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PRINCIPAL CONTENTS

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Brassfoundry Productivity

Last week, there was held in Birmingham a conference of the higher executives of the copper-base foundry interests to ascertain what steps could be taken to implement the Productivity Report on American conditions. About 200 people were present and a whole day was spent in discussion. The most important contribution to this was made by Mr. Victor Feather, the assistant general secretary of the Trade Union Congress, who promised the support of that body in the national drive for productivity. The meeting was assured that co-operation would be accorded in such matters as time-studies and so forth.

The chairman of the afternoon session, Sir Thomas Hutton, general manager, Anglo-American Council on Productivity, in his summing-up, suggested that the following steps should be taken:—The two associations—the Association of Bronze and Brass Founders and the National Brassfoundry Association—should set up a steering committee upon which qualified and enterprising technical executives would serve. This committee would initiate both regional and sectional committees. Finally, a national conference should be called to discuss the Report chapter by chapter. This was agreed to; yet we doubt if the solution has been found. A national convention would produce a spate of oratory, but little else. Though it is essential for the whole industry to increase productivity, the actual implementation of the Report must necessarily be an individual matter. This is clearly shown by the recent Report on "Results" issued by the British Steel Founders' Association. Thus employers and their executives should read and re-read the Report and establish a plan of campaign among their own men for its implementation. This obviously includes informing the staff in ways best suited for ensuring enthusiastic co-operation initially. There are no set rules, and never will be, for this type of undertaking, as groups of individuals rarely react along anticipated lines, and quite different types of approach have to be made to obtain the desired results.

A policy of employers' associations, which has been so successfully established by both the steel and ironfounders is, when an innovation has been successfully launched, to allow it to be examined by any other member who is interested. The financial calls on these associations is indeed heavy and likely to become more onerous. The happiest solution would, of course, be increased membership, yet whilst the whole industry benefits from the co-operative actions taken, there are, and always will be, a number of firms who for various reasons will not "play ball." Thus, some sort of overall levy—maybe by adding a small percentage on every invoice or an increment on a type of raw material bought—would evenly spread the load over the whole industry. Naturally, a high percentage of the money so received should be devoted to research and development. The working out of such proposals is a really difficult task calling for the highest qualities of statesmanship by the leaders of this industry.

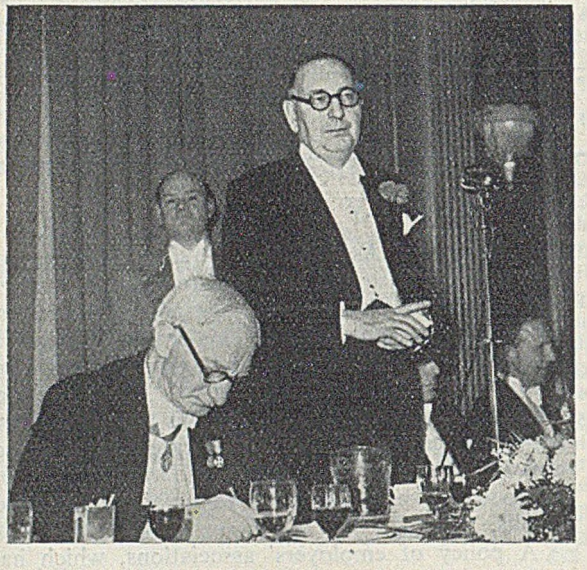
Dinners

BRITISH STEEL FOUNDERS' ASSOCIATION

The annual dinner of the British Steel Founders' Association was held on December 5 at Claridge's, London, W.1. Mr. Frank Rowe presided, and proposed the toast "British Industry" to which Sir Archibald Forbes replied. Other speakers were the Rt. Hon. Lord Beveridge, Mr. T. H. Summerson, Mr. F. N. Lloyd and the Rt. Hon. The Viscount Davidson. The company was, on the conclusion of the speeches, entertained to a pianoforte recital by Miss Irene Scharrer.

The guests at the high table were, in addition to speakers:—

Lieut.-Col. Lord Dudley Gordon; Mr. F. Pickworth; The Ven. The Hon. Stephen H. Phillimore; Admiral Sir Claud Barry; Mr. A. C. Hartley; Mr. G. P. Barnett; Mr. G. M. Flather (The Master Cutler); Mr. Cyril M. Cohen; Sir Andrew McCance; Sir Ronald Garrett; Sir Alexander Ramsey; Mr. G. E. Beharrel; Mr. G. B. Cotton (Master the Worshipful Company of Founders), and Mr. Colin Gresty (president of the Institute of British Foundrymen).



Mr. Frank Rowe, president, speaking at the Steel Founders' Dinner; on his right is the Rt. Hon. Lord Beveridge, author of the Social Security plan.

Daily Press Comment

"Peterborough" of the "Daily Telegraph and Morning Post" wrote the following comments on the function:—

"*Steel-eating Locusts*"

"At the annual dinner of the British Steel Founders' Association held at Claridge's last night, five of the six speakers dwelt on productivity.

"These included Sir Archibald Forbes, president of the Federation of British Industries. Lord Beveridge, who described himself as a 'cold-hearted economist,' and the association's next chairman, Mr. T. H. Summerson.

"Mr. Frank Rowe, chairman of the Steel Founders, spoke with some bitterness on the nationalisation of steel. He said it had begun to throttle the industry and had driven brilliant men out of it through frustration.

"The new Government, he declared, would have to give 'real, lively support' to restore the years the locusts had eaten.

"None of the speakers could be accused of over-production. Lord Davidson, president of the Engineering Industries Association, sat down at 10 p.m. precisely so that the company could hear Irene Scharrer play."

FEDERATION OF SECONDARY LIGHT ALLOY SMELTERS

The annual function of the Federation of Secondary Light Alloy Smelters, held last week at the Trocadero Restaurant, London, was presided over by Mr. R. T. Priestman. Among those present were:—Mr. V. P. Harris, (Under-secretary, Metals and Radio Division of the Ministry of Supply), Mr. H. E. Thatcher, Mr. A. Myers, Mr. L. J. Chandler, Mr. H. E. Jackson, Mr. H. R. Murray-Shaw, Mr. G. A. Woodruff, Mr. S. W. Platt, Mr. V. C. Faulkner, and Mr. L. G. Beresford, most of whom were accompanied by their ladies. The dinner was organised by Mr. H. Y. Ross, the secretary.

Film Review

Argonarc Welding Process. 16 mm. Kodachrome colour and sound film, running time 53 min., produced by Industrial Colour Films, Limited, for the British Oxygen Company, Limited.

This film, which had its première in London last week, is divided into two more or less independent reels. The first describes the elementary purpose of flux in welding which led up to the development of the Argonarc tool and describes the process, apparatus and applications. The second is more concerned with applications and was prepared with the co-operation of the Aluminium Development Association. By means of remarkable high-speed photographic technique, truly wonderful close-up pictures of gas and Argonarc welding in progress are incorporated. Unfortunately, despite all this effort, the changed appearance with and without flux are somewhat difficult for the layman to follow, though this was the main point attempted. Nevertheless, it is convincingly demonstrated that Argonarc welding produces consistently reliable welds without externally applied flux on light alloys, stainless steel and some other sheet metals. In each reel, the repair of a fractured light-alloy casting was shown. It is understood that the film is available for public and industrial showing on application to the British Oxygen Company, through any of the branches.

Sir John Cass College Lectures

This College has organised several series of lectures for the new year. Of interest to our London readers are "Patents and Industrial Design Protection," by Mr. Eric Walker (Barrister-at-Law); "Absorption Spectroscopy," by Mr. A. R. Philpotts; "Microchemical Analysis," by Mr. David W. Wilson, and "X-ray Crystallography," by Mr. L. A. Thomas. Additionally a laboratory course on "Solid Fuel Analysis" is being conducted by Mr. S. Weld. Details can be had by writing to the principal of the College at Jewry Street, Aldgate, E.C.3.

Board Changes

HOOVER, LIMITED—Mr. Walter Puckey has resigned from the board.

WOLVERHAMPTON METAL COMPANY, LIMITED—Mr. T. C. James has been appointed chairman.

VULCAN FOUNDRY, LIMITED—Sir George Binney and Mr. K. F. Pearson have been elected directors.

DAVY & UNITED ENGINEERING COMPANY, LIMITED—Mr. W. W. Franklin has been elected a director.

HEAD, WRIGHTSON & COMPANY, LIMITED—Mr. Vaughan Rendred has been appointed a director.

Productivity in the Brass Foundry

Economic Utilisation of Raw Materials*

By Frank Hudson, F.I.M.

Every country in the world is anxious to increase production in order to make good the destruction caused by war, to minimise the effects of inflation and obtain a higher standard of living, and to promote re-armament programmes in order to reduce the threat of further war. This problem, never an easy one, is particularly difficult today in view of the world-wide shortage of essential materials, and many brassfounders are no doubt wondering how increased productivity can be obtained when insufficient raw materials are available even to maintain present production levels.

However, if this matter be given the consideration it deserves, there is a possibility that, as well as being able to increase production, many founders may at the same time be able to contribute to the more efficient use of available materials and thereby gain still greater benefits. In this Paper the Author will endeavour to correlate some of the technical points associated with productivity and the supply position, in the hope that this may lead to a discussion which will benefit foundrymen of all nations. It is fully appreciated that there are other factors, such as the question of incentives, the policy of governments, etc., which play an important part in this problem, but such considerations are outside the scope of this Paper.

Last year the Author was privileged to lead a British Brassfoundry Productivity Team to the United States, and one of the observations made in the course of this visit was that the output per man-hour in the average brass foundry was greater than in British and European plants of similar type and size. Furthermore, it was evident that the American brassfoundry industry was not composed entirely of the large highly-mechanised plants that so many people tend to associate with the United States. Actually, it is similar to that in many other countries, being made up of a number of relatively small foundries, yet different, inasmuch as even the smallest American jobbing founder is essentially progressive and production-minded. It will be a relatively simple matter to copy American production methods, but if increased productivity is to be obtained in the brass foundries of the Old World, particularly under present conditions, it is also essential that each individual founder be inspired anew with the spirit of industrial adventure. In writing this Paper this last thought has been kept much in mind.

Simplification and Standardisation

Before maximum productivity can be obtained, in conjunction with the most efficient use of available raw materials, international consideration must be given to the greater use of simplification, standardisation and specialisation methods, so that manufacturing operations can be properly planned. According to the British productivity report, "Simplification in Industry," these terms can be defined as follows:—

Simplification.—The process of reducing the number of types and varieties of products made.

Standardisation.—The process of organising agreement on

(1) a standard for a particular product, range of products or procedure, and,

(2) the application of that standard. (A "standard" is a definition with reference to performance quality, composition, dimensions or method of manufacture or testing.)

Specialisation.—The application of particular productive resources exclusively to the manufacture of a narrow range of products.

Simplification and standardisation must go hand in hand, since too many specifications may be just as bad as none at all, so far as efficient production methods are concerned. An endeavour should, therefore, be made to plan production so that the minimum number of alloys is required per day. The ideal would be the use of one alloy, a condition which may be difficult to obtain in many jobbing foundries, but bad planning is the only reason why more than six different alloys need ever be handled in any one day.

British Standard Schedule 1400: 1948, covering "Copper-alloy Ingots and Castings," outlines twenty-three different alloys for castings. The bulk of industrial requirements can be met by ten copper-base alloys, and these can be readily grouped into seven main types for production purposes, as indicated in Table I. The simplification of alloys in this way assists productivity, in both melting shop and foundry, and aids subsequent reclamation of scrap. Those responsible for the drafting of standard specifications should keep this point particularly in mind. It is interesting to note that the full use of simplification methods has led to a reduction in the number of alloys employed in America; in the plants visited by the British Brassfoundry Productivity Team approximately 75

* Paper presented at the International Foundry Congress at Brussels.

TABLE I.—*Suggested Grouping of Copper-base Alloys for Production Purposes.* (B.S. 1400 : 1948).

Group.	Alloy.	Composition (per cent.)									Min. test-bar properties separately cast (sand).	
		Cu.	Sn.	Zn.	Pb.	P.	Al.	Fe.	Mn.	Ni.	Tons U.T.S. per sq.in.	Elongation per cent.
1	Phosphor bronze, B.S.1400-PB1-C	Bal.	10.0 min.	0.05 max.	0.25 max.	0.50 min.	—	—	—	—	12.0	1.5
	Phosphor bronze, B.S.1400-PB3-C	Bal.	9.0 to 11.0	0.05 max.	0.15 max.	0.03–0.25	—	—	—	—	16.0	10.0
2	80/10/0/10 Leaded bronze, B.S. 1400-LB2-C	Bal.	9.0 to 11.0	0.5 max.	9.0 to 11.0	0.3 max.	—	—	—	1.5 max.	11.0	4.0
3	85/5/5/5 Leaded gunmetal, B.S.1400-LG2-C	Bal.	4.0 to 6.0	4.0 to 6.0	4.0 to 6.0	—	—	—	—	1.0 max.	12.0	12.0
4	86/7/5/2 Leaded gunmetal, B.S.1400-LG3-C	Bal.	6.0 to 8.0	4.0 to 6.0	1.0 to 3.0	—	—	—	—	1.0 max.	14.0	12.0
5	Aluminium bronze, B.S. 1400-AB1-C	Bal.	—	0.5 max.	—	—	8.5 to 10.5	1.5 to 3.5	1.0 max.	1.0 max.	32.0	20.0
	High-tensile aluminium bronze, B.S.1400-AB2-C	Bal.	—	0.5 max.	—	—	8.5 to 10.5	3.0 to 5.5	3.0 max.	3.0 to 5.5	40.0	12.0
6	Brass, B.S.1400-B1-C ..	70.0 to 80.0	1.0 to 3.5	Bal.	3.0 to 6.0	—	—	1.0 max.	—	1.0 max.	11.0	12.0
7	30-ton, High-tensile brass, B.S. 1400-HTB1-C	55.0 min.	1.5 max.	Bal.	0.5 max.	—	2.5 max.	0.5 to 2.0	3.0 max.	1.0 max.	30.0	20.0
	38-ton High-tensile brass, B.S. 1400-HTB2-C	55.0 min.	0.5 max.	Bal.	0.5 max.	—	5.0 max.	0.5 to 2.5	3.0 max.	2.0 max.	38.0	15.0

per cent. of the total output of castings was in 85/5/5/5 gunmetal.

