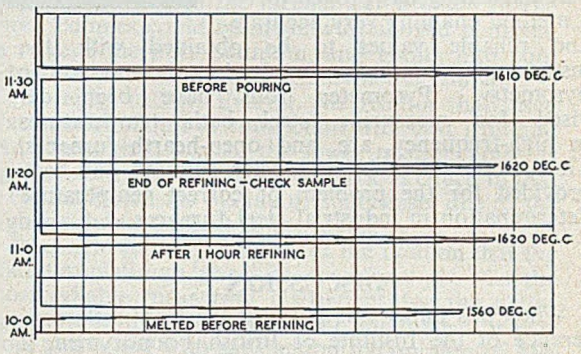


FIG. 24.—*Portion of a Continuous Temperature Record of a Steel Melt obtained from the Immersion Pyrometer. The actual Record relates to Siemens Furnace No. 8, Heat No. 5025 of 30-7-49, making Mild Steel for Sheets.*

Summary

The progressive development of industrial pyrometry has finally led to a method of calibration by a standard reference curve, enabling the Pt-Pt/Rh thermocouple to be used for temperatures up to 1,720 deg. C. For interchangeability, the thermocouple wires should be of special quality and their characteristics defined by appropriate standards. The works' laboratory should test thermocouple wires and supervise their behaviour in service. The most suitable test method is that of differential comparison with reference standards.

This is simultaneously a method of control and experi-

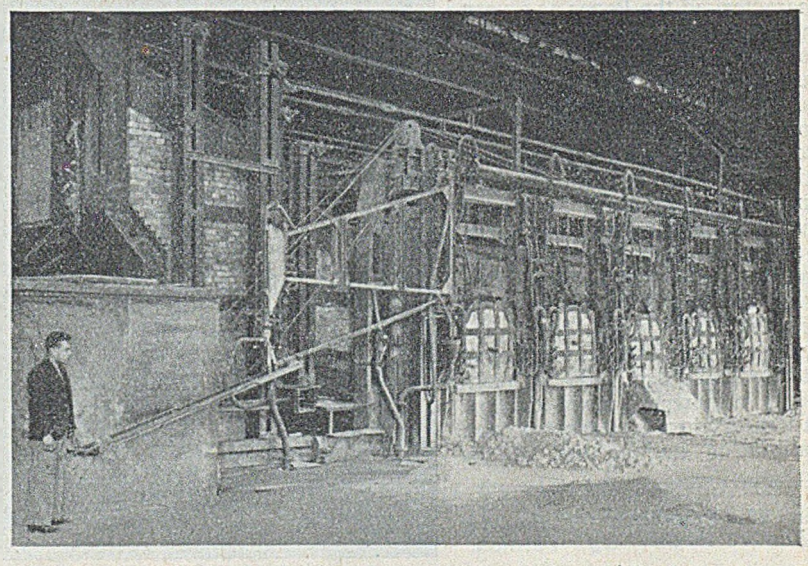


FIG. 21.—*Water-cooled Immersion Pyrometer for an Open-hearth Furnace in the "Off" Position.*

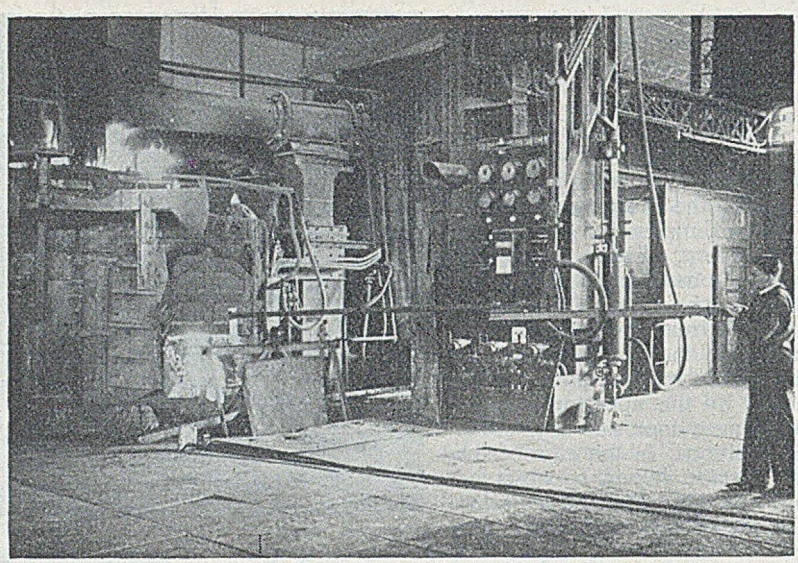


FIG. 22.—*Immersion Pyrometer for an Electric-arc Furnace, in the Measuring Position.*

mental technique, and is capable of furnishing valuable information and considerably increasing knowledge of thermo-electric phenomena. A particular testing technique has enabled the degree of ageing of thermocouple wires to be measured in various contaminating media, with the result that thorium oxide has been found to afford the best protection against contamination of thermocouple wires.

Used for temperature measurement in steel baths, thorium oxide shielding has proved to be a method enabling very accurate and reliable values to be obtained with the instruments normally used in thermo-electric pyrometry. Pyrometer rods have been devised for measuring steel bath temperatures in high-frequency, arc, and open-hearth furnaces, Thus, a simple and inexpensive solution has been provided for the problem of correct temperature determination in industrial steel furnaces.

DISCUSSION

When this Paper was given at the Newcastle conference of the Institute of British Foundrymen, it was presented by Dr. A. B. Everest on behalf of the Author, who in that capacity replied to points raised in discussion. Subsequently the report of this discussion was submitted to Mr. Chaussain and his comments are appended.

MR. H. MORROGH (B.C.I.R.A.) characterised the Paper as a very thorough study of the problems associated with the use of platinum/rhodium thermocouples, but said there were one or two comments he had to make. The Paper was presented to the Institute of British Foundrymen and a very important section of the foundry industry was the ironfounding industry. He thought there was a danger that the Paper might be taken as indicating that immersion pyrometry in the iron foundry was fundamentally a difficult technique requiring a good deal of laboratory work connected with calibration and testing of the thermocouples. He submitted that that in fact was not correct. Even if they took into account the effects of contamination, reported by Mr. Chaussain—these, incidentally, only obtained after prolonged exposure at those elevated temperatures—in many cases deviations were in his experience far less than errors likely to be introduced by optical pyrometry.

In this country there were available platinum-platinum/rhodium wires of a high standard and of guaranteed e.m.f. He had had many opportunities of checking the manufacturers' values and had found them always to be very close to what was claimed. This country produced now some of the finest recording instruments in the world for the foundry, and he would like to put on record that the difficulties referred to in the Paper should not deter members of the ironfounding industry from applying

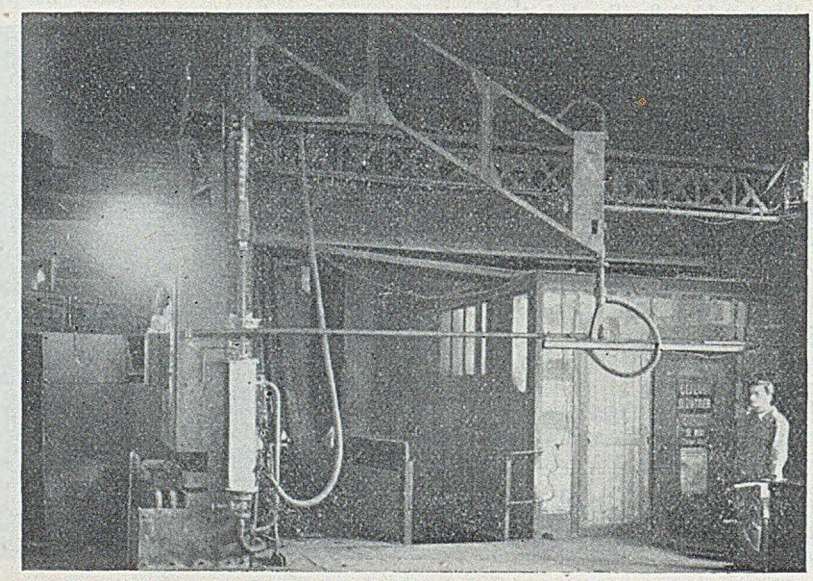


FIG. 23.—*Pyrometer for the Arc Furnace in the "Off" Position.*

the immersion thermocouple technique for the measurement of liquid cast-iron temperatures.