Founders should take every opportunity of educating the users of non-ferrous castings to appreciate factors which promote high productivity, namely:—(1) The use of a limited number of standard alloys, and (2) the importance of ordering castings of the same design in sufficient quantity so that machine-moulding methods may be employed.

Manufacturers using brass and gunmetal castings should endeavour to apply simplification methods to their products to the utmost possible extent. Whilst it is not always possible to reduce the variety of finished products, many components making up the whole can often be made identical, enabling sub-assemblies of one particular part of the final assembly to be produced in greater quantities.

Simplification, standardisation and specification methods have been effectively applied by American manufacturers of foundry plant and equipment. As a result, roller conveyors, overhead mechanical-handling systems, moulding machines, core-ovens, sand-preparation plant, etc., of a standard type are readily available at an economic price, together with a full range of all essential spare parts. This has enabled even the smallest jobbing brass foundry to make full use of mechanical aids. In studying the needs of the foundry industry, British and European manufacturers of plant and equipment could well give consideration to the development of suitable and fully-standardised equipment.

Design and Control of Casting Quality

After the application of simplification, standardisation and specialisation methods, the next most important factors in obtaining increased productivity, in conjunction with the best use of available materials, are undoubtedly design and the technical control of casting quality.

Design of Castings.—Most designers and engineers to-day appreciate that neither integral nor separately-cast test-bars normally exhibit mechanical properties representative of the casting. In many instances the properties of castings, particularly when they are made in sand moulds, are below those obtained from test-bars. When designing bronze and gunmetal castings, the engineer therefore increases the section of the casting, in order to ensure a certain factor of safety. This obviously increases the weight of the casting and the amount of metal required.

In discussing this matter with one firm of marine engineers of international repute, the Author was informed that the design of bronze and gunmetal castings was based on 50 per cent. of the specified test-bar properties. In other words, the castings were twice as thick (and twice as heavy) as they need have been if the founder were able to produce castings having properties similar to those obtainable from separately-cast test-bars. The production of castings of better quality, enabling designers to reduce the section and weight of castings, will obviously lead to substantial economy in the use of metal. The problem is, however, a long-term one, and it is hoped that every brassfounder will give this matter serious attention, as indicated in the Paper,[1] "Mechanical Properties of Some Copper-base Alloy Castings," presented to the Institute of British Foundrymen by the Technical Committee of the Association of Bronze and Brass Founders in 1949.

In that Report it is suggested that improvements in the quality of cast products may be sought along several lines, *e.g.*:—

(1) By co-operation between designer and

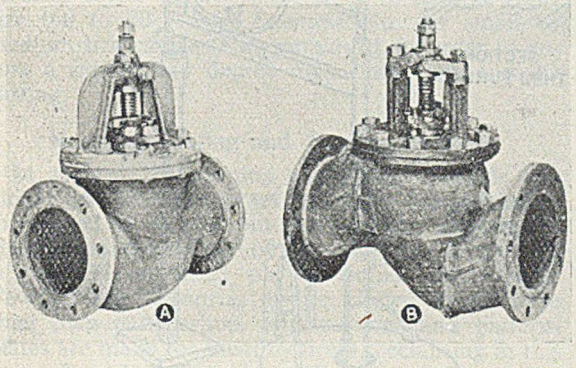
manufacturer with a view to evolving designs which will meet the designer's requirements, and at the same time be conducive to the production of a sound casting.

(2) By improvement in manufacturing technique derived from the results of fundamental research allied with manufacturing experience.

(3) By research which promotes a better understanding of the casting characteristics of the materials and to provide materials with improved casting characteristics.

Incidentally, the results given in the above Paper support the belief that alloys with long freezing ranges, such as bronze and gunmetal, are liable to contain dispersed porosity which lowers their mechanical properties, whilst castings in alloys with a short freezing range, like high-tensile brass and aluminium bronze, can be made completely sound and with properties equal to those of separately-cast test-bars, provided the metal is not gassy and the castings are properly fed. It might be suggested, therefore, that in order to make the best use of available supplies of metal, wherever design and service conditions permit, centrifugal and chill-casting methods should be used for the production of bronze and gunmetal castings, and that greater use should be made of both high-tensile brass and aluminium-bronze castings. This will enable the founder to produce castings with superior mechanical properties, which the designer can utilise for reducing section and weight as illustrated in Fig. 1.

Mention might also be made of the possibility of effecting weight reduction in castings through the use of bronzes on the 5 per cent. nickel, 5 per cent. tin composition. The properties of the alloys in this series have been recently fully described by Vanick,[2] and it is interesting to note that. after a direct age-hardening treatment of 6 to 10 hours at 300 deg. C., a tensile strength of 65,000 lb. per sq. in. (29 tons per sq. in. or 45.7 kgs. per sq. mm.), with 10 per cent. elongation, can be obtained. Unfortunately, at the moment nickel is in heavy demand, but those responsible for the future allocation of this metal might well consider the use of small amounts of nickel justifiable, in view of the 25 to 50 per cent. overall economy in copper and other metals likely to be so achieved.



[Courtesy of Meigh High Tensile Alloys, Limited

FIG. 1.—*The use of high-tensile Aluminium-bronze instead of Gunmetal enables Castings to be reduced in Weight without affecting Margin of Safety. The Standard 6-inch Gunmetal Valve (A) weighs 128 lb., whilst the re-designed High-tensile Aluminium-bronze Valve (B) weighs only 80 lb.*

Technical Control of Casting Quality.—In order to obtain increased productivity from available supplies of metal, it is essential that founders use metal more economically. This can be brought about by the production of castings of higher quailty, enabling engineers and designers to reduce section and weight. Furthermore, this increase in quality must be obtained, wherever possible, by reduction in the number of defective castings produced. In order to attain this ideal, brass founders must give greater attention to the technical control of casting quality. To cover this subject fully would require a separate Paper and at the moment brief mention only can be made of one or two of the more important production factors which merit careful consideration, namely:—

(1) More general use of de-gassing methods, in conjunction with the development of a rapid control test for assessing melt quality.

(2) More effective control of pouring temperatures.

(3) More effective control of the properties of moulding and core sands.

(4) Improvements in running and feeding methods.

Gas Control and Rapid Testing

The improvements in metal quality to be gained by the removal of dissolved gas is now conclusively established, and it is generally agreed that degasification by gas-scavenging, using air or nitrogen, has considerable production and economic advantages over the oxidation-reduction method utilising slags and fluxes. The former is a more positive, quicker, and cleaner operation, is less liable to reduce the life of crucibles and furnace linings, and can be readily applied on a practical production basis in the foundry, as indicated by Kurzinski.[3]

The nitrogen-scavenging method recommended by Kurzinski for use with lift-out crucible is illustrated in Fig. 2. The metal is heated to approximately 38 deg. C. above the desired pouring temperature; the nitrogen flow is adjusted to approximately 30 cub. ft. (857 litres) per hour and the assembly is placed over the crucible with the timer set for the required treating time, which is one minute for 200 lb. (90.7 kg.) of bronze (8 cub. ft. of nitrogen per ton of metal or 226 litres per 1,000 kg.). When the bell in the timer rings, the degassing assembly is removed and the flow of nitrogen stopped. It is claimed that, if reasonable care is exercised, the graphite tubes employed for introducing the nitrogen into the molten metal will last for more than 200 immersions. The degassing unit shown in Fig. 3 is designed for introducing nitrogen into a crucible furnace during melting. The advantage of this procedure is that the total time required for melting and degassing is reduced, as treatment

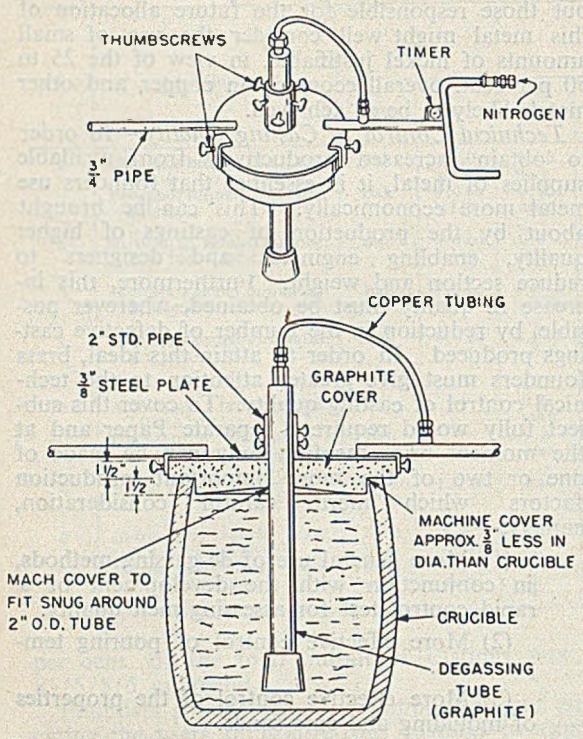


FIG. 2.—*Nitrogen-scavenging Method recommended by Kurzinski for Use in the Foundry with Ordinary Crucibles.*

is completed by the time the required pouring temperature is attained. The incorporation by furnace manufacturers of gas-scavenging methods as an integral part of melting equipment may well play a decisive part in promoting greater use of this process in the foundry and a higher and more uniform standard of metal quality.

Although the oxidation-reduction process has in the past played a useful part in improving metal quality, there is no guarantee that it will give consistent results in every foundry, and with certain alloys, such as those containing an appreciable percentage of phosphorus, it is ineffective. As a result, some thought has been given by founders of copper-base alloys to the possible development of a rapid control test for assessing the quality of molten metal. At the moment the Brass and Bronze Division of the American Foundrymen's Society is developing a fracture test for assessing the melt quality of 85/5/5/5 gunmetal; interim reports have already been published.[1] This test takes only three minutes to complete. Whilst there is undoubted need for some kind of a rapid control test, this need is much less in foundries using gas-scavenging methods, in view of the ease with which a high level of metal quality can be consistently obtained when the process is correctly applied.

Control of Pouring Temperatures

In Britain, the control of pouring temperature is, on the whole, still a haphazard operation, and greater attention must be given to this matter if the standard of casting quality is to be improved. Considerable study has been given to this subject by brass-founders in the United States, where even the smallest jobbing founder has installed efficient methods for the routine control of pouring temperature, as an integral part of production operations.

The successful results obtained in America depend largely upon the fact that melting operations are invariably conducted in a separate melting shop, and that the layout is so arranged that all supplies of molten metal coming to the foundry must pass through a central skimming station, where temperatures are taken and recorded. One or more operators (depending on the size of the foundry) are solely engaged in this work and in directing the metal to different sections of the foundry, according to the type and class of casting being produced. For measurement of molten-metal temperatures, the use of the protected-sheath type of thermocouple seems to be preferred, used in conjunction with a recording instrument which embodies a large dial at least 12-in. dia.

This placing of a reliable and easily-read pyrometer in a central position, *through which all molten metal must pass under the direct supervision of a foreman*, is typical of American thoroughness, inasmuch as having once decided that a certain measure of technical control is desirable, all essential steps are taken to ensure that such control is regularly and systematically applied, as part of normal production procedure.

The adoption of similar methods over here is long overdue, and at the same time consideration might be given to the possibility of combining degassing methods with the measurement of molten-metal temperatures. For example, certain problems of temperature control, such as the need for quick-

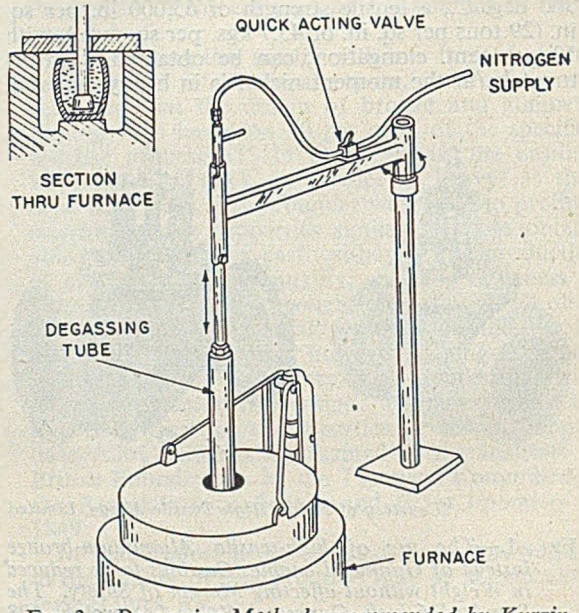


FIG. 3.—*De-gassing Method recommended by Kurzinski for introducing Nitrogen into a Crucible Furnace during Melting.*

reading thermocouples, might well disappear if suitable temperature-measuring equipment were designed to form an integral part of gas-scavenging assemblies such as those illustrated in Figs. 2 and 3.

Moulding and Core Sands

Every foundryman in the United States attaches great importance to the quality of moulding and core sands, and routine control tests are universally employed to ensure that the properties of sand are suitable for the castings being produced. Sand control is enormously simplified, due to the fact that sand suppliers sell their products with a guarantee that they conform to certain agreed properties, such as fineness, green-bond strength, permeability, moisture content, etc. Furthermore, because of the careful control exercised by the sand supplier, the properties of new sand are reasonably constant over long periods of time, and the foundryman can rely upon obtaining consistent results if the necessary attention is given to three points:—(1) Accurate make-up of sand mixtures; (2) use of simple sand-preparation plant, to ensure that mixing is carried out in a uniform and standard manner, and (3) control of moisture content.