Difficulty with H.F. Furnaces

DR. R. V. RILEY (Staveley-Bradley & Foster Laboratories) associated himself with Mr. Morrogh's observations. Thermocouple temperatures were on the whole very reliable. Occasionally there was difficulty in making continuous temperature measurements; for instance, in the laboratory melting of a few pounds of metal in a high-frequency furnace it might be desired to keep the temperature critically controlled. The trouble was that sometimes there was a pick-up of high-frequency current in the thermocouple wire which gave rise to trouble with the potentiometer. He would like to know if anyone knew of any practical methods of overcoming that.

The second point he had to make was not so much a question as an observation. Some work they were doing involving the measurement of temperature centrifugally-spun iron in which the thermocouple was under high tensile stress, it was, as it were, operating at its limiting conditions and considerable trouble was experienced with the platinum leg of the thermocouple wire breaking. Eventually, the trouble was overcome by using a 1 per cent. rhodium/platinum alloy with the standard 13 per cent. for the other limb.

A MEMBER suggested that Dr. Riley might overcome the high-frequency pick-up in the conditions which he had outlined, by earthing the thermocouple circuit during the measurements.

DR. EVEREST felt he ought to say a word in case he had given a wrong impression in presenting the summary. He agreed that platinum-platinum/rhodium couples were of definite interest in the iron-foundry industry, in spite of the fact that the Paper was primarily concerned with steel; he knew that there were some people who had used these couples on an industrial scale for cast iron for some time past. It was his impression that, in spite of the difficulties referred to in the Paper and which were perhaps over-emphasised in the discussion, the immersion thermocouple was by far and away the best method of measuring the temperature of molten iron. It was far better than the optical methods.

Additional Collaboration

MR. W. J. COLTON had no question to ask, but on pyrometry in the foundry he had found that the most useful instrument for liquid-metal temperatures was the immersion pyrometer. He had not found any particular difficulty in checking the couples; the method was usually sufficiently accurate for normal working.

He had noticed in several publications references to the need for the couple to be protected where it left the sheath. One of the present methods was to pass it through a carbon block. That was preferred on account of reduced contamination, but from a practical point of view he was himself inclined to regard the carbon tube or rod as an improvement. With the rod one only had to push it through the slag, whereas the carbon block tended to float. He supported all that had been said about the value and use of the thermocouple in the iron foundry in preference to any other method of measuring temperature.

A vote of thanks to the Author and to Dr. Everest for presenting the Paper concluded this section of the proceedings.

Author's Comments

MR. MARCEL CHAUSSAIN wrote:—

In reply to Mr. H. Morrogh and Dr. R. V. Riley, it could be stated that fundamental laboratory research had been followed by the industrial application of the immersion pyrometer, and that at the moment the control of the couple leads was a simple manipulation, and was sufficient to assure the desired precision. He had never himself carried out the determination of temperatures in a high-frequency furnace when the current was on.

It was well known that platinum wire was hardened by alloying with rhodium, and particularly with iridium; to increase the mechanical strength of the wires, couples could be made with alloyed platinum to replace the pure platinum, and taking into consideration in this the new e.m.f. of the couple.

In reply to Dr. Everest, the Author had used platinum/rhodium in connection with cast iron and had found that, despite the lower melting point as against steel, cast iron had a deleterious effect, in that it contaminated the platinum, doubtlessly due to the higher sulphur content in the metal.

In conclusion, he was now of the opinion that the platinum-platinum/rhodium thermocouple was the most reliable measuring instrument for the determination of the temperatures of liquid steel or cast iron, and noted with satisfaction the opinion of Mr. W. J. Colton. He thanked Dr. Everest for presenting the Paper, and for the support of his point of view.

Warner's Pig-iron Record

Accompanying the annual balance sheet of Warner & Company, Limited, makers of refined pig-iron, of Middlesbrough, Mr. David O. Sillars, the chairman, has issued a statement revealing that the tonnage produced during the past year exceeded the record of the previous year by nearly 25 per cent. To handle this tonnage, which is twice as great as in the war years, £8.000 has been spent on additional sidings and rolling stock.

The plant is now working at "absolute capacity," but still the demand for the company's products greatly exceeds the supply. The directors, the chairman continues, believe this is due primarily to developments in the use of special grades of pig-iron rather than the exceptional circumstances of the rearmament programme. It has therefore been decided to proceed with a scheme, estimated to cost £40,000, for new and larger melting units which will provide additional tonnage and replace to a large extent the older portions of the present plant.

PREMISES situated in the Mossend works of Colvilles, Limited, used during the last war as a foundry by the Clyde Alloy Steel Company are to be put into operation again.

British Blast Furnaces in the June Quarter, 1951

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 second quarter, 1951.					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	1	2
New Cransley Iron & Steel	—	—	1	—	1	1	2
Renishaw Iron	—	—	2	—	2	2	2
Sheepbridge	—	—	1	—	1	1.2	1
Stanton Ironworks: Stanton-by-Dale	—	—	5	—	5	4.4	5
Staveley Iron & Chemical	—	—	4	—	4	3.2	4
Stewarts and Lloyds: Corby	—	3	—	—	3	3.9	4
Wellingboro' Iron	—	2	—	—	2	2.2	3
TOTAL	—	5	10	—	24	23.9	30

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

Brymbo Steel	—	1	—	—	1	0.9	1
Darwen & Mostyn	—	—	—	1	1	1	2
Lancashire Steel Corp'n	—	2	—	—	2	2	4
TOTAL	—	3	—	1	4	3.9	7

North-West Coast.

Barrow Ironworks	2	—	—	—	2	2	2
Charcoal Iron	—	—	—	—	—	0.5	1
Millom & Askam	2	—	—	—	2	2	3
United Steel: Workington	2	—	—	1	3	3	3
TOTAL	6	—	—	1	7	7.5	9

Lincolnshire.

Appleby-Frodingham	—	8	—	—	8	7.6	8
Lysaght, J.: Scunthorpe	—	4	—	—	4	3.9	4
Thomas, R., & Baldwins: Redbourn	—	2	—	—	2	2	2
TOTAL	—	14	—	—	14	13.5	14

North-East Coast.

Cargo Fleet Iron	—	2	—	—	2	2	2
Consett Iron	1	1	—	—	2	2	2
Dorman, Long: Acklam	—	3	—	—	3	3	4
Redcar	—	2	—	—	2	2	2
Cleveland	—	2	—	—	2	2	5
Bessemer	—	2	—	—	2	2	3
South Bank	—	—	—	2	2	2	4
Grangetown	—	—	—	—	—	—	2
Gjers, Mills & Co.	2	—	—	—	2	2	5
Pease & Partners	2	—	—	—	2	2	3
Skinningrove Iron	—	2	—	—	2	2	2
South Durham Steel & Iron	—	2	—	—	2	2	2
TOTAL	5	16	—	2	23	23	36

Scotland.

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

South Wales and Monmouthshire.

Briton Ferry Works	—	—	—	—	—	—	1
Guest Keen Baldwins: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	2	—	—	2	2	3
Steel Company of Wales: Margam	—	2	—	—	2	2	2
TOTAL	1	6	—	—	7	7	10

Unions Seek Higher Wages

No fewer than 17 of the 29 resolutions submitted by unions in the Confederation of Shipbuilding and Engineering Unions for discussion at the confederation's annual meeting, which is being held at Swansea this week, are directly concerned with seeking higher wages, piece- and time-work rates, and various allowances, including payment for work on Bank and certain other holidays. A resolution submitted by the Amalgamated Engineering Union calls for an increase of £1 per 44-hr. week for all manual workers in the engineering and shipbuilding industries, while the Transport and General Workers' Union seeks submission of claims to the Engineering and Allied Employers' National Federation for "substantial" wage increases, to be applied generally to all male workers employed in shipbuilding and ship-repairing.

Two resolutions have been tabled by the Association of Engineering and Shipbuilding Draughtsmen, one expressing concern that the rearmament programme should not lead to a further big inflation of profits and urging representation to the Government to ensure effective control of prices, and the other calling for an extension of public control.

The Amalgamated Union of Foundry Workers calls for the speedy implementation of confederation policy for the nationalisation of the main sections of the engineering industry and draws attention to the need for workers to share in the management of nationalised industries, calling for the "exclusion from the boards of these industries of any of the former owners and others who are hostile to nationalisation."

Gauge and Tool Makers' Assoc.

The Gauge and Tool Makers' Association's party to the first European Machine-tool Exhibition in Paris will include over 50 directors of member-firms. The visit will be from September 7 to 11, and on the second day the G.T.M.A. group will be entertained by *Le Comité Européen de Coopération des Industries de la Machine-outil*, which is organising the exhibition.

There will be an informal luncheon of G.T.M.A. members at the Savoy Hotel, London, on October 9, at which the successful entrants in the competition in craftsmanship and draughtsmanship, held last May, will be presented with their prizes (tools, instruments, or books of their own selection) by the president and chairman of the association. The luncheon will be followed at 3 p.m. by the annual general meeting.

British Blast Furnaces in the June Quarter, 1951—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of the second quarter, 1951.					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 Steelworks	—	—	1	—	1	1	2
Shelton Iron, Steel & Coal	—	3	—	—	3	3	3
Stewarts and Lloyds: Bilston	—	3	—	—	3	3	3
TOTAL	—	6	3	—	9	9	12
Sheffield.							
Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	13	56	26	4	99	98.8	138

Weekly Average Number of Furnaces in Blast during June Quarter, 1951, and Previous Four Quarters

District.	1950.			1951.	
	June.	Sept.	Dec.	March.	June.
Derby, Leics., Notts., Northants, and Essex	24.6	24.4	25	24.8	23.9
Lancs (excl. N.-W. Coast), Denbigh, Flint, and Ches	4.5	4.2	4.6	4.4	3.9
Lincolnshire	14	13.8	14	13.3	13.5
North-East Coast	23	22.8	23	23	23
Scotland	8	8.7	9	9	9
Staffs, Shrops, Worcs, and Warwicks	8.4	8.9	9	9	9
S. Wales and Monmouth	8	7.7	8	7.2	7
Sheffield	1	1.5	2	2	2
North-West Coast	6.6	6.4	7	7.5	7.5
TOTAL	98.1	98.4	101.6	100.2	98.8

The following companies have furnaces in course of construction or rebuilding:—Barrow Ironworks (2); Cargo Fleet Iron; Consett Iron; Lancashire Steel Corporation; J. Lysaght (Scunthorpe); R. Thomas & Baldwins (Redbourn); Sheepbridge; Skinningrove Iron; Steel Co. of Wales; South Durham Steel & Iron.

Obituary

MR. WILLIAM CAMPBELL, of William Campbell & Company (Iron Merchants), Limited, Glasgow, died suddenly on August 6. He was 74.

PROF. ARTHUR JOHN ALLMAND, F.R.S., Daniel Professor of Chemistry at King's College, London, since 1938, who was president of the Faraday Society in 1947-48, has died at the age of 66.

THE DEATH is reported from Nairobi of MR. HENRY CECIL BALLANTYNE, who was in charge of erection work there for Lobnitz & Company, Limited, the Renfrew engineers and dredger builders.

MR. J. F. DAVIES died suddenly on August 4. He was consultant to the Radiation, Limited, group of companies, since the beginning of 1949, when he retired from the chairmanship of the parent company after having spent 56 yrs. in the industry. A member of the council of Birmingham Chamber of Commerce, of the F.B.I. Grand Council, and of the management board of the Engineering and Allied Employers' Association, Mr. Davies commenced his career with John Wright & Company, Limited, Aston, Birmingham, becoming, in 1912, general manager and in 1919 managing director. He was appointed chairman in 1930. The company became associated with the Radiation group in 1919, and Mr. Davies was one of the original managing directors of Radiation, Limited.

Wills

FROST, F. A., a former director of Peter Stubs, Limited, steelmakers, etc., of Warrington ... £158,147

MCCORMICK, F. R. A., formerly a lecturer in mechanical engineering at Trinity College, Dublin ... £7,757

ST. STEPHENS, R. DE H., a director of the Climax Rock Drill & Engineering Works, Limited, Carn Brea (Cornwall) ... £6,921

FINNIE, WALTER, north-east coast manager of J. & E. Hall, Limited, engineers and ironfounders, etc., of Dartford (Kent) ... £79

ROBERTSHAW, ARTHUR, formerly production manager of Joseph Morton, Limited, firebrick manufacturers, of Halifax ... £2,514

ROBSON, H. N., sales director of James A. Jobling & Company, Limited, manufacturers of scientific glassware, etc., of Newcastle-upon-Tyne ... £7,802

GASKELL, SIR HOLBROOK, formerly managing director of United Alkali Company, Limited, and a director of Imperial Chemical Industries, Limited, 1934-46 ... £217,619

HOSKING, R. G., well-known Midland engineer, who was associated with the British Thomson-Houston Company, Limited, late chairman of the East Midland region of the Engineering and Allied Employers' Federation, chairman of the governors of the Rugby College of Technology and Art, and a past-president of the Leicester and District Engineering Employers' Association £68,634

CASH, S. E., chairman for 24 years of Stein & Atkinson, Limited, combustion engineers, etc., of London, S.W.1, chairman of United Gas Industries, Limited, and the Vulcan Stove Company, Limited, Exeter, and a director of Smith Meters, Limited, Sutherland Meter Company, Limited, J. H. Robinson & Company (Liverpool), Limited, manufacturers of gas meters, etc. ... £24,660

Full-size "Set-outs" for Patterns and Coreboxes

By "Checker"

The usefulness of full-size "set-outs," which are made by patternmakers for the more complicated work they may have to produce, is not always fully appreciated. Advantages which can be obtained from them include:—

1.—A better and more accurate conception of the work is obtained much more rapidly, because the job *is* full size, with all coreprints and machining allowances marked on.

2.—The positions of timber joints for both pattern and coreboxes are found more easily.

3.—Templates can sometimes be made off the "set-out" for various sections of the job.

4.—When patterns are partly or wholly completed, they can often be laid on their "-set-out," as a check to ensure any irregular shapes have been developed correctly.