In this way, the control of moulding sand is simplified, and it is often possible to maintain consistent quality merely by means of routine moisture tests, with much-less-frequent checks on permeability and green-bond strength. The supply of more uniform sands, with guaranteed properties, to British and European brass foundries, would simplify routine methods of sand control and assist both productivity and the production of quality castings.

American brass foundries avoid the use of mould and core paints wherever possible. Apart from the extra time needed to apply such paints, which incidentally reduces production, it is considered that they reduce permeability. Where mould and cores need some protection from molten metal, at such points as core joints, heavy metal sections, or where impingement of molten metal is liable to occur, only the actual area concerned is treated. In the case of oil-sand cores, blended silica sands of suitable grain size (60 to 70 A.F.S. Fineness No. for small to medium-size castings) are employed, in order to ensure a satisfactory degree of surface finish on the casting.

Running, Gating and Feeding Methods

In general, the running and gating methods employed in American brass foundries are similar to those used in Britain, but much greater attention is given to standardisation of the running system, which is invariably mounted on the actual patternplate. Few jobbing foundries in the United States have their own patternshop, and patterns and patternplates are made for them by firms specialising in this type of work. This system has many advantages. For example, as much care is taken with the finish, accuracy and design of the running system as with the pattern-plate itself. As a result, castings are always up to a certain standard of quality which does not vary over periods of time. Furthermore, new developments in running and feeding methods become immediately available to even the smallest foundry.

Separate pouring basins are rarely used on moulds made by machine; the pouring basin is formed by the top-board during the actual machine-moulding operation. In addition to producing pouring basins of standard shape, free from loose sand, this also promotes increased productivity by reducing the number of operations required.

Atmospheric feeding-heads are employed fairly extensively in the production of castings in alloys of high liquid shrinkage, such as aluminium-bronze and high-tensile brass. The main advantages resulting from this method of feeding, apart from obtaining a better casting, are higher yield of castings in relation to amount of metal melted, and reduction in time and cost of fettling; also adaptability to machine-moulding methods using pattern-plates.

Gypsum sleeves, as shown in Figs. 4 and 5, are used by some American brass foundries as a means of reducing the size and weight of feeding riser required. In addition to retarding solidification of the molten metal, these sleeves are also designed to provide a necked riser. It has been stated that necked risers may effect as much as 45 per cent. reduction in fettling costs when removing 3-in. dia. risers, and up to 80 per cent. with 9-in. risers.

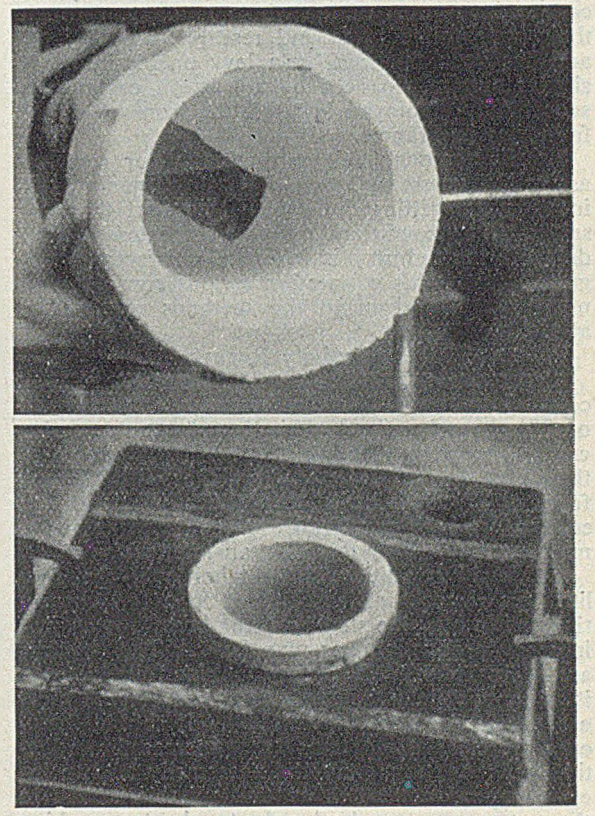


FIG. 4.—*Gypsum Riser Sleeve designed to produce a Necked Riser.*

FIG. 5.—*Gypsum Riser Sleeve in a Green-sand Mould.*

Furthermore, the use of gypsum sleeves enables the risers to be made 30 per cent. smaller, without sacrifice of feeding power, and in many instances feeding may be actually improved.

Research and Application of Existing Knowledge

In order to take full advantage of the factors mentioned in connection with the technical control of casting quality and the benefits that are bound to result to the industry, both as regards increased productivity and the economic utilisation of raw materials, every brassfounder must be prepared to take a more active part in the practical application of existing knowledge and in any further research work which may be required.

In the British steelfounding industry, the results of research have been effectively applied and this no doubt has been facilitated by the fact that foundries in this field are relatively few in number and that they possess the enthusiasm, technical staff and other facilities essential for such work. The iron-founding industry, which closely resembles the brassfoundry industry in its structure, inasmuch as it is composed of a large number of small foundries, has also made excellent progress during recent years in connection with the practical application of research. This has been brought about by the co-operative effort of the whole industry, through their appropriate trade and research associations, and has been financed by a levy on pig-iron. A similar system, financed by a levy on castings, is successfully employed by both the iron and brass foundries in France.

At the moment, neither the trade nor research associations connected with the British brassfoundry industry are getting the financial support they deserve. Such conditions must be corrected without delay if the industry is to make satisfactory progress, and in this connection serious consideration might well be given to the methods referred to above.

Productivity Report

Every aspect of this important subject is fully covered in the British Productivity Team Report on The Brassfoundry.[5] This Report should receive careful study by every founder. In the course of their visit to the United States, the British Brassfoundry Productivity Team produced a sound film entitled "The Brass Trail,"* which illustrates the main points of their report in an interesting way.

To avoid repetition, the Author will therefore limit his remarks on this subject to a few suggestions as to how the small jobbing brassfoundry can increase production per man/hour. The remarks are addressed primarily to the jobbing founder since it is in this field that improvements can be most easily and economically effected. It should, however, be clearly understood that increased production per man/hour may not necessarily lead to increased productivity, as without suitable incentives the net result may lead only to shorter working hours.

[* This film was shown at the International Congress and has several times been exhibited in this country.—EDITOR.]

Foundry Layout.—Every foundry should be carefully planned for the work it has to do, and maintained in a clean, well-lighted, properly-ventilated and orderly condition. A carefully-planned lay-out, providing good working conditions, is an obvious aid to increased and more efficient production. Consideraton should be given to the possibility of dividing the foundry into two parts, one section being devoted to the manufacture of castings by machine-moulding methods, the other being used for bench and floor work. Melting operations should be conducted in a separate melting shop.

Mechanical Aids.—Careful thought must be given to directing and assisting the workers' efforts into the most effective channels and ensuring that energy is not uselessly dissipated in carrying out subsidiary duties. A moulder should do nothing but make, core, and close moulds. Moulding sand of suitable quality should be supplied to him, and he should not be responsible for having to mix his own sand. Cores should fit the mould properly and not have to be rubbed or trimmed by the moulder. Conveniently-placed roller conveyors, of the correct height, should be available to carry moulds away when they are completed. Operations such as weighting, pouring of moulds, knocking-out, return of moulding-boxes and bottom-boards, etc., should all be carried out by less-highly-skilled labour. Every man must have a certain job to do, and, wherever possible, maximum use should be made of such mechanised aids as will assist each man to do his particular job with the minimum of non-productive effort. Mechanisation should be employed, as in the United States, to assist productive effort, *not* to save labour.

Mechanical aids for the small jobbing brass foundry should preferably follow the American pattern and be of a simple and inexpensive type which do not require much maintenance. Furthermore, such equipment as roller conveyors and moulding machines should be portable, so that any modifications to foundry lay-out can be easily and rapidly effected. Many small British and European jobbing founders are of the opinion that the cost of mechanical aids is beyond their means. Complete mechanisation may certainly entail a substantial capital outlay, but the installation of suitable mechanical aids to assist production is within the means of even the smallest founder. One of the most efficient foundries visited in America by the British Brassfoundry Productivity Team, so far as maximum productivity is concerned, is illustrated in Fig. 6.

This foundry specialises in the manufacture of gunmetal valves and fittings (up to ¾-in. bore) in green-sand, and with a total labour force of 40 workers, comprising 11 moulding-machine operators, 2 core-makers, 11 fettlers and inspectors, 4 furnacemen, 6 casters, and 6 general labourers, produces 3½ to 4 tons of finished castings per day, with an average weight of 4 oz. each, approximating an output of 170,000 castings per week. Still more interesting is the fact that this output is obtained from a lay-out incorporating simple mechanical aids, installed in 1948 at a cost of only 25,000 dollars. This includes cost of roller conveyors

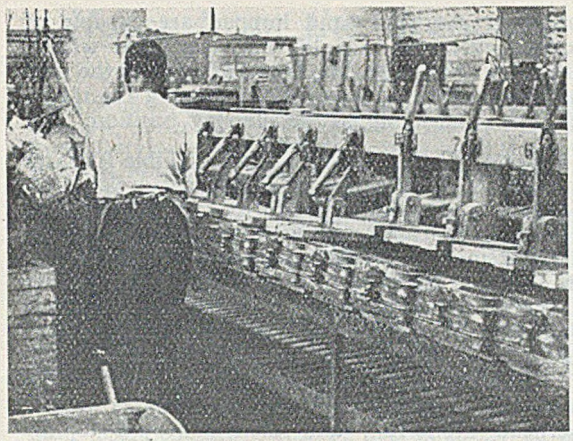
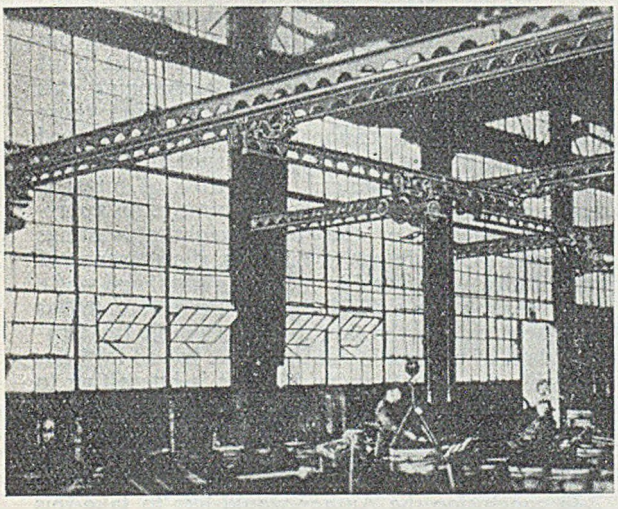


FIG. 6.—*Mechanical Aids employed in an American Brass Foundry, to obtain a High Level of Production. Note use of Inclined Roller-Conveyor, to facilitate Pouring, and simple Mechanical Weighting System. The Box-like Structure in the bottom left Corner is a simple Knock-out and Sand Plant, whilst the Gravity Roller Conveyor, below the Main Conveyor, is for returning Empty Boxes and Bottom Boards to Moulding Machine situated at the end of the Conveyor underneath the Windows.*

fitted with mechanical weighting device, overhead mechanical-handling system, sand-plants, etc., but excludes moulding machines and crucible furnaces, which were in existence prior to the re-organisation.

Overhead Mechanical-handling Systems.—Inexpensive and well-designed overhead mono-rail systems, coupled up to overhead cranes or transfer bridges, as illustrated in Fig. 7, are used extensively in American brass foundries.

These overhead mechanical-handling systems are installed in even the smallest jobbing foundry, with the result that metal-carrying by hand is no longer used. With this method, crucibles of molten metal can be lifted out of pit-type melting furnaces and transported direct to the casting area without manual effort. The longitudinal movement of the crane beam, and the cross traverse of the carrier unit, need not necessarily be power-operated, as the design of the system is such that all movements can be very easily effected and controlled by the operator, even whilst pouring.



[Courtesy of Cleveland Tramrail Division, Cleveland Crane & Engineering Company

FIG. 7.—*Overhead Mechanical-handling System used in American Brass Foundries.*

Roller Conveyors.—Full use of roller conveyors should form an integral part of a properly-planned production scheme; the equipment should not consist of an odd length here and there, put down in any haphazard manner, to carry a few moulds. The greater and more intelligent use of roller conveyors in British and European brass foundries would materially increase production. Furthermore, they enable a higher standard of housekeeping to be maintained and are relatively inexpensive to install. Very few foundries in America put moulds on the floor, and even the bench- and tub-moulders are supplied with roller conveyors, or racks, to facilitate production operations.