Generally a "set-out" will consist of one or more views or sections, as considered necessary by the patternmaker, and are in all cases made full size. It is advisable that a number of set-out boards of various sizes should be available, so that before commencing any work requiring such a device, the patternmaker can obtain a board of suitable dimensions from those avail-

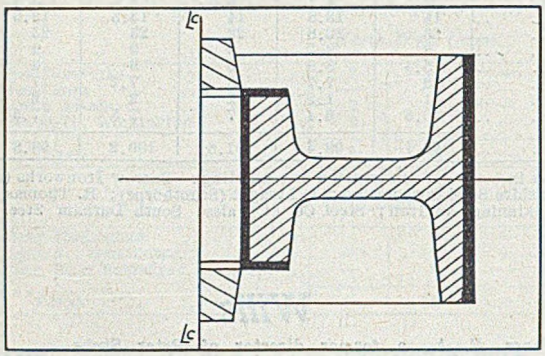


FIG. 1.—*Plan View of a "Set-out" on a Board for a Section of a Pattern.*

able. Several pieces of timber are usually necessary to produce a large-size board width, and battens are screwed on the back to keep them straight and true. This using of existing boards has one big advantage: they are well seasoned, and therefore little or no shrinkage will take place across their width, after the set-out has been made on them.

Repeated Use of Boards

These special boards can be used many times; on each occasion however, the old "set-out" must be planed off before commencing the new one. Therefore it is essential that only those which are obsolete can be used again. If the date when the set-out was made is written on, it is often found to be a helpful guide when deciding if it should be saved for a further period. Other details which should be added after completing a new "set-out" are, the drawing or job number, order number, and rate of contraction used. To preserve a "set-out" and prevent it getting dirty and difficult to see, a coat of thin shellac varnish applied after it has been completed, will be found very effective.

When set-outs are required for smaller work, they can be made on ordinary pieces of wood. Sometimes it is only necessary to mark out half the work, this usually applies when the job is symmetrical such as for a plain pulley wheel. Fig. 1 gives an example of a half "set-out" for a pattern, made in section, with coreprints and machining allowance also shown. Often a "set-out" cannot be completely marked out on a board because it is of insufficient width in one small part only, such as a large flange diameter. This difficulty can be usually overcome without using a wider board by fixing a local extension in the required position with a screw at each end as shown in Fig. 2.

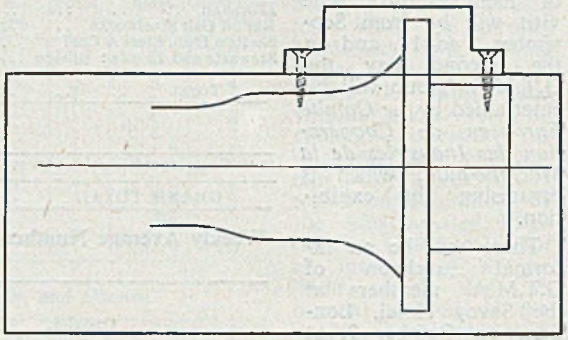


FIG. 2.—*Second example of a "Set-out," showing an Extension Piece to accommodate a Larger Pattern.*

Publication Received

Statistical Year Book for 1950. Part I: United Kingdom Statistics. Published by the British Iron and Steel Federation, Steel House, Tothill Street, Westminster, London, S.W.1. Price 7s. 6d.

This issue follows, as it should, the pattern established by previous volumes, for thereby comparisons are easily determined. There are, however, some changes, mainly relating to finished-steel deliveries. Of interest to our readers are the following figures. Pig-iron production in 1950 at 9.6 million tons is rapidly approaching the output of 1905-1906 when it was over 10 millions. In 1925 over 100,000 tons of castings were made from blast-furnace metal; in 1943 only 300 tons, and in 1950 3,000 tons were made in this manner. At the end of 1950, there were in existence in the steel—not including the ironfounding—industry 191 electric furnaces, 18 stock converters, 10 Bessemers and 6 rotary furnaces. From Table 70—a most interest one from the foundry angle—it is learnt that the largest outlet for steel castings is in meeting the needs of iron and steel works, with "private locomotive, carriage and wagon builders" a poor second. For the ironfounder, Tables 74 and 75 command attention. They disclose that there is a tendency to use more steel scrap in cupola burdens; that whilst the largest tonnage output is of cast iron and malleable pipes and fittings (over half a million tons in recent years), the unallocated is second, ingot-moulds third, and (in recent times) motor-car castings fourth. Tunnel segments, though still nothing like their pre-war production, are beginning to be appreciable. Finally, Table 77 shows that employment in iron foundries rose from 136,869 in 1947 to 145,968 in 1950. This gain is made up by 9,098 men and one woman! In steelfounding, employment rose during this period from 18,565 to 18,869, gaining 360 men and losing 56 women. The price of pig-iron has virtually doubled since pre-war days, but the wholesale index shows that general prices rose over two and half times during the same period.

Personal

SCOTTISH MECHANICAL LIGHT INDUSTRIES, LIMITED, Ayr, have appointed MR. I. S. HORABIN as its sales manager.

MR. D. L. FARRANT, who was recently appointed assistant secretary of the Council of Iron Foundry Associations, took up his duties on August 1.

Short Bros. & Harland, Limited, aeronautical engineers, of Belfast, has appointed CAPT. H. ST. JOHN FANCOURT to the post of assistant general manager.

MR. JOHN AUSTIN, who has been with Qualcast, Limited, for 60 years, has retired. He was the recipient of presents both from directors and workmates. For many years he has been an inspector of castings.

MR. AND MRS. A. POWELL, of Moseley, Birmingham, celebrated their golden wedding on August 3. Mr. Powell is one of the principals in the firms of Powell & Lygo, brassfounders, of Moseley, Birmingham. Three sons are engaged in the same business.

MR. F. E. BECK has retired on pension after 50 years' service with Bamfords, Limited. At one time he was responsible for the company's stands at various shows and exhibitions all over the British Isles. Later he was employed in the spares department.

MR. J. COLIN LEE, a director of J. Colin Lee, Limited, iron, steel, and scrap merchants, of Sheffield, and MR. GEORGE TROTTER, a Sheffield small tools manufacturer, are making a business visit to Canada, where they hope to open out new connections with dollar-earning possibilities and also to cement existing friendships.

OCTOBER 1 will also witness two further changes in the Crompton Parkinson organisation. Mr. C. A. J. Martin will become general sales manager of the plant division, and his present position of product sales manager, E.H.P. motors, will be taken over by Mr. R. V. Powditch, who is at present product sales manager, Nelson stud welding.

MR. HAROLD EDWIN BOYD, for 27 years secretary of W. H. Allen, Sons & Company, Limited, mechanical and electrical engineers, of Bedford, with which he has been associated for 57 years, has retired. His successor is MR. P. C. SALTMARSH, formerly secretary of the British Internal Combustion Engine Manufacturers' Association.

MEMBERS of the Mungal foundry inspection department waited on Mr. William Docherty at his home in Stenhousemuir on August 8, to present him with a smoker's outfit on his retirement after 64 years' service with the Carron Company. Mr. A. Polson, departmental foreman, making the presentation, said Mr. Docherty had started work 64 years ago at the age of 12. From the fitting shop he was transferred to Mungal Foundry about 30 years ago to supervise the inspection of kiosk castings. Last May, Mr. Docherty received a chiming clock from the firm for over 50 years' service.

IN THE SPACIOUS new patternshop behind the works of Cruikshank & Company, Limited, ironfounders, Denny, on August 10, over 400 workers assembled to honour Mr. J. K. Shanks, M.B.E., D.L., J.P., the 81-year-old managing director of the firm, now retired, together with Mrs. Shanks, on the occasion of their golden wedding. Mr. W. Nisbet, director, presided, accompanied by Mr. Thomas Shanks, present managing director; Mr. Wm. M. Shanks, C.A., J.P., director; and Mr. A. Kinsman, convener of shop stewards. Mr. Kinsman handed over a Westminster chiming clock, together with a crystal bowl for Mrs. Shanks.

New Catalogues

Conveyor Belt Maintenance. A booklet received from the British Tyre and Rubber Company, Limited, of Herga House, Vincent Square, London, S.W.1, though primarily written for the mining industry, is of value to the mechanised foundries. Not only are the processes for repairs detailed and illustrated, but information is given of a fleet of mobile vans which are available for more serious breakdowns. As the information contained in this booklet may avoid a serious hold-up, it is suggested that readers operating a belt conveyor should write to Vincent Square for a copy for study and filing.

Insulating Refractories. Two leaflets, one single and one of four pages, have been received from General Refractories, Limited, of Genefax House, Sheffield, 10. The latter covers four types of bricks:—the first is a standard type going up to 900 deg. C.; the second a denser one, with the same limiting temperature; the third withstands 1,200 deg. C. and the fourth 1,250 deg., but with different mechanical properties. The properties are set out in tabular form on page 2. The balance of the leaflet is devoted to insulating mortars and cements. The single sheet treats similarly of slabs. Very pleasing colours have been used and the leaflets form an excellent example of the good use to which such media can be put, where "cheapness" is not the major factor.

Foundry Equipment. Foundry Equipment, Limited, of Linslade Works, Leighton Buzzard, have sent us five leaflets covering various machines they make for use by foundries. They are all of uniform size and "get up" and are characterised by a commendable clarity. Too many publicity managers chase after composite presentations, and usually miss the boat. Two of these are devoted to the Sandrammers—a major and a "Minor" size, and one each to a rotary cage sand disintegrator, a pneumatic moulding and a continuous sand mill. An effort has been made to disclose the main characteristics of each machine, whilst avoiding excessive showmanship. The changes in colour for each are at least helpful in the internal organisation and in general fit in well with the product. As a policy it has much to commend it. These catalogues are available to our readers on writing to Linslade Works.

Board Changes

MORGAN CRUCIBLE COMPANY, LIMITED—Mr. H. I. Matthey has been appointed a director.

R. Y. PICKERING & COMPANY, LIMITED—Mr. I. W. Macdonald has been appointed a director.

THORN ELECTRICAL INDUSTRIES, LIMITED—Mr. L. Bentley-Jones has been elected a director.

SHORT BROS. & HARLAND, LIMITED—Mr. C. P. T. Lipscomb, the company's technical director, has resigned, but, at the special request of the board, he remains a director.

A NEW CONVEYOR TRANSFER DEVICE known as the "Wedco" Aircush Lowerator is being manufactured by the British Wedge Wire Company, Limited, Academy Street, Warrington. It has been designed to operate between gravity-roller or power-driven conveyors at different floor levels, and it will lower, safely and speedily, such items as cases, crates, barrels, bales, etc. The machine is fully automatic and requires no power other than gravity. It will be appreciated by many firms where floor space is at a premium because it occupies less than 8 sq. ft.

News in Brief

TWENTY-FIVE new-type single-deck tramcars for Blackpool Corporation are being made by Charles Roberts & Company, Limited, railway-wagon builders, Horbury.

THE DIRECTORS of the General Electric Company, Limited, state that exports in the year ended March 31 created a fresh record. The number of employees at March 31 was approximately 58,000.

THE PAYMENT—by way of cash bonus—of 1½ per cent. more than the 16 per cent. dividend forecast when the company became public last December is recommended by the directors of Arthur Balfour & Company, Limited, the Sheffield steelmakers.

A ONE-FOR-FIVE scrip bonus is proposed by the directors of Smith & Wellstood, Limited, stove and boiler makers, of Bonnybridge (Stirlingshire). It is proposed to capitalise £30,000 of the general reserve and to issue one 5s. ordinary share for every five held.

IN ADDITION to the considerable amount of work already on hand, the North British Locomotive Company, Limited, Glasgow, has received an order for 25 engines and tenders of the S1 class (light) for the South African Railways and Harbours Administration.

JOHN & WILLIAM KERR, LIMITED, Greenock, has been granted an exclusive licence to manufacture the heating equipment products of Warren Webster & Company, New Jersey, U.S.A., for export to the U.S. and other countries. Production is scheduled to start in October.

ABOUT A DOZEN Italian workers will start work on August 13 in the spun-pipe plants of Stanton Ironworks Company, Limited, Stanton-by-Dale. These will be the first of 50 Italians who were recruited by a representative of the firm when he visited Genoa in May. The men are on a two-year contract.

THE INTERNATIONAL NICKEL COMPANY OF CANADA is increasing its quarterly dividend on the common stock from 40 cents to 50 cents. Two quarterly dividends, each of 40 cents, have already been paid in respect of 1951. Total distribution for 1950 was brought up to $2 with an extra distribution of 40 cents.

THE FIRST SHIPMENT of iron ore is due to be exported from British Columbia to Japan this week. It will consist of 10,000 tons. The Argonaut Company, Limited, of Quinsam Lake, on the east coast of Vancouver Island, expects to send about 80,000 tons of ore a month to Japan when operations are in full swing.

THE WORKS of the West Yorkshire Foundries, Limited, Saynor Lane, Leeds, were closed all bank holiday week in order to permit the installation of new machinery in preparation for expansion of business and to switch over to a new power system. The task was carried out by 120 men working in the 12-hr. shifts each day under the superintendent engineer, Mr. James Walker.

A SCHEME completely to manufacture, assemble, and test the Rolls-Royce Avon turbo-jet engine at the Coventry factories of the Standard Motor Company, Limited, has been submitted to the Ministry of Supply and approved. The scheme was submitted at the request of the Ministry, and the ordering and installation of plant and equipment will proceed immediately.

MERELY IN THE BLUE PRINT STAGE a year ago, a new constructional shop for the Power-Gas Corporation, Limited, Stockton-on-Tees, entered into production this week. This addition to the company's productive capacity has a floor area of 132,000 sq. ft. and is designed to handle mild steel, stainless steel, and other plate work as required by the gas, chemical, oil, and iron and steel industries.

THE QUASI-ARC COMPANY, LIMITED, Bilston (Staffs), announces that arrangements are now in hand with the General Electric Company, Limited, under which the Quasi-Arc Company will be the sole concessionnaires throughout the world for the G.E.C. twin-arc metallic arc welding process, which will be demonstrated on the Quasi-Arc stand at the Engineering, Marine, and Welding Exhibition, at Olympia, London, in September.

THE TOTAL EXTENT of the mechanical engineering research station of the D.S.I.R. at Birniehill, Each Kilbride, is 60 acres. The scheme is the largest of its kind in Britain and will involve a total expenditure of almost £1,500,000, and it is estimated that ultimately between 700 and 800 science technicians and administrative workers will be employed. The Scottish Development Corporation are providing the employees with houses and other communal services.

ARRIVALS OF ORES at Bristol during the four months ended July 31 totalled 18,545 tons. During the corresponding period of last year there were no imports of ores at the port. There was a general increase in the port's trade during the period, foreign imports increasing from 1,079,018 tons to 1,307,522 tons, foreign exports from 23,501 tons to 42,096 tons, coastwise imports from 578,723 tons to 684,753 tons, and coastwise exports from 305,552 tons to 388,873 tons.