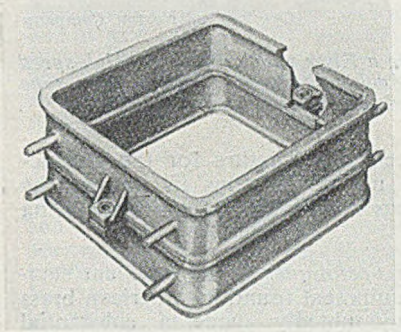
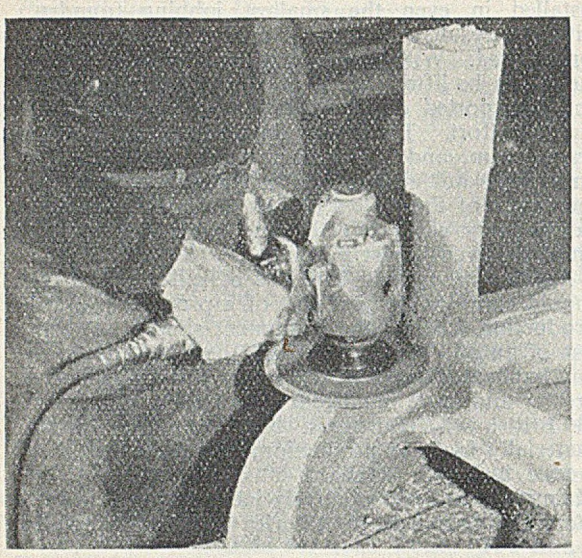


FIG. 8.—*Moulding Box with Round and Elongated Holes in the Pin Bushes.*

Moulding Boxes and Weighting Devices.—Standardisation is a key-word in the United States, and it is not surprising that it has had a great effect on American foundry practice. For example, in foundries using moulding boxes (many plants preferred snap-flasks) these were of standard type, to enable them to be readily employed with mechanical weighting devices similar to those shown in Fig. 6. Furthermore, all boxes were fitted with bushed holes, one being round, the other elongated, as shown in Fig. 8. The elongated hole takes up any distortion of the moulding-box and facilitates a rapid and even draw. This practice, although not unknown in Great Britain and other European countries, is not used so extensively as in America. Minor improvements such as this often play a major part in obtaining increased production.

Sand-handling and Re-conditioning Equipment.—Every brass foundry should use green-sand as far as possible, and employ mechanical methods for handling and re-conditioning moulding sand. In the case of small jobbing foundries only simple and inexpensive equipment is needed to effect a considerable improvement in both the output and quality of castings. American brass foundries use



[Courtesy of Norton Company

FIG. 9.—*Notching a Riser with a Portable High-speed Cutting-off Machine fitted with a new-type Reinforced and flexible Abrasive Wheel.*

one standard green-sand mixture for the production of castings up to 2.7 tons in weight, the moulds for castings above 300 lb. invariably being skin-dried.

Pattern-making Techniques.—The excellent standard of pattern equipment found in American brass foundries has undoubtedly made a substantial contribution to their high level of productivity. Properly-designed and accurate patterns and core-boxes provide the basis for good production methods, and brassfounders in other parts of the world can learn a great deal about this subject from their counterparts in the United States. Pattern- and match-plates are used wherever possible, and these always incorporate a suitable running, gating and feeding system.

The method used in America for making aluminium-alloy match-plates and core-boxes in plaster moulds is of outstanding interest, as it has greatly reduced the cost of pattern equipment and enabled foundries to adopt machine-moulding methods even on relatively small orders. A full description of this process is given in the British Productivity Team Report[5] on the Brassfoundry.

Core-shop.—Oil-sand should be employed as far as possible for the production of cores, using a sand mixture of controlled grain size, to ensure good casting finish. The use of core grids, wires, artificial vents and core paints should be avoided. Metal core-boxes of high quality, in conjunction with good core-shop inspection methods, ensure that the moulder is always supplied with accurately-fitting cores for the moulds. The cartridge type of core-blowing machine is not expensive and is particularly useful for the rapid production of small cores. Latest models incorporate an overhead sand hopper, are capable of blowing cores up to 5 lb., and are fitted with a stationary sand magazine, which eliminates the time and effort formerly required for moving the magazine from the filling to the blowing position.

Melting Methods.—The lift-out crucible furnaces favoured in America are of a different design from the older type of coke-fired furnaces so widely used in many European brass foundries. The tops of the furnaces, instead of being flush with the floor, project about 2 ft. above it. Raising the furnace to this height assists charging, provides better working conditions for the furnace operator, and prolongs crucible life. Invariably, crucibles of molten metal are withdrawn from these furnaces by means of an electrically-operated pulley-block, running on an overhead mono-rail, and then conveyed to the moulding section by a light manually-operated overhead mechanical-handling system, as previously described.

Dressing Shop.—Due to the development of a new type of reinforced and flexible abrasive wheel by American grinding-wheel manufacturers, considerable progress has been made in the design and application of high-speed, abrasive-wheel cutting-off machines. As a result, when cutting-off gates and risers, it is no longer necessary for castings to be rigidly held to prevent breakage of the abrasive wheel, as this new reinforced wheel is capable of appreciable deflection whilst running at high speed. Small, hand abrasive cutting-off machines, similar to that illustrated in Fig. 9, are in use in many American foundries for cutting-off gates and risers, removing excess weld metal and smoothing down surfaces on large castings. Availability in Great Britain and Europe of cutting-off wheels of this type would materially assist increased production.

Reclamation of Metal.—Very few brassfounders, even in the United States, give serious thought to the subject of the reclamation of waste metal, but in view of the present supply position this must receive greater consideration. In mentioning this matter the Author has particularly in mind those metal losses which cannot be accounted for and are entered in cost systems under such headings as "metal loss," "shrinkage," etc. Loss of metal is due to several causes, and may amount to an appreciable percentage of the total weight of castings produced. One source of this loss, the presence of small particles of metal in moulding sand, and waste sand from the dressing shop, has been accepted as inevitable, due to the fact that no suitable reclamation plant of economic size and price has so far been available for brassfoundry use. It is interesting to note that, as a result of development work by a British brassfounder, a small compact reclamation plant, of reasonable price, has been successfully developed for this purpose.

In conclusion the Author would like to take this opportunity of acknowledging his indebtedness to the Mond Nickel Company, Limited, for permission to prepare this Paper.

(*References printed on facing page, at the foot of column* 2.)

Notes from the Branches

Wales and Monmouth

On Saturday, November 3, Mr. J. Currie of Cathcart, Glasgow, presented a Paper entitled "Intricate Castings from Durable Loam Moulds" to a meeting of the Wales & Monmouth branch of the Institute of British Foundrymen. The Paper had been previously presented to Lancashire branch and published in the FOUNDRY TRADE JOURNAL April 12 and 19, 1951. Illustrating his address with a series of lantern slides, Mr. Currie was closely followed by an attentive audience, and later he dealt very ably with numerous questions.

MR. MCKINLAY enquired why seven risers were used for one job? Would not a single head of metal have been more effective; this could have been machined off?

MR. CURRIE explained that the machining-off of head metal entailed a cost of approximately 60 hrs., whereas the seven risers could be removed easily and served the same purpose.

MR. H. COLE asked about the use of chills to avoid the porosity that one frequently encountered when machining thick sections.

MR. CURRIE replied that spiral denseners were preferred to chills and were certainly effective in preventing porosity.

Proposing a vote of thanks to Mr. Currie for an excellent contribution, MR. GORDON JONES praised the layout of the Paper which gave every detail of manufacture in its correct sequence, supported by excellent illustrations. He had also noted the clean floor for a jobbing foundry, which indicated good house-keeping. He was quite sure that everyone present had enjoyed an interesting evening and that all would support him in thanking Mr. Currie for his visit to Cardiff.

MR. MCKINLAY, seconding, said he had looked forward to Mr. Currie's visit and he was pleased to say he had not been disappointed.

Replying, MR CURRIE thanked Mr. Jones and Mr. McKinlay for their kind remarks. It was his first visit to South Wales and he hoped it would not be the last. If his effort had been of interest and assistance to members present, then it had been worthwhile.

Newcastle-upon-Tyne

The Newcastle-upon-Tyne branch of the Institute of British Foundrymen held a well-attended informal dinner on November 2, 1951, in the Crown Hotel, Newcastle-upon-Tyne. The guests of the branch were the president of the Institute, Mr. Colin Gresty and Mrs. Gresty. After the Loyal Toast Mr. Lashly M.C., branch president, expressed pleasure at having the company of the president of the Institute and his lady, especially as Mr. Gresty was a member of the Newcastle branch. All members were aware of the devoted service he had given to the branch and to the Institute and how, on many occasions, his restraining influence had been a guiding factor in the affairs of the branch.

In reply, Mr. Gresty said how delighted both Mrs. Gresty and he were to be present, as guests, as it were, in his own home. This was a function to which they had looked forward. He felt he owed the branch a great deal for giving his year of office such a splendid start as the successful conference held in June last, and he wished to express his sincere thanks to Mr. Lashly, chairman of the conference committee, and to Mrs. Lashly, chairman of the ladies' committee for their invaluable help. Mr. Gresty then asked Mrs. Gresty to present Mrs. Lashly with a travelling clock as a small memento of their appreciation.

West Wales Section

A very interesting works visit was held on Saturday afternoon, October 20, by the West Wales section of the Wales and Monmouth branch of the Institute of British Foundrymen to the new mechanised ingot-mould foundry of Richard Thomas & Baldwins Limited, Landore, Swansea.

Among the visitors was Mr. Harold Davies, branch president, who together with a party of 30 members from Cardiff and Newport, came along to support this first meeting of the session.

After the visit, a company of just over eighty members and friends were entertained to a very enjoyable tea, provided by the hosts in their canteen. The company afterwards retired to an adjoining room where Mr. J. R. Jones presented a Paper on "Ingot moulds from the Sandslinger." Mr. Gwilym Rees, works manager of Richard Thomas & Baldwins, Limited, taking the Chair in place of Mr. J. R. Jones, section president, who was giving the Paper, addressed the meeting before the discussion began, and told of the long period spent on making ingot moulds at Landore, and of the vast experimental work done there in recent years on making ingot moulds from the Sandslinger. He maintained the success of their production figures was largely due to the utilisation of this method and he paid tribute to the workmen for their co-operation in this respect. After a brief history of the works, Mr. Rees opened the meeting for discussion on Mr. Jones' Paper on which it is hoped to print a further report.

Lancashire

On November 27 a lecture on "Castings for Smiths and Forging Industry" was given by Mr. W. S. Spenseley, (M.I.B.F.) foundry manager of Joseph Berry Limited, Swinton, to the Lancashire branch of the Institute of British Foundrymen. Mr. J. A. Reynolds of British Insulated Callender's Cables Limited, Prescot, presided.

The lecturer showed interesting slides of the processes and plant for the manufacture of power-driven drop-hammers for heavy forgings, and included the ultra-modern method of fettling castings by high-pressure "Hydroblast." A lively discussion ensued showing the keen interest which local industrialists and supervisors are taking in foundry technology. Further lectures are to be given later in the session, and it is hoped to form a local (Merseyside) section of the Lancashire branch of the Institute in the near future. The enthusiastic reception accorded this lecture is a good augury of the probable success of the venture.

Productivity in the Brass Foundry

(*Continued from facing page.*)

REFERENCES.

[1] A communication from the Technical Committee of the Association of Bronze and Brass Founders, "Mechanical Properties of Some Copper-base Alloy Castings," *Proc. Inst. of Brit. Foundrymen*, 1949, XLII, pp. A.134-A.157.

[2] J. S. Vanick, "Nickel/Tin Bronzes," *Foundry*, 1951, Vol. 79, Feb., pp. 102-7.

[3] E. F. Kurzinski, "Degas Molten Metals with Inert Gas," *American Foundryman*, April, 1951, Vol. 19, No. 4, pp. 78-81.

[4] F. M. Baker, C. Upthegrove and F. B. Rote, "Melt Quality and Fracture Characteristics of 85/5/5/5 Red Brass," *Trans. Amer. Foundrymen's Soc.*, 1950, Vol. 58, pp. 122-132.

[5] Productivity Team Report on the Brassfoundry. Obtainable from Association of Bronze and Brass Founders, Secretaries: Heathcote and Coleman, 25, Bennetts Hill, Birmingham, 2, or the National Brass Foundry Association, 30, Waterloo Street, Birmingham, 2. Price 7s. 6d

Iron and Steel Industry in Scotland

Changes During Half a Century

Prof. R. Hay, of the Royal Technical College, Glasgow, during his presidental address, considered it profitable to compare the background against which the West of Scotland Iron and Steel Institute operated some half-century ago with the present time, in order to see if any useful lessons could be learned for the future development of its work. He recalled that the approach to metallurgy in those days was largely through analytical chemistry, and much of the student's time was devoted to chemical analysis of raw materials and finished products. The extraction of metals from their ores and the working and heat-treatment of the finished product were largely arts handed down from early times and instruction was of a descriptive character. As would be expected, the Papers presented to the Institute reflected the background of education and practice. Thus, in the session 1895-96 the chemistry of the open-hearth process was described from the angle of taking bath samples at different times from melt-out to tap, but no attention was given to the composition of the slag and its influence upon the process. The puddling process he recalled was almost extinct and now received little attention from metallurgists.

Of the many blast-furnace plants which were in existence in 1895, only four now remained in operation, namely, Clyde, Govan, Gartsherrie and Carron, with a combined total of nine furnaces in blast, all operating on coke so that the unique practice of Scotland was now defunct due to lack of splint coal. Three plants still use the small hand-charged furnaces which were used in the old Scottish practice, but the old Clyde furnaces had been completely replaced by modern mechanically charged furnaces. Clyde Iron Works was again making history by being the first plant in Britain to instal high-top-pressure practice. Other marked changes in Scotland had been the cessation of Bessemer practice and the extension of basic steel manufacture and decrease of acid steel manufacture by the open-hearth process.

Training and Research

Sexton, in his presidential address in 1895, continued the speaker, laid great emphasis on the development of a good metallurgical school in Scotland and asked for the support of the local industrialists to this end. Today, in his opinion, they did possess a good metallurgical school in Scotland and received strong support from local industrialists. For many years the system of governing the Royal Technical College, Glasgow, had been through special Departmental Committees composed of academic people and leading industrialists. A further development which would prove of the greatest importance in the future of the industry was a new course of study introduced in 1946, with the object of adequately combining theory and practice. In developing this course the speaker said he was very conscious of the fact that only in an industrial plant could a student receive a proper practical training. The scheme was based on a fair distribution of time between College and industry, and this was fixed at six months in College and six months in industry over a period of four years. This was a further illustration of the close relationship between College and industry in Scotland.