FINES OF £1,000 EACH were imposed at London Sessions on August 8 on Herbert Hannan (30), company director, and Feltrex, Limited, Carlisle Street, Soho Square, London, W., who were found Guilty of acquiring and selling 181 tons of steel in breach of the Control of Iron and Steel Order, 1948. Hannan and the company were each ordered to pay £21 towards the cost of the prosecution and were given three months to pay. In default of payment, Hannan was told that he would go to prison for six months.

THE BRITISH STANDARDS INSTITUTION, in their Monthly Information Sheet for July, lists under "New Standards Issued," B.S. 1760:1951, Carbon steel castings for surface hardening (2s.). This provides for two grades of casting. Chemical composition, tensile properties and surface hardness after hardening are specified for both grades. Other requirements included are for process of manufacture, heat-treatment, fettling and dressing, provision of samples and their testing, marking and inspection and testing facilities. A clause covers the repair of castings and an appendix gives recommendations for repairs by metal-arc welding.

More Sulphuric Acid

Production of sulphuric acid in the United Kingdom during the second quarter of the year amounted to 402,082 tons or 79.1 per cent. of capacity, compared with 391,102 tons (77.3 per cent.) in the preceding quarter.

Consumption in the second quarter totalled 416,506 tons, including 15,454 tons of imported acid, as against 403,584 tons in the first quarter. Stocks increased last quarter by nearly 5,000 tons to 64,965 tons, but were 4,291 tons below those at January 1.

Fork-lift Trucks. On perusing a 12-page leaflet just issued by Ransomes, Sims & Jefferies, Limited, of Ipswich, on this subject, the reviewer began to wish that castings were articles which lent themselves to this method of handling. Here and there, however, there are foundries which pack standardised articles into boxes and so, for their end products, they could usefully adopt the fork-lift truck. Throughout the booklet the name Ransomes looms large, but it so happens that there are several firms of this name, and yet the actual title of the firm appears in quite small print at the bottom of the front inside cover. This is a feature which needs attention. Moreover, the telephone number and telegraphic address should also be included. The booklet is nicely presented and well illustrated.

Raw Material Markets

Iron and Steel

An Order—the Iron and Steel Prices (No. 2) Order, 1951 (SI No. 1423)—increasing controlled maximum prices of iron and steel products from Monday last, has been made by the Minister of Supply. It is stated that the increases are necessary because of a sharp rise in the prices of imports of iron ore, scrap, pig-iron, and semi-manufactured steel, and also because of recent increases in costs in this country, including increases in wages, transport, scrap, and fuel costs.

The British Iron and Steel Federation informed the Ministry in March that, in view of the serious cost increases due to these causes, early consideration needed to be given to the position. The prices now authorised are based on recommendations submitted by the Iron and Steel Corporation of Great Britain, after consultation with the B.I.S.F.

The Ministry of Supply states that the loss arising from buying finished steel abroad and selling it in this country at home prices has hitherto been borne by the Exchequer. This loss has risen steeply with the sharp rise in world prices and the Government has decided that, to avoid an increase in the subsidy, the trading loss, but not the import duty, should now be recovered by an adjustment spread over home controlled prices. This accounts for over 20 per cent., and other imported steel and steelmaking materials for approximately 40 per cent. of the overall price increases.

Examples of the increases under the new Order are: Foundry pig-iron, £11 4s. 6d. per ton (increase of 11s. 6d.) per ton; basic pig-iron, £11 15s. 6d. (16s. 6d.) per ton; soft basic billets (tested), £21 16s. 6d. (£4 7s. 6d.) per ton; re-rolled bars, £27 11s. (£4 16s.) per ton; sheets, uncoated, £35 15s. 6d. (£6 2s. 6d.) per ton.

United Kingdom prices will, in the main, continue to be lower than corresponding domestic prices in other countries.

Many foundries have now recommenced work following their annual holidays, during which time there has been much activity in carrying out necessary repairs. If they could be assured of adequate supplies of raw materials, particularly pig-iron and scrap, the majority of foundries would have no difficulty in maintaining maximum production for many months ahead, as there is plenty of work on hand and in prospect. It had been hoped that some improvement would have been made in the supply of pig-iron for the general engineering, motor, and textile foundries, but, so far, any improvement has been only slight. Furnaces producing low- and medium-phosphorus iron and hematite cannot cope with the heavy demands made upon them, and other grades are not available in sufficient quantities to narrow the margin appreciably. Refined iron and Scotch foundry iron are easing the position slightly, but the supply position generally is so uncertain that many foundries would consider taking up foreign iron of equivalent analyses if these were available, despite the much higher prices of Continental material.

Improved supplies of ore will enable hematite makers to step up production, but, apart from the needs of the foundries, producers are committed for supplies for the steelworks, which are equally, if not more urgently, in need of larger quantities.

The supply of high-phosphorus pig-iron for the jobbing and light foundries and for some of the engineering foundries is stringent, and there is little prospect of the furnaces producing basic-steel making pig-iron being transferred to the foundry grades. Stocks are low at both furnaces and foundries. The scrap position is also very difficult.

Foundry coke is being sent forward in sufficient quantities for current consumption, but there is little opportunity to build up stocks. Ganister, limestone, and firebricks are received to requirements.

The prompt acceptance by re-rollers of any offers of defective billets, crops, and re-rolling scrap, emphasises anew the dearth of prime steel semis. Imports are on a slightly better scale, but deliveries of foreign material are still heavily in arrears and re-rollers are finding it difficult to keep going, even on a short-time basis, although they have substantial bookings to execute both for export and for home delivery.

Non-ferrous Metals

A firmer tone was evident on the London tin market last week, and, in the second half of the week, at any rate, the Eastern market showed a steadier front. No change has been reported in the U.S. attitude over purchasing, and for the present America remains out of the market for fresh acquisitions of tin metal or concentrates. The operation of the Texas smelter in the United States, built as a war measure but still operating, depends on imported concentrates, and to this end a revised contract on the basis of $1.12 per lb. is being arranged with Bolivia, whose contribution to the running of the Texas plant is a major one. The R.F.C. has, however, let it be known that there is no intention of paying this price to any other producer. Contracts for the supply of concentrates are also in operation with Indonesian and the Belgian producers. It has been reported that the relatively low level to which the price of tin has now fallen is checking output at certain properties, but it is unlikely that this interference so far amounts to very much.

On the question of the future of the price, developments are uncertain, for so much depends on the action taken by the United States. The original conception of the stockpile tonnage has been revised downwards, it is true, but many thousands of tons of metal still remain to be secured. It would seem, therefore, that sooner or later America must re-enter the world market for metal.

Official tin quotations on the London Metal Exchange were as follow:—

Cash—Thursday, £825 to £830; Friday, £826 to £827 10s.; Monday, £837 10s. to £842 10s.; Tuesday, £865 to £872 10s.; Wednesday, £837 10s. to £842 10s.

Three Months—Thursday, £805 to £807; Friday, £806 to £808; Monday, £811 to £812; Tuesday, £836 to £837 10s.; Wednesday, £811 to £812.

Beginning with the fourth quarter of this year, the U.S. Government will allocate all steel, copper, and aluminium in the United States. This announcement was broadcast last week by the Defence Production Administrator. Other news from the States announces a threat of a copper strike, which, it is estimated, would affect practically the whole of the country's copper production. Whether or not this threat will materialise remains to be seen. In some quarters it is felt that the prospect is so alarming and serious, especially at the present time, that the U.S. Government may well decide to intervene with a view to preventing the trouble. It is, after all, only a matter of days since the stoppage at the Garfield smelter came to an end.