Just as there had been great changes in the composition of the industry and in the educational facilities, said the speaker, so there had been great changes in the approach to research. Research on to-day's scale was quite unknown some 50 years ago, and no laboratories existed for this particular purpose. Today not only had the large producing firms got well-equipped research laboratories, but also many of the larger firms who used the products of the industry had equally well-equipped research laboratories.

Registered Trade Unions

It is estimated that the membership of trade unions registered under the Trade Union Acts, 1871-1940, now represents about 90 per cent. of that of the whole of the trade-union movement in Great Britain. This is revealed in the statistical summary of registered trade unions covering the period 1940 to 1950, compiled by the Registry of Friendly Societies and published by H.M. Stationery Office (price 4d.).

The appended details relate to 1950, the 1940 figures being given in parentheses for comparison:—Number of unions, 416 (same); number of members, 7,947,535 (5,362,792); income from members' contributions, £15,721,000 (£9,041,000); income from other sources, £1,903,000 (£877,000); expenditure covering dispute benefit, £244,000 (£55,000), of which the paper and printing trades accounted for £137,000 in 1950; expenditure from political fund, £451,000 (£102,000); working expenses, £8,226,000 (£3,486,000); superannuation, £1,791,000 (£1,307,000); funds at end of year, £62,150,000 (£24,708,000).

There was in 1950 a total of 96 associations of employers (97 in 1940), the number of members being 116,703 (53,727). Income from members totalled £362,000 (£160,000) and from other sources £59,000 (£31,000). Expenditure included a sum of £6,000 from the political fund (less than £500); working expenses were £313,000 (£118,000), while funds at the end of the year were £826,000 (£411,000).

Foundry Building Work Opposed

Willenhall Urban District Council are being recommended to reject a Wolverhampton firm's plans to build an iron foundry at Ashmore Lake, Willenhall.

The Town Planning and Development Committee reported a resolution that the plans submitted by Green & Russell (1940), Limited, are not in accordance with the detailed plan of the area approved by the Council for the protection of houses in the vicinity.

Mr. J. R. Riding, Clerk to the Council, said that the area where the firm wanted to build the foundry is one which the Council wished to keep clear of heavy industries to protect houses in the neighbourhood.

An official of the firm said recently that the application was submitted to the Council over six months ago, and they could not understand the delay. "The plans were for a modern type of factory, designed to alleviate dust and smoke," he said. The firm had obtained a Board of Trade certificate and ordered thousands of pounds worth of equipment.

Insulated Feeder Heads for Steel Castings and Ingots

By H. O. Howson, A.Met., A.I.M.

The successful use of feeder sleeves of superior insulating properties for non-ferrous castings introduces the prospect of a similar application to steel castings. Trials have shown that insulating methods are applicable to steelfoundry practice, resulting in improved feeding action and allowing the use of hot-tops of reduced volume for steel castings and ingots.

LOSS OF STEEL associated with the use of feeder heads and the expense of removal in the fettling process are important factors in the cost of castings and ingots, and continuous efforts have been made to reduce the volume of feeding metal. Until the last few years, the practical method was to apply insulation to the exposed upper surface, or to maintain the temperature by exothermic reactions. Recent independent work in England and America[1,2] has shown that the heat losses from ingot feeder heads are disposed in the following approximate proportions: (*1*) Loss from the upper surface, 20 per cent.; (*2*) from the body of the ingot, 20 per cent.; (*3*) loss to feeder head refractories, 60 per cent., of which only 10 per cent. is radiated or conducted from the outer surface of the refractories.

It follows that the heat loss to the feeder-head walls is of the greatest moment, and that this applies in some degree to the feeders of steel castings. It is interesting to note that considerable reductions in the bulk of feeder heads are reported with the use of insulating feeder heads for non-ferrous castings in American practice. The application of insulating methods to steel castings is more difficult in view of the higher temperatures involved, but preliminary trials have indicated that the construction of such heads is a practicable proposition, and there appears no reason why the method should not be applied on a production basis. The development of suitable refractories and the consideration of the costs involved are more conveniently carried out in ingot practice; and the following notes are indicative of the improvements in feeding efficiency which may be obtained.

Experiments on a 1-ton Ingot

Fig. 1 is an example of a sectioned feeder head of a 1-ton ingot of carbon-chromium steel, the head representing 18.9 per cent. of ingot volume. It follows that this size of hot top is adequate to secure complete central soundness in the steel. Fig. 2 is a feeder head from a similar ingot of the same cast in which a hot top of the same dimensions was lined with vermiculite slabs 1¼ in. thick to form a container representing 8.9 per cent. of ingot volume. Examination showed that the body of the ingot was quite sound, and experiments indicate that insulating feeder heads of even smaller capacity are practicable in the production of mild steels. The vermiculite had melted at the base causing some slight bulging of the feeder head, but this is no detriment nor has steel penetration been severe when the hot top has been thoroughly dried before use.

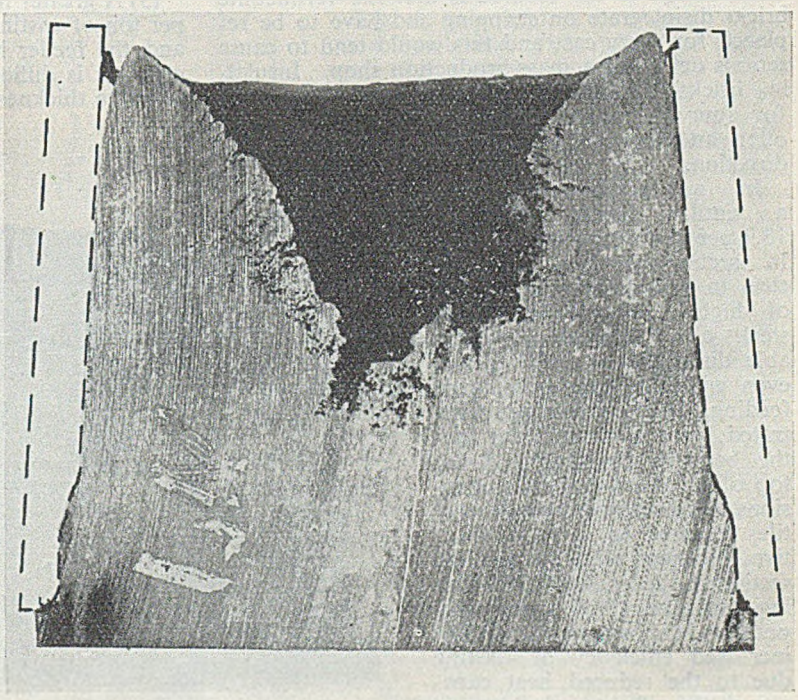


FIG. 1.—*Compo-rammed Feed Head representing 18.9 per cent. Capacity of the Carbon-chromium Steel Ingot. The Dotted Lines indicate the Lining.*

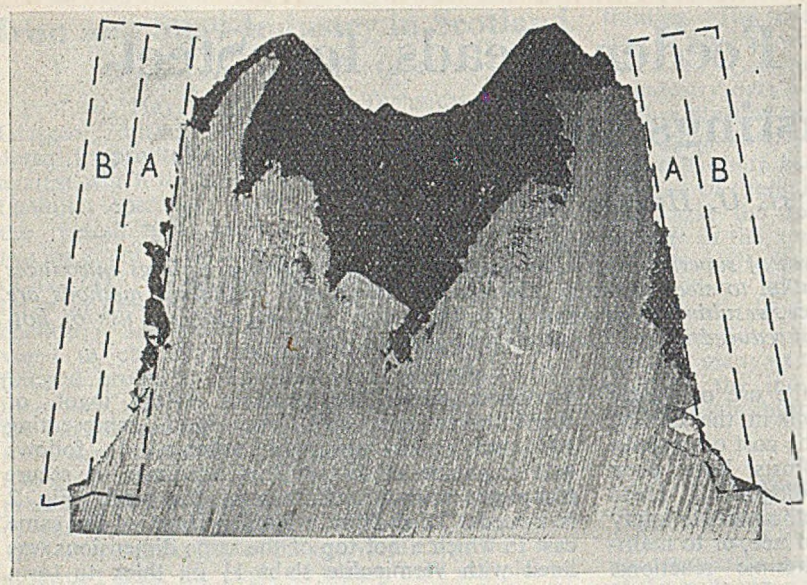


FIG. 2.—*Vermiculite-lined Feeder Head representing 8.9 per cent. of the Capacity of a Carbon-chromium Steel Ingot. A—Vermiculite Slab; B—Solid Tile.*

Assuming a scrap-to-steel conversion cost of £7 10s. per ton it follows that the saving of 9 per cent. of liquid steel represents a cost reduction of 13s. 6d. per ton. The cost of vermiculite slabs and the expense of fitting is approximately 4s., representing a net saving of 9s. 6d. per ton. The disadvantage of the method is that the vermiculite bricks disintegrate on stripping and have to be replaced for every cast and this would tend to cause serious delays in a mass-production shop. Insulating bricks of greater refractoriness have been used for four successive casts and offer an improvement in this direction.

In a further experiment a similar feeder head of 18.9 per cent. capacity is shown in section in Fig. 3. The steel in this instance is a grade of highly alloyed high-speed steel, which presents considerable difficulties in feeding, and even with the large volume of feeding metal, the pipe penetrated for a short distance into the body of the ingot. A hot top of identical internal dimensions was prepared from fireclay tiles recessed to give an effective thickness of $\frac{1}{2}$ in. and the sectioned feeder head from an ingot of similar high-speed composition is shown in Fig. 4. The increased efficiency of feeding due to the reduced heat capacity of the refractory is apparent and the body of the ingot was completely sound. Due to the absence of spalling, recessed feeder-head tiles give an increased length of life in the case of a 1-ton ingot as previously described. The relative applications of the benefits of the improved thermal efficiency and increase in service life will of course depend on the production demands in a particular instance.

Application of Insulating Feeder Heads to Steel Castings

Although the functioning of feeder heads theoretically is similar for ingots and sand castings, the following, in practice, have to be taken into consideration when dealing with steel castings.

(*1*) Feeder heads for sand castings are used once only, so that the question of repeated use will not occur. It follows that the selection of the refractory will depend largely on the volumetric specific heat which is practically equivalent to density, and the cost of the refractory assembly.

(*2*) The cost of cutting off feeder heads is considerable, and to facilitate this job the insulating heads can be of reduced cross section. If possible, the extreme base of the feeder head should not bulge or the area of cut will be increased.

(*3*) A greater number of feeder heads are required per ton of casting as compared with ingot practice, and the feeder heads are generally of small capacity. It is difficult to produce recessed tiles of an effective thickness less than $\frac{3}{8}$ in., and the resulting

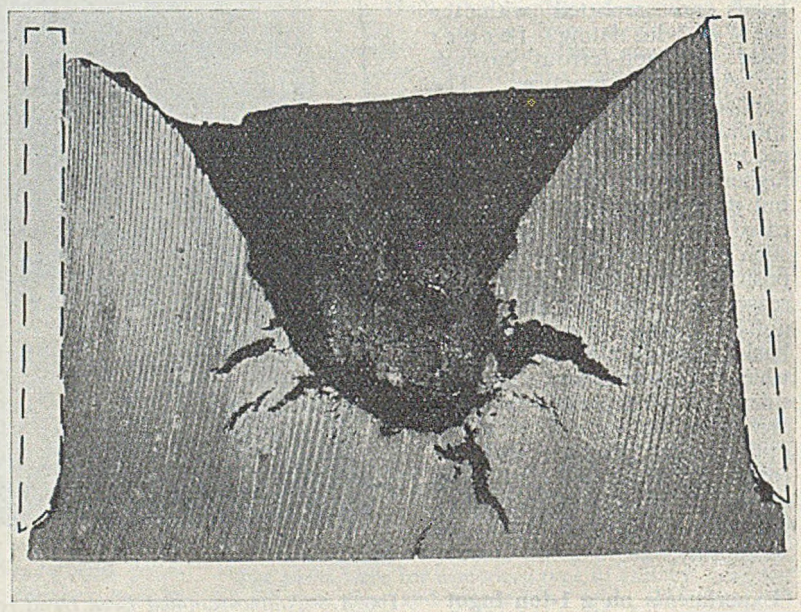


FIG. 3.—*Solid Tiled Feeder Head 18.9 per cent. of the Capacity of a High-speed Steel Ingot.*

heat capacity will be such that an improvement in feeding efficiency is only noticeable in heads greater than 8 in. dia. With smaller feeder heads use of porous materials is essential.

(*4*) It is necessary that the porous materials should be quite free from moisture, and this will occur automatically with dry-sand castings. For green-sand moulding it may be possible to position previously dried insulating feeder heads shortly before casting.

(*5*) Restriction in ingot feeder heads may be readily overcome, but design considerations render this a more important subject in sand castings. The smaller diameter and generally greater collapsibility of insulating feeder head indicates the possibility of improvement in this respect.