Latest Foundry Statistics

The output of brass and bronze castings for the first six months of this year was, according to the British Bureau of Non-ferrous Metal Statistics, 31,300 tons as compared with 23,495 during the corresponding period of 1951. About 3,000 tons of copper castings were also made.

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

(Delivered, unless otherwise stated)

August 15, 1951

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £11 10s.; Birmingham, £11 4s. 6d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £13 0s. 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, £13 12s. 3d.

Scotch Iron.—No. 3 foundry, £13 1s., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £14 2s.; South Zone, £14 4s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £14 12s.; South Zone, £14 14s. 6d.

Cold Blast.—South Staffs, £16 10s. 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, £12 17s.; Scotland (Scotch iron), £13 3s. 6d.; Sheffield, £13 13s. 6d.; Birmingham, £14 0s. 6d.; Wales (Welsh iron), £13 3s. 6d.

Spiegeleisen.—20 per cent. Mn, £18 15s. 9d.

Basic Pig-iron.—£11 15s. 6d. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered.)

Ferro-silicon (6-ton lots).—40/55 per cent., £40 15s., basis 45% Si, scale 15s. per unit; 70/84 per cent., £56 2s. 6d., basis 75% Si, scale 16s. per unit.

Silicon Briquettes (5-ton lots and over).—2lb. Si, £48 5s.; 1lb. Si, £49 5s.

Ferro-vanadium.—50/60 per cent., 15s. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 9s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £175; ditto, copper-free, £190.

Ferro-tungsten.—80/85 per cent., 33s. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 35s. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent C, £74, basis 60% Cr, scale 24s. 6d. per unit; 6/8 per cent. C, £70, basis 60% Cr, scale 23s. 3d. per unit; max. 2 per cent. C, 1s. 8¼d. per lb. Cr; max. 1 per cent. C, 1s. 8¼d. per lb. Cr; max. 0.15 per cent. C, 1s. 9½d. per lb. Cr.; max. 0.10 per cent. C, 1s. 9¾d. per lb. Cr.

Chromium Briquettes (5-ton lots and over).—1 lb. Cr, £78 9s.

Cobalt.—98/99 per cent., 17s. 6d. per lb.

Metallic Chromium.—98/99 per cent., 5s. 11d. per lb.

Ferro-manganese (blast-furnace). — 78 per cent., £39 9s. 4d.

Manganese Briquettes (5-ton lots and over).—2lb. Mn, £46 18s.

Metallic Manganese.—96/98 per cent., carbon-free, £215 per ton.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £21 6s. 6d.; tested, 0·08 to 0.25 per cent. C (100-ton lots), £21 16s. 6d.; hard (0.42 to 0.60 per cent. C), £23 14s.; silico-manganese, £29 10s.; free-cutting, £24 10s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £27 11s.; case-hardening, £27 19s.; silico-manganese £30 11s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £25 10s.; basic, hard, over 0.41 up to 0.60 per cent. C, £26 10s.; acid, up to 0.25 per cent. C, £27 19s.

Sheet and Tinplate Bars.—£21 8s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £25 6s. 6d.; boiler plates (N.-E. Coast), £26 14s.; chequer plates (N.-E. Coast), £26 15s. 6d.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £23 15s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £27 11s.; flats, 5 in. wide and under, £27 11s.; hoop and strip, £28 6s.; black sheets, 17/20 g., £35 15s. 6d.; galvanised corrugated sheets, 17/20 g., £49 18s. 6d.

Alloy Steel Bars.—1-in. dia. and up: Nickel, £44 17s. 3d.; nickel-chrome, £65 2s. 9d.; nickel-chrome-molybdenum, £72 10s. 3d.

Tinplates.—49s. 6½d. per basis box.

NON-FERROUS METALS

Copper.—Electrolytic, £234; high-grade fire-refined, £233 10s.; fire-refined of not less than 99.7 per cent., £233; ditto, 99.2 per cent., £232 10s.; black hot-rolled wire rods, £243 12s. 6d.

Tin.—Cash, £837 10s. to £842 10s.; three months, £811 to £812; settlement, £840.

Zinc.—G.O.B. (foreign) (duty paid), £190; ditto (domestic), £190; "Prime Western," £190; electrolytic, £194; not less than 99.99 per cent., £196.

Lead.—Good soft pig-lead (foreign) (duty paid), £180; ditto (Empire and domestic), £180; "English," £181 10s.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £210 10s.; rolled zinc (boiler plates), all English destinations, £208 10s.; zinc oxide (Red Seal), d/d buyers' premises, £205.

Other Metals.—Aluminium, ingots, £124; antimony, English, 99 per cent., £390; quicksilver, ex warehouse, £73 5s. to £74; nickel, £454.

Brass.—Solid-drawn tubes, 25½d. per lb.; rods, drawn, 28½d.; sheets to 10 w.g., 30½d.; wire, 31½d. rolled metal, 28⅞d.

Copper Tubes, etc.—Solid-drawn tubes, 26⅞d. per lb.; wire, 26l.s. 9d. per cwt. basis; 20 s.w.g., 288s. 9d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £277 to £281; BS. 1400—LG3—1 (86/7/5/2), £282 to £300; BS. 1400—G1—1 (88/10/2), £340 to £360; Admiralty GM (88/10/2), virgin quality, £340 to £350 per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £348 to £390; L.P.Bl, £309 to £322 per ton.

Phosphor Bronze.—Strip, 38d. per lb.; sheets to 10 w.g., 40½d.; wire, 42½d.; rods, 38d.; tubes, 36½d.; chill cast bars: solids 3s. 10d., cored, 3s. 11d. (C. CLIFFORD & SON, LIMITED)

Nickel Silver, etc.—Ingots for raising, 2s. 7½d. per lb. (7%) to 3s. 7½d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 3s. 1½d. (7%) to 4s. 1½d. (30%); to 12 in. wide × .056, 3s. 1½d. to 4s. 1½d.; to 25 in. wide × .056, 3s. 3½d. to 4s. 3½d. Spoon and fork metal, unsheared, 2s. 10½d. to 3s. 10½d. Wire, 10g., in coils, 3s. 7½d. (10%) to 4s. 7d. (30%). Special quality turning rod, 10%, 3s. 6½d.: 15%, 3s. 11d.; 18%, 4s. 3½d. All prices are net.

New Board of Trade Addresses

The headquarters of the Board of Trade is being transferred to Horse Guards Avenue, Whitehall, London, S.W.1 (telephone: TRAfalgar 8855). Many of the branches of the Industries and Manufactures Department, Division 2, have already moved to the new offices.

Until further notice, correspondence for divisions of the Board of Trade hitherto housed in Imperial Chemical House and Thames House (North) should be addressed as follows:—

The President, Overseas and Parliamentary Secretaries, Secretariat and Information Division (from August 6); Industries and Manufactures Division Branches 2A and 2D; Industries and Manufactures Division 2B (dealing with organic and inorganic chemicals and plastic materials):—House Guards Avenue, Whitehall, London, S.W.1 (telephone: TRAfalgar 8855).

Commercial Relations and Exports Department (Films Division)—I.C. House, Millbank, London, S.W.1 (telephone: WHItehall 5140).

Commercial Relations and Exports Department (Industries Branch); Industries and Manufactures Division Branch 2B and 2C (dealing with the production of rubber goods, paints, asbestos, manufactures, bichromates, alkalis, chlorine, certain sulphur and zinc derivatives, etc.); Industries and Manufactures Division, Branch 1; Distribution of Industry and Regional Division; Solicitor's Department; Statistical Division:—Thames House (North), Millbank, London, S.W.1 (telephone: VICtoria 9040).

The telegraphic address for the Secretary, Board of Trade, London, remains "Boneblack, London."

Industrial Design Policies

London's Royal College of Art is to be the scene of the first international discussion by industrialists of their design policies. About 250 invited guests—mainly chairmen, directors, and managers from leading firms in Britain, Europe, and the United States—will meet on September 19 and 20 to discuss design policy in industry as a responsibility of management. This Design Congress, which is an official event of the Festival of Britain, has been planned by the Council of Industrial Design, which appointed a management committee with representatives from the Federation of British Industries, the T.U.C., the Royal Society of Arts, the Society of Industrial Artists, and the Design and Industries Association.

Among the U.K. delegates who will be giving Papers are Dr. Harold Hartley, chairman of Radiation, Limited, who will deal with domestic appliances, and Mr. W. T. Wren, a director of Allied Ironfounders, Limited, and managing director of Aga Heat, Limited, who will give a Paper on domestic equipment.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained.

SUNDERLAND, August 20—Steel wire reinforcement, gullies, manholes, covers, step-irons, etc., for the Borough Council. The Borough Engineer, Athenæum Buildings, Fawcett Street, Sunderland.

NEWARK, September 10—Provision and laying of about 14 miles of 3-in. to 6-in. iron pipe water mains, for the Rural District Council. Elliott & Brown, consulting engineers, Stanley House, Pelham Road, Nottingham. (Deposit, £3 3s.)

CLASSIFIED ADVERTISEMENTS

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

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

SITUATIONS WANTED

EXPERIENCED FOUNDRY SUPERINTENDENT (38) desires joining progressive firm intending to increase output and improve quality. Sound practical and technical qualifications.—Box 1168, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER (age 40) seeks similar post with a company of repute. Fully competent with all aspects of foundry administration. 12 years' executive experience.—Box 1157, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

FOREMAN required, staff appointment, for Cupolas serving Tropenas Plant in Yorkshire foundry. State age and fullest details in confidence, with some indication of salary expected. Assistance with housing to suitable applicant.—Box 1144, FOUNDRY TRADE JOURNAL.

VACANCY for METALLURGIST, age 21-25, not necessarily qualified for work on Tropenas Plant in Yorkshire.—Details of experience (if any) and salary expected to Box 1145, FOUNDRY TRADE JOURNAL.

WANTED, immediately, FOUNDRY SUPERINTENDENT for Mechanised Grey Iron Foundry in South Africa. Experience with plant supplied by Foundry Equipment, Leighton Buzzard, an advantage. Good salary and passage paid for suitable man.—Apply, stating age and experience, to Box 1158, FOUNRY TRADE JOURNAL.

FOUNDRY MANAGER. Must be fully experienced aluminium gravity diecastings, to lay down small foundry, and take complete control; able to design own dies, cost, and obtain results on own initiative. Good prospects. Interview Lancashire or London.—Box 1155, FOUNDRY TRADE JOURNAL.

DRAUGHTSMAN-DESIGNER required for Grate Trade. House available for suitable applicant.—State age and full details of experience to SECRETARY, Samuel Smith & Sons, Ltd., Smethwick, Staffs.

JUNIOR METALLURGIST required for Foundry producing high quality iron castings. Applicants should state age, experience, qualifications and salary required.—Apply Box 1169, FOUNDRY TRADE JOURNAL.

NON-FERROUS and CAST IRON MOULDERS required. Good rates. Canteen, etc.—Write Box 302, W.B.G., 39, Cheapside, London, E.C.2.

SITUATIONS VACANT—*Contd.*

WANTED, immediately, fully experienced man to control and operate battery of Cupolas at well known foundry in the North-West. Position is a permanent one, and assistance will be given with housing to successful applicant. All applicants must state age, wage, and experience.—Box 1153, FOUNDRY TRADE JOURNAL.

EASTON & JOHNSON, LTD., Taunton, Somerset, have vacancy for FOUNDRY FOREMAN, to take charge of Foundry. Applicant must have wide experience in dry, green and loam moulding of a wide variety of castings ranging from few lbs. up to 5 tons. Apply in writing, stating age and full particulars.

WORKING FOREMAN for Small Non-Ferrous Foundry in the Midlands. Living accommodation provided. Good working conditions, with prospect of advancement. Please state age, experience, and salary required.—Box 1146, FOUNDRY TRADE JOURNAL.

DESIGNER - DRAUGHTSMEN required for design and tool work for Gravity Dies for Aluminium Diecastings. These are extremely attractive positions, with good scope for advancement to men of ability.—Apply A. R. FORD, Vowles Aluminimum Foundry Co., Ltd., Bank Street, West Bromwich.

FOREMAN COREMAKER wanted. Must be fully conversant with all modern methods of core making, core blowing and labour control. This position is a permanent one. Assistance will be given on housing. All applicants must first apply in writing, giving full particulars of experience, age, and salary required, to SYKES & HARRISON, LTD., Port Penrhyn Foundry, Bangor, N. Wales.

METALLURGICAL ASSISTANT required for Engineering Works in North Midlands; graduate or associate preferred; age 20-25 years; previous experience in foundry or welding work desirable, but not essential; the post covers shop and laboratory work, and offers wide scope to a man with initiative.—Write, stating age, experience, and salary required, to Box 1170, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required to take over a small Iron Foundry. Development work is required on quality and output, and applicant must be fully conversant with jobbing and machine moulding. In addition, experience of Costing and a Metallurgical background is desirable. This position is one with a good future for a young executive who is capable of growing with the job. Write giving full particulars, age, and salary required. House available.—Box 1160, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

FOUNDRY SHIFT FOREMAN required by Non-ferrous Refiners, Billet and Ingot Manufacturers in Birmingham area. Commencing salary £550. Applicants should be capable of supervising all labour and controlling Electric, Coal and Oil-fired Furnaces. Full particulars in confidence.—Box 1162, FOUNDRY TRADE JOURNAL.

SKILLED MOULDERS, PLATERS, TURNERS, BORERS, etc., required by Distington Engineering Company, Limited, Workington, Cumberland. For further details apply to the LABOUR MANAGER.

FOUNDRY FOREMAN required for small General and Repetition Grey Iron castings—3 tons per day, up to 10 cwts. Knowledge of modern production methods and control of green labour. Set out pattern plates and tackle. Full particulars of experience, age, and salary required. Leeds-Yorks area.—Box 1151, FOUNDRY TRADE JOURNAL.

AGENCY

WELL-KNOWN Continental manufacturer of Airless Shot Blast plant seeks well introduced firm or firms supplying foundry equipment, as agents, in the United Kingdom. Please write full particulars including other lines sold, to.—Box 1118, FOUNDRY TRADE JOURNAL.

FACTORY PREMISES WANTED

DISUSED FOUNDRY or Premises suitable for smelting required within 25 miles London, either Surrey or Sussex. Approx. 5-8,000 sq. ft.—Full details and price to Box 1106, FOUNDRY TRADE JOURNAL.

BUSINESS FOR SALE

FOR SALE AS A GOING CONCERN.—Iron Foundry in South of England. Premises 43,000 sq. ft. Mainly modern ferro concrete buildings, 17,500 sq. ft. Mechanised equipment with key personnel if required.—Box 1054, FOUNDRY TRADE JOURNAL.

FOUNDRY WANTED

GREY IRON FOUNDRY required for outright purchase. Any going concern considered.—Apply Box 1167, FOUNDRY TRADE JOURNAL.

MATERIALS FOR SALE

FOR SALE.—7 Tons Aluminium Alloy Ingots. Further details on request. Regular tonnages available.—Box 1134, FOUNDRY TRADE JOURNAL.