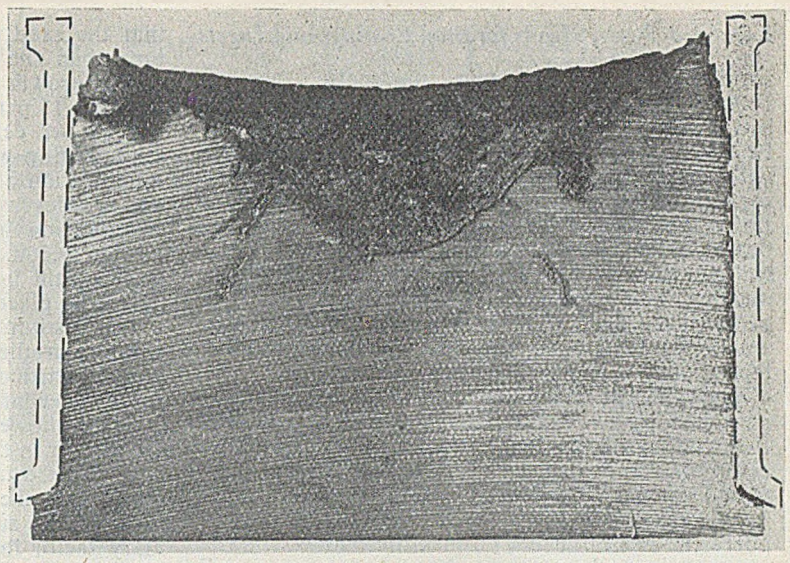


FIG. 4.—*Recessed-tile Feeder Head representing* 18.9 *per cent. High-speed Steel Ingot Capacity*

(*6*) Probably this most important demand for trial purposes is that the insulating method should not require any noteworthy changes to moulding technique or patterns.

Designs of Insulating Feeder Heads

The design of suitable insulating feeder heads can only be determined by experience, under many different production conditions, and is largely a problem for the practical moulder. The following suggested designs are advanced, however, on the basis of experience with ingots, and the considerations discussed in the preceding section. It is assumed that the feeder head is rammed to the standard dimensions in sand, and then the insulated lining inserted afterwards to give a reduced volume.

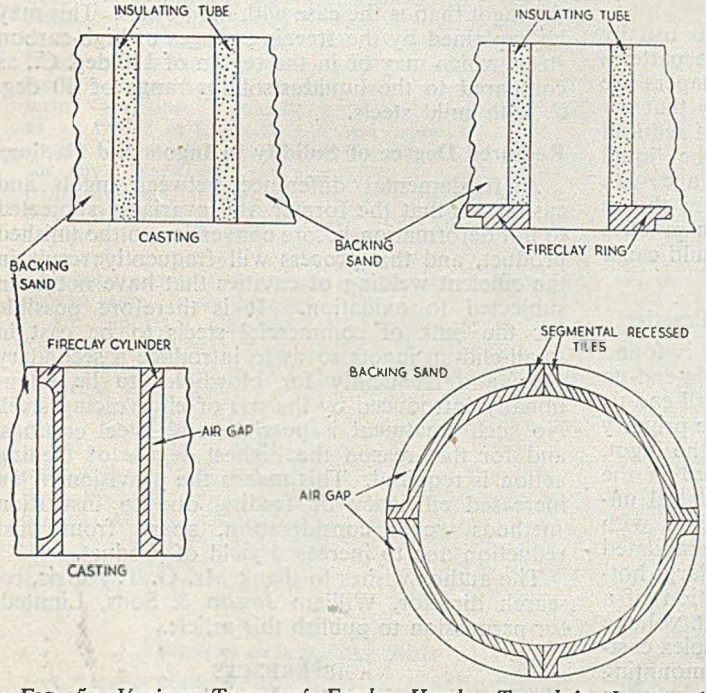


FIG. 5.—*Various Types of Feeder Head. Top left—Insert of Insulating Material; Top Right—Insert of Insulating Material, and Fireclay Ring at the Base; Bottom Left—Thin Fireclay Cylinder and Air Gap; Bottom Right—Cross-section of Large Feeder Head fitted with Four Segmental Recessed Tiles.*

Fig. 5 (*top left*) is a diagram of a plain insulating brick tube and represents the simplest method. To avoid bulging at the base of the feeder head a thin refractory ring is fitted at the base (Fig. 5, *top right*). It is probable that with these two designs the insulating cylinder may be rammed in during the moulding process. In Fig. 5 (*bottom left*), a larger diameter feeder head is rammed by the normal method, and a thin refractory cylinder is inserted before casting. The refractory cylinder is fitted with bosses at top and bottom in order to form the air gap. For feeder heads above approximately 12 in. dia. it would probably be advantageous to construct the lining from a series of curved recessed fireclay tiles (Fig. 5, *bottom right*). Experience on ingots has shown that tiles $\frac{1}{2}$ in. thick are quite effective in containing steel.

The economies of feeder-head applications are a matter for experience, but it is invariably the case that insulating brick or recessed tiles are cheaper than the equivalent volume of solid steel.

Proportioning of Feeder Heads

If it is assumed that the heat loss from the upper surface may be neutralised by

insulating or exothermic materials, then it follows that the dimensioning of feeder heads is a compromise between the two opposing factors of heat loss to the refractory walls and heat exchange with the body of the casting. The heat-absorbing capacity is governed by the specific heat, which is fairly constant for siliceous refractories, and by the density. As heat flow is a surface phenomenon it follows that the minimum surface area will produce optimum conditions for heat retention. The problem has been studied on the geometrical basis, and it has been concluded that the broad, shallow feeder head is most effective in this respect.

The heat loss to the body of the casting is largely governed by convection, but it would appear that the heat exchange will be reduced by a smaller communicating area, so that the tall narrow head would be most effective. The compromise dictated by experience in the steel castings industry is to make the feeder head $1\frac{1}{2}$ times the diameter. The reduced heat flow to insulated refractories will change this ratio, and permit the use of a proportionately taller feeder head. Experience with steel ingots has shown that to replace the existing tiles with insulating refractories, will not permit a substantial decrease in the height to which the metal in the feeder head is teemed, as the heat loss to the body of the ingot is still pronounced. It appears that a certain "head" of metal is necessary to produce effective feeding, and that the smaller feeder-head volume must be produced mainly by a contraction in diameter.

The taper on feeder heads for castings is usually the minimum to facilitate stripping of the pattern, but for ingot hot tops quite appreciable tapers are employed. It may be shown geometrically that for a given volume an increase in taper gives a reduced surface of refractory in contact with the liquid steel. However, the area for heat exchange with the ingot is proportionately increased, and this is again a subject for experimental work. In practice the use of an excessive degree of taper would cause difficulties.

Comparative Ingot and Sand-casting Practice

In the production of mild-steel ingots it is found that 15 per cent. feeder-head volume for big-end-up moulds or 12 per cent. volume for small-end-up moulds is normally sufficient to prevent the primary pipe penetrating into the chill portion of the ingot. A secondary pipe is, of course, developed in the small-end-up type, and some degree of central unsoundness would persist in big-end-up ingots with $\frac{1}{8}$-in. per ft. taper, which can only be eliminated by the use of more taper or an excessively large hot-top volume. By contrast, in the production of a simple shape of casting at least 30 per cent. volume is required to eliminate pipe, and with complex castings numerous feeder heads are required amounting to a still greater percentage. The difference between the two methods deserves consideration, and serves to illuminate some aspects of the feeding problem.

Neglecting heat interchange, and considering the feeder head purely as a reservoir of metal it follows that the sand casting remains liquid for a longer time than the ingot of corresponding bulk. As crystal growth increases with time it follows that a standard 15 per cent. volume feeder head, representing 15 per cent. of casting volume, applied to a sand casting would freeze off at the neck before solidification of the body was complete, and shrinkage cavities would develop. Due to more rapid solidification in the corresponding ingot, the chill portion becomes solid while the centre of the feeder head is still liquid, and feeding of the pipe cavity may take place.

The institution of convection currents and temperature gradients vastly complicates the foregoing picture, particularly as so little is known about the actual mechanism of solidification. It may be deduced, however, that the temperature gradients are steeper in the ingot as compared with sand casting. This treatment is admittedly unscientific, but is useful until the mathematical or experimental treatment of the subject has been extended. The primary factor that emerges is that it is essential for the lower portion or "neck" of the feeder head to remain liquid until solidification of the main casting or ingot is completed. When once a solid bridge has built up at this position, the pressure of liquid metal in the upper portion has no further influence on feeding.

Although it is known that the shrinkage contractions of steels show no great variation within the usual commercial analyses, yet the higher carbon or alloyed steels have a marked tendency to form a deep pipe cavity or bridges in the upper portion of the ingot than is the case with mild steels. This may be explained by the freezing ranges of high-carbon steels which may be in the region of 120 deg. C., as compared to the liquidus-solidus range of 40 deg. C. with mild steels.

Required Degree of Solidity in Ingots and Castings

A fundamental difference between ingots and castings is that the former are invariably subjected to hot deformation before conversion to the finished product, and this process will frequently result in the efficient welding of cavities that have not been subjected to oxidation. It is therefore possible for the bulk of commercial steels to be cast in small-end-up ingots so as to introduce a secondary pipe, and frequently for blowholes to be intentionally introduced by the use of effervescing steel. No such treatment is possible with steel castings, and for this reason the highest degree of feeding action is required. This makes the provision of an increased efficiency of feeding due to insulation methods worth consideration, apart from cost reduction due to increased yield of product.

The author wishes to thank Mr. G. T. Harris, research director, William Jessop & Sons, Limited, for permission to publish this article.

REFERENCES

[1] "Ingot Feeder Heads," by H. O. Howson. *Iron and Coal Trades Review*, April 20, 1951.
[2] J. W. Mueller and G. A. Bole. *Steel*, 1950, Vol. 126, No. 4.
[3] "Insulation Increases Riser Efficiency," by O'Keefe. *The Foundry*, December, 1950.
[4] "A Survey of the Methods of Keeping Ingot Heads Hot," by W. H. Glaisher. 31st B.I.S.R.A. Steelmaking Conference.

Restoration of Pre-war Trade Practices

By F. J. Tebbutt

The Restoration of Pre-war Trade Practices Act, 1942, is a peculiar measure, as its chief provision has never been brought into force, its operation having been postponed by subsequent Acts and then by Orders in Council, the last such Order postponing its operation until December 10, 1951. Meantime there is a new Act, the 1950 Act of same title which alters the method to be employed when this particular provision is to be brought into force.

The 1942 Act requires employers (under penalties) to restore any trade practice which was in operation before the war (that is before September 3, 1939, or April 30, 1939, if the firm was then on "munitions"—a wide term), which has been departed from since within two months after a date to be appointed by the Ministry of Labour as representing the end of the war period for this purpose. Since 1945, such a date has been laid down several times by different enactments, as mentioned, only for each subsequent Order to put off its operation to a later date.

1950 Act

By this 1950 Act, the position now is that instead of a date being announced as constituting the end of the "war period" with the two months period of grace reckoned from that date, the postponement of the provision will continue indefinitely until an Order in Council is issued announcing a date from which the two months will commence to run and so bringing the obligation upon employers into force. A point to note also is that any such old practice must then continue for eighteen months from the date when the practice is restored or the date appointed by the Order which ever is the later. The position really is that any war-time practice (but note a later definition of the term "war-time") can be continued until such time as an Order in Council is issued under the 1950 Act stating differently. If, however, it is thought advisable for any "war-time" practice to be retained (different from pre-war), as may well be the case, the Acts give power to modify or waive the obligation as regards any practice, so long as agreements are made between an employer (or an employer's association) and the relevant trade union—a union whose custom it was pre-war to maintain the practice.

An important alteration from the original Act is made by the new Act, so that the pre-war trade practices which are to apply for the Acts, are not any departed from throughout the war *or departed from since hostilities ceased*, but only those departed from during the period September 3, 1939 (again, April 30, 1939, if then on munitions), to August 15, 1945. A point to note in connection with this explanation is that although the term "war-period" was used in the original Act and is used in this article for easy explanation, this term has now been taken out of the Acts, the operative period being now definitely stated as being September 3, 1939 (or April 30, 1939), to August 15, 1945.

What is a Trade Practice?

A "trade practice" for this Act is defined as any rule, practice, or custom observed in the undertaking with respect to the class or classes of persons to be or not to be employed therein or with respect to the conditions of employment, hours of work, or working conditions, etc. That is, the term covers such things as daily hours; working week, as for example whether five or six days; overtime matters; employment of boys, girls or women for certain jobs as substitutes for men; dilution matters generally; definition of operations, as, for example, whether they are classified as skilled or semi-skilled and so forth; proportion of young persons to adults; ages and experience in certain processes; apprenticeship matters and the like.

Pertinent Points

The new Act was practically an agreed Act of all parties (the 1942 Act was passed by the Coalition Government), and the new provisions were the outcome of recommendations of the National Joint Advisory Council, established before the war, which consists of 17 employers' representatives and seventeen trade union representatives, the first named being representatives of the British Employers' Confederation, and there are also representatives of the nationalised industries introduced in post-war times. The Order in Council which would bring the obligations of the Act into operation must be brought before both Houses of Parliament, and be affirmed by each before becoming law; until that happens, the postponement of restoration continues indefinitely. The Advisory Council will be consulted as regards the Order in Council, before being sent to Parliament. To sum up, the Act is confined to departures from trade practices which took place before August 15, 1945, the firms to which it applies are the pre-war firms and firms who started to operate during the war, but it does not apply to firms started after August 15, 1945.

Metal-finishing Report

Under the direction of the Anglo-American Council on Productivity, a specialist team representing the British metal-finishing industry visited the United States some 18 months ago under the leadership of Mr. J. N. T. Adcock, of Imperial Chemical Industries, Limited, and has recently issued its report. The investigation covered paint finishing and electroplating, including certain related processes, such as anodising, bright dipping and metal colouring. Twenty-one factories were visited and the itinerary was designed to cover a representative selection of metal-finishing plants ranging from the small jobbing shop to the largest mass-production units in the motor-car industry. Sections of the report deal with metal pre-treatment; mechanical polishing; application methods; plant and equipment; specifications and testing; design in relation to finishing; research; safety; and management/labour relations.

The Americans deliberately adopt a more utilitarian approach in this matter. Thus, in the automobile industry they employ a so-called "kerb-side" finish for painted and plated components in which a satisfactory appearance from the normal viewing range (*e.g.*, 6 to 12 ft. for an automobile) is accepted as the criterion. The high standards of finish called for in many British factories based on close visual inspection impose a considerable handicap on productivity and the team recommends that subject to maintaining the durability of the finish, the adoption of the American standard should be given serious consideration.

Copies of the report are obtainable from the Anglo-American Council on Productivity, 21, Tothill Street, London, S.W.1, price 3s. 6d. (by post).

Distribution of Pig-iron and Steel

CONTROL of the distribution of pig-iron and alloy and non-alloy (carbon) steel—as announced by the Minister of Supply—begins on February 4 of next year. The main clauses of the two schedules are as follow:

Pig-iron

As from February 4, 1952, no person shall acquire or dispose of pig-iron without authorisation from the Minister of Supply except from or to a person in accordance with a licence granted on behalf of the Minister. Likewise, no person shall in the United Kingdom treat, use or consume any pig-iron, except under similar authority.

Notwithstanding anything contained in the first part of the Order it shall be permissible to prove either:—that at the time at which the acquisition or disposal or agreement was made, the pig-iron was outside the United Kingdom, on board the ship, or that the pig-iron was neither delivered nor intended to be delivered otherwise than for export. That is to say, delivered either (*a*) outside the United Kingdom, or (*b*) on board ship or aircraft for export.

The holders of licences are subject to the usual conditions as to any conditions contained or incorporated with regard to validity.

Then follow in the Order (Pig-iron Distribution Order —S.I. 2005, price 3d. from His Majesty's Stationery Office) various clauses dealing with interpretation and revocations. Under the heading pig-iron is included alloy pig-iron and no exceptions for small quantities are mentioned.

Steel

Also from February 4. 1952, specified types of steel may not be acquired or used without authorisation. The authorisation will permit the consumer to acquire steel direct or to allow his sub-contractors to purchase steel. Any consumer (except a sub-contractor) requiring steel in the controlled forms who has not already stated his requirements to the appropriate Government department or to a regional office of the Ministry of Supply, should apply at once to the department which he normally approaches on matters of production. Consumers whose requirements are not more than 25 tons a quarter—including not more than 10 tons of sheets—should apply to their Ministry of Supply, Regional Controller. In cases of doubt, application should be made to the Ministry of Supply, Iron and Steel Division, Shell Mex House, Strand, London, W.C.2.

The new Order covers alloy as well as non-alloy steel, but consumers will receive separate authorisations for each type. Iron and steel stockholders will again need licences to acquire controlled types of steel for re-sale.

The Ministry of Supply emphasises that it will—subject to the small-quantity exemption provisions—be illegal (*a*) for any firm or person to acquire or use controlled forms of steel unless an appropriate authorisation is held; (*b*) to dispose of such steel except to holders of authorisations. Orders already placed for delivery on or after February 4 will, therefore, require an authorisation.

Copies of the Order—the Iron and Steel Distribution Order, 1951 (S.I. No. 2006)—may be obtained from the Stationery Office (price 6d.).

Steel Products Affected

Control will apply to alloy iron, alloy steel, and non-alloy steel in any condition, *i.e.*, new, secondhand, prime, or defective. Small-quantities exemptions are:—Heavy plates, sections, joists, and bars, 1 ton; medium plates, 10 cwt.; small sections, channels, joists, rounds, squares, hexagons and flats, 1 ton; sheets, 10 cwt.; tinplate, terneplate, blackplate, and silver-finished plate, 10 double boxes or 1 ton; hoop and strip, 10 cwt.; tubes and pipes, 15 cwt.; drop forgings, 1 ton; forgings, 1 ton; wire, wire rope, and wire strand, 5 cwt.; alloy iron and alloy steel of any description, 2 cwt. For these small quantities, a prescribed certificate must be given upon acquisition to the effect that the amount laid down in the above list has not been exceeded in the month of the year in which the material is to be delivered and that no other authorisation to acquire steel is currently in force.

(*Concluded at the foot of column* 2)

Steel Price Order Contravened

Breezecraft, Limited, building contractors and industrial estate developers, of Staines (Middx), were fined £500, with 10 guineas costs, at Dartford (Kent), recently for selling 86 tons of steel at £47 a ton when the maximum permitted price was £29 2s. 6d. Thomas Everett Parker, constructional engineer, of Fulham, was also fined £500, with 10 guineas costs, for selling the steel to Breezecraft, Limited, at £42 a ton.

Mr. C. H. Lewis, prosecuting, said that George Wimpey & Company were building an oil refinery on the Isle of Grain, Kent, and could not obtain sufficient steel. Mr. Hawthorn, a director of Breezecraft, offered the company a quantity of steel at £47 a ton. They agreed to buy it for £4,500.

The matter came to the notice of the Ministry of Supply. Its representatives saw Mr. Hawthorn, who admitted the transaction and claimed that he had not previously known of the existence of the Order which imposed a control on the price of steel.

London Cases

There was no intentional breach of the law, although they were guilty of a culpable offence, said Mr. A. W. Cockburn, K.C., the Deputy Chairman, at London Sessions recently, when three men and a firm of steel stockholders, charged with the disposal of steel sheets, were fined.

The accused were Elvet Victor Lloyd, of Neath Abbey (Glam), a director and works manager of Lloyds Metal, Limited, of Skewen (Glam), the company concerned; Eric Vernon Matthews, of Jersey Marine (Glam); and Frederick Walter Burnet-Craigie, of Bayswater, London, W.2. They were found guilty of conspiring together and with persons unknown between September 1, 1949, and June 30, 1950, to contravene the Control of Iron and Steel (No. 62) Order, 1948, by acquiring and disposing of steel sheets otherwise than in accordance with the provisions of the Order. Lloyds Metals, Limited, were fined £50, Elvet Lloyd £50 or two months' imprisonment, Matthews £25 or one month, and Burnet-Craigie £200 or three months.

Burnet-Craigie pleaded guilty to a further 20 charges of disposing of steel sheets to persons not entitled to acquire them. He was fined £1,000, or six months, and ordered to pay 20 guineas towards the costs of the prosecution. Mr. Edward Clark, prosecuting, said that Burnet-Craigie sold this steel for £10,800, and made a profit of £1,850.

In a case heard later at the Sessions, William Frederick Cadman (45), company director, of Ilford (Essex), and W. F. Cadman & Company, Limited, pleaded guilty to 12 charges of acquiring and disposing of steel illegally. The first six counts covered the acquiring of 74 tons of steel otherwise than in accordance with the provisions of Article 1 of the Iron and Steel Order (No. 62), 1948. The other six counts covered the disposal of 74 tons of steel sheets to persons not entitled to acquire them in accordance with the provisions of the Order.

Personal

MR. S. DICKINSON, head of the Department of Engineering and Mining at Wakefield Technical College, has submitted his resignation to take effect at the end of the year.

Mr. M. W. SHORTER, general sales manager of the Westinghouse Brake & Signal Company, Limited, has been elected a director of the W. R. Sykes Interlocking Signal Company, Limited.

ON January 1, MR. GILBERT DODD, at present manager of the company's plastic sales department, will take up his new appointment as deputy manager of the purchasing department of Monsanto Chemicals, Limited, London. He has been with the Company for 13 years.

FOR THE THIRD successive year, MR. MATTHEW W. DRYSDALE has been re-elected chairman of Lloyd's, At a preliminary meeting of the Committee of Lloyd's held on November 29, MR. WALTER BARRIE was re-elected deputy-chairman. Mr. Drysdale has been an underwriting member of Lloyd's since 1919, and is now serving his third four-yearly term of office as a member of the Committee.

PRESENTATIONS have been made to three foremen by Mr. G. H. R. Towers, managing director of John Readhead & Sons, Limited, shipbuilders, of South Shields (Co. Durham), to mark their completion of 50 years' service with the company. They are MR. JOHN SANDERSON, head foreman shipwright, who has supervised the docking of about 3,500 ships, MR. THOMAS DORWARD, foreman driller, and MR. B. WOODHOUSE, foreman, boatbuilder, who has been concerned with the building of over 1,000 lifeboats and other small craft.

MR. H. GARRATT, for 40 years principal of the Chance Technical College, Smethwick, who retires at the end of this month, has been closely associated with technical training in the heavily-industrialised area which the College serves. He has played a major part in the formation and implementation of the apprenticeship schemes of such firms as Birmid Industries Limited, and he it was who pioneered the "sandwich" course which has been particularly valuable in craft training, enabling academic instruction to be kept parallel with shop-floor instruction and practice.

Mr. Garratt has been especially interested in the training of youths for the foundry trades, and among educationists he is a leading authority on the specific requirements of the trade in technical and craft capacities. Colleagues, students, civic officials and many representatives from the industries of the district gather to-day (December 13) to present him with a cheque to mark appreciation of his work.

Films for Industry

A booklet addressed to industrial firms and trade associations which have no first-hand knowledge or experience of film-sponsoring or of the channels through which industrial films are distributed has been published by the Federation of British Industry under the title "Films for Industry." People in this country and overseas should have greater opportunity of learning about British industry's achievements and methods and the film is an excellent means of making the facts known. Practical guidance on the sponsoring and distribution of industrial films is given in the booklet, copies of which can be obtained from the F.B.I. (21, Tothill Street, London, S.W.1; price 1s. 8d.).

Correspondence

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

WORKS SUPPORTERS' CLUBS

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—As there has been in existence in our organisation for about eighteen months now what is called a Works Council, your recent leader "Works Supporters' Clubs" was of particular interest to us.

Our Council was formed on the instigation of the management "to consolidate the relations between employees and management upon a durable basis of mutual understanding and confidence." It is composed of twelve members, seven appointed by and representing the employees and five, of whom two are works-foremen, appointed by the management. Meetings are convened once a month and are held during working hours in a comfortably-furnished conference room. All matters appertaining to the general welfare and happiness of the employees and such subjects as improved efficiency, fire-prevention, etc., are discussed and any recommendations, once approved, are acted on with the minimum of delay.

One specially interesting idea came from the Council a few monthe ago. A member suggested that, to increase interest in the day-to-day work, it would greatly help if workers knew how our various products are used, and what part they played in industry generally. Since then, regular demonstrations, with commentaries describing in non-technical terms just what happens, have been given in our experimental foundry to audiences of workpeople. They have proved most successful and popular. A new development is being tried out within the next fortnight when lunch-hour film shows are introduced. These shows will be from about half an hour to three quarters of an hour in length and will include entertainment films as well as those of a factual or frankly instructive nature.

It is found that the Works Council plays a big part in maintaining and boosting the morale of the employees generally and more than repays any expenditure on it. Also, as you suggest, it helps in achieving the ideal that one's work is not just the means of earning money but that it should be an interesting and worthwhile part of one's life. Your phrase "Works Supporters' Clubs" is, we think, a particularly happy one and in congratulating you on it, we hope that it aptly describes our own Works Council.—Yours, etc.,

for Foundry Services, Limited.
M. N. BOYDE.

Long Acre, Nechells,
Birmingham, 7.
December 4, 1951.

Weekly Wage Bill Up

The weekly full-time wages of 1,707,000 workers increased by £526,000 in October according to figures contained in the Ministry of Labour Gazette. Among those who benefited during the month were workers engaged in iron and steel manufacture. In the first 10 months of the year 10,126,000 wage-earners received increases totalling £4,537,400, compared with increases amounting to £681,000 granted to 3,600,000 workers in the corresponding period of last year. During the first 10 months of 1951 the weekly wages of 423,000 workers employed in the mining and quarrying industries increased by £166,300.

Industrial disputes in October involved 29,000 workers with a total loss of 111,000 working days. The highest incidence of stoppages was among shipbuilding workers on Clydeside.

Parliamentary

Atomic Energy for Industry

Asked by MR. HECTOR HUGHES what progress had been made in British national research stations to the problem of harnessing atomic energy for industrial, travel, and other peaceful development purposes, MR. DUNCAN SANDYS, Minister of Supply, said that there was a steadily increasing demand, both at home and abroad, for radioactive isotopes for use in industry, medicine, and science, and improved facilities for production and distribution and for training in their use, were being made available. More than 800 consignments were now being delivered each month. The use of atomic energy for industrial power, or as a means of locomotion, was, however, still in a very early stage.

Earlier in his statement Mr. Sandys had said that progress had been made in the detailed study of individual technological problems which must be solved before the construction of an experimental power reactor could be undertaken. The development of the supply of nuclear fuel and of the chemical separation processes connected with its production was proceeding satisfactorily. Facilities had been or were being established for the production of the rare metals which would probably be required. The first stages in the work on design studies of experimental reactors for marine propulsion were being concluded and further work would be undertaken. Studies were being made of other types of reactor.

Metal and Sulphur Stocks

When SIR I. FRASER asked the Secretary for Overseas Trade, as representing the Chancellor of the Duchy of Lancaster, if he would make a statement about the stocks of non-ferrous metals and sulphur held in this country at the beginning of this month and the supply prospects for the new year, MR. HOPKINSON said that provisional figures for United Kingdom stocks in the country at the beginning of this month were as follow:—Sulphur, 108,900 tons; virgin copper, 122,800 tons; refined lead, 45,000 tons; virgin zinc, 35,700 tons; zinc concentrates, 64,000 tons; virgin tin (exclusive of producers' and Government stocks), 1,800 tons.

Sulphur, copper, and zinc were at present subject to International Materials Conference allocations and our future supplies would be affected by conference decisions, he said. World supplies of lead were improving and it was expected that, in 1952, the requirements of British industry would be met. Supplies of tin for the United Kingdom should present no serious problems.

Steel Imports from the U.S.A.

Replying to MR. G. R. STRAUSS, who asked whether any conclusions had yet been reached in the negotiations with the United States authorities for the shipment of steel to this country, MR. SANDYS, Minister of Supply, said that the United Kingdom had so far been authorised to place orders for 93,000 tons of ingots and had been allocated 25,000 tons of finished steel for the first quarter of 1952. This would be debited against the total tonnage of steel which the United Kingdom had asked for in 1952. Negotiations were continuing.

Report on Rainwater Goods

Replying to MR. CROSLAND and MR. M. MACPHERSON, who asked the Minister of Works what action he proposed to take to ensure that the recommendations of the report of the Monopolies Commission on the supply of cast-iron rainwater goods were carried out, MR. ECCLES said that his department had held discussions with representatives of the manufacturers and merchants concerned and had received an assurance that new trading arrangements to carry out the recommendations of the Monopolies and Restrictive Practices Commission would replace the present agreements. He expressed his appreciation of their co-operation.

Disused Tramways as Scrap

Discussions were at present taking place between the Ministry of Supply, the Ministry of Transport, and the local authorities, said MR. DUNCAN SANDYS, Minister of Supply, when asked by SIR AUSTIN HUDSON if he would make arrangements with the local authorities concerned to take up the disused tramway tracks in London in order that they might be used as scrap metal. The Minister, who said that they were trying to expedite the matter as much as possible, said that quite a lot of scrap steel could be obtained—they expected about 30,000 tons—and they recognised the importance of it.

Exports of I.C. Engines

MR. P. THORNEYCROFT, President of the Board of Trade, told MR. NABARRO that he was aware of the expansion in the export of internal-combustion engines over recent years; and that representations had been made by the British Internal Combustion Engine Manufacturers' Association for increased facilities for obtaining relief from Customs duties in respect of imported machinery parts incorporated in engines for export. A memorandum on this subject from the association which was addressed to another department had been brought to his attention, and he was now considering it.

Fuel for New Power Stations

Stating that the additional fuel needed for new power stations under construction or approved would be 16,000,000 tons, MR. LLOYD, Minister of Fuel and Power, told CAPT. RYDER that this modern plant would replace older plant which would otherwise consume 21,000,000 tons to produce the same amount of electricity. It would be seen, therefore, he said, that the need for coal did not depend on the building of new power stations, but on the demand for electricity, and we must certainly hope that the necessary home coal would be available.

THE MINISTER OF FUEL AND POWER intimated that he intends to see if the existing arrangements for advising the public on fuel economy measures can be improved.

ALTHOUGH IT WAS not yet possible to make a statement on the Government's policy on higher technological education, the Minister of Education (Miss Florence Horsbrugh) assured Mr. Austen Albu that it was being considered as a matter of great urgency and importance by consultation between herself and her colleagues who were concerned with aspects of the matter which were outside the scope of her department.

WHEN MR. J. JOHNSON asked the Minister of Supply what was the delivery period for cast-iron pipes for water mains in July, 1951, and October, 1951, and whether any firm dates for delivery could be offered in the future, MR. LOW, who replied, said that the delivery period for orders placed in both July and October this year was between 18 months and two years. Makers adhered as far as possible to the delivery dates promised when the order was received.

MR. R. W. PIPES, M.I.B.F., has changed his address to 31 Inglis Road, Ealing, W.5; his telephone number is now Acorn 1268.

Colours for Aluminium Ingots

Alar Standards for Foundry Alloys

Some founders prefer their aluminium ingots to be identified by colour instead of the more common stamped specification number. Unfortunately no single system of colours has been used either by the founders or ingot producers, with the result that the alloy manufacturers have sometimes been required to paint one alloy with varying colours or two or more alloys with the same colour to meet the wishes of different founders.

To overcome this lack of uniformity and so avoid possible confusion in the production and storage of alloys, the members of ALAR (Association of Light Alloy Refiners) have agreed to adopt the standard system of colours set out in Table I. It is hoped that all founders who prefer this method of identification will co-operate by accepting the new colour scheme. It is emphasised that this standardisation is not an attempt to popularise identification by colour and that the methods which have been used in the past will be continued unless a change is requested by the founder.

TABLE I.—*Colour Scheme for the Identification of Aluminium Casting Alloys.*

Alloy type	Colour.	Alloy Spec. B.S. 1490.	Old or related designation.
Al-pure ..	White	LM-0	DTD 478
Al/Cu	Green	LM-12	LAC 10
	Green and white ..	LM-11	DTD 304
	Green and blue ..	LM-19	DTD 294
Al/Mg ..	Black	LM-5	DTD 165
	Black and white ..	LM-10	DTD 360A
Al/Cu/Ni (Fe, Si)	Brown	LM-7	DTD 133C
	Brown and black..	LM-14	"Y" alloy
	Brown and white	LM-15	RR 53
Al/Zn (Cu) ..	Blue	LM-1	DTD 428
	Blue and black ..	LM-3	LAC 113B
Al/Si (Mg) ..	Yellow	LM-6	L.33
	Yellow and white	LM18	ALAR 00.5
	Yellow and green	LM-20	ALAR 00.12
	Yellow and red ..	LM-8	AC.8
	Yellow and brown	LM-9	DTD 240/5
	Yellow and black	LM-13	Lo-Ex
	Yellow and blue ..	LM-17	Birmasil Special
Al/Si/Cu ..	Red	LM-4	DTD 424
	Red and white ..	LM-2	LAC 112A
	Red and black ..	LM-16	DTD 272/6
	Red and green ..	—	ALAR 305
	Red and blue ..	—	ALAR 308

Mond Nickel Fellowships

The Mond Nickel Fellowships Committee has announced the following awards for 1951:—

MR. J. PRESTON (British Non-Ferrous Metals Research Association) to study in Britain, the U.S., and Canada, specialised methods of production and fabrication of metals with particular reference to powder metallurgical techniques. MR. P. E. WHITE (J. B. & S. Lees, Limited, West Bromwich) to study the metallurgy and detailed production technique of high quality strip steels in the U.K., Scandinavia, the U.S., and Canada, with particular reference to hardened and tempered steel strip, stainless steels, and silicon steels. MR. P. J. HILL (Public Works Department of Western Australia) to study in the U.K. the application of research to the development of corrosion resistant metals for use in the mechanical engineering industry.

Microscope in Industry

A small but interesting exhibition was staged by the Royal Microscopical Society in the Great Hall, B.M.A. House, Tavistock Square, London, at the end of last month, at which industrialists were given an opportunity to show how they were applying microscopes to their own particular problems. The exhibition was opened by Mr. A. J. Philpot, director of the British Scientific Instrument Research Association, and the displays explored almost every avenue in which the microscope was being used in industry, including agriculture, food, biology, ceramics and glass, mining, paper, rubber, fabrics, interferometry, photography and metallurgy.

Included in the last section, the British Thomson-Houston Company, Limited, showed two methods to assess preferred orientation of the constituent crystals in the silicon-iron laminations for transformers. The orientation of the exposed planes which have been etched are identified by a simplified goniometric method or using polarised light. A quick estimate of the degree of preferred orientation in a polycrystal is possible.

An exhibit of recent work on a new reflecting microscope to study metals at high temperature by Mr. M. J. Olney (Department of Metallurgy, University of Cambridge) demonstrated how a specially-designed apparatus permits the study of phase changes in small metal specimens heated *in vacuo* to temperatures up to 1,000 deg. C. Metallographic features on the heated specimens are observed through a window sealed into the lid of the furnace.

Developments of electron micrographic techniques were exhibited by Dr. J. Nutting, also of the Department of Metallurgy, University of Cambridge, and further work on the same subject was displayed by Dr. V. E. Cosslet of the Cavendish Laboratory, University of Cambridge.

The chemical analysis of the complex material which accumulates on the tubes and in the flues of large water-tube boilers is a lengthy process and the results are not easily interpreted. The Fuel Research Station of the Department of Scientific and Industrial Research showed a method of examination under the microscope which they have developed by which a quick assessment of the type of deposit can be made. From the characteristic features of the ash particles, which are identified under the microscope, information is obtained as to the reasons for their occurrence and as to steps to be taken to avoid such troubles. Specimens of the various types of deposits and methods used to elucidate the structure of deposits were shown.

Numerous photomicrographs exemplifying the capabilities of modern metallographic and electron micrographic techniques were exhibited by the Imperial Chemical Industries, Limited, the General Electric Company, Limited, and the Post Office Engineering Department.

Giant Indian Fertiliser Plant

The main British contractors for the construction of the Indian Government's £20,000,000 fertiliser plant at Sindri, Bihar, are Power-Gas Corporation Limited, Stockton-on-Tees. The largest of its kind in Asia, it will produce 1,000 tons of ammonium sulphate a day as well as a range of other chemical by-products in bulk. Provision has been made for output to be doubled by the installation of additional plant.

The factory is electrically powered throughout and the bulk of the electrical equipment, including the generating plant, was supplied and erected by the English Electric Company, Limited.

Obituary

MR. HAROLD BRYING HEWLETT, a former senior engineer and geologist with the quarries department of the Stanton Ironworks Company, Limited, Nottingham, died on November 28 at the age of 67.

MR. BENJAMIN T. G. FORD, who died recently in his 80th year, was formerly managing director of the Coghlan Iron & Steel Company, Limited (now known as Coghlans, Limited), Hunslet, Leeds.

MR. SYDNEY E. HILL, prominent in the brassfoundry trade, has died at his Birmingham home at the age of 74. Mr. Hill had American interests and was a director of Skinner-Hill Incorporated, New York.

MR. JAMES MCCHESNEY, manager of the North British Locomotive Company, Limited, Glasgow, has died after a brief illness. He served his apprenticeship at the firm's Queen's Park Works, but later joined another company in the Midlands as an inspecting locomotive engineer. He returned to Glasgow to become manager of the Hydepark works during the war. His father also served the company for more than 60 years and was latterly works general manager and a director.

MUCH ESTEEMED in Scottish electrical engineering circles, MR. JOHN HENDERSON DINWOODIE, manager of the Edinburgh branch of British Insulated Callender's Cables, Limited, died on November 28. He was 50. Joining the former Callender's Cable & Construction Company, Limited, in 1916, he subsequently served for many years in the company's Glasgow office, where he specialised in mining electrification work—an interest which he maintained for the rest of his life.

MR. DAVID R. HUTCHISON, engineering manager of Scott's Shipbuilding & Engineering Company, Limited, Greenock, died recently. He began his career as an office boy with the company nearly 50 years ago, completing his apprenticeship as a draughtsman in 1911. He took a prominent part in the production of the Scott-Fiat oil engine which was developed principally for submarine propulsion. During the 1914-18 war he spent some time in the testing and running of these engines and later devoted himself to the development of the Scott-Still engine. His work was not confined to the test bed and he made several voyages with early Diesel-engined vessels.

Labour Drift from Textiles to Engineering

The prevalence of unemployment and short-time working in the wool textile industry appears to be causing a definite drift of workers from that industry in the West Riding of Yorkshire to the engineering industries which are expanding under the stimulus of rearmament. According to Ministry of Labour official's estimate, the wool textile industry is reported to have lost some 6,000 workers already this year, including 2,000 part-time workers who have been thrown out of work by the closure of evening shifts in textile mills. Some large West Riding engineering works are reported to have absorbed as many as 100 workers, including foreign workers, mainly from the woollen mills during recent months. One works, on the outskirts of Bradford, had taken a fair proportion of foreign workers for the foundry. The firm have only vacancies nowadays for skilled apprentice-trained turners and pattern-makers.

New Liverymen. During 1951, the following gentlemen were admitted to the Livery of the Worshipful Company of Founders:—Mr. C. H. Kain; Mr. W. R. Purnell, O.B.E.; Mr. G. R. Tobitt; Mr. G. F. Mundell; Mr. J. G. Stanier; Mr. C. F. Styles; Mr. A. L. Wilson, B.A.; Mr. J. G. S. Longcroft, and Mr. C. E. Spearing, M.A.

U.S. Coking Industry

Statistics relating to the coking and by-products industry in the United States during the year 1950 have recently been issued by the Bureau of Mines. There existed at the beginning of the year 15,104 so-called patent ovens and at December 31, 14,982. In Great Britain, where the ancient beehive oven is almost extinct, it is strange to learn that in the United States the number was 13,662 at January 1, 1950, increasing to no fewer than 17,708 by the end of the year. But the total coal charged into these ovens amounted to only 9,088,385 net tons (2,000 lb.), compared with 94,926,310 tons into patent ovens, the respective coke yields being 5,827,420 tons and 66,890,618 tons, and the oven yields (as percentages of coal charged) 64.12 and 70.47. The annual coke capacity at the end of 1950 was 72,488,200 tons for patent ovens and 11,571,500 tons for beehive ovens.

The output of by-products from patent ovens included the following:—Tar, 739,868,767 gal. (U.S. gallon = 0.83267 Imperial gallon); ammonium sulphate or equivalent, 1,849,127,582 lb.; gas, 979,592,988 million cub. ft.; crude light oil, 260,856,875 gal. Yields of coal chemical materials per ton of coal charged were as follow:—Tar, 7.79 gal.; ammonium sulphate or equivalent, 19.89 lb.; crude light oil, 2.81 gal.; surplus gas, 10.32 million cub. ft.

New Propeller Foundry Proposed

Proposals for a new foundry at the Yoker works of Bull's Metal & Melloid Company, Limited, Glasgow, were mentioned on November 22 by Mr. F. McAlister, a director of the company, before an inspection of the works by representatives of the Press and other guests, who were welcomed by the chairman, Mr. B. W. Preston. Mr. McAlister said the foundry in its present state, was capable of producing over 1,000 tons of finished ships' propellers per annum, with a maximum weight of 16 tons. In the course of normal expansion and development, the company were contemplating the construction of a new foundry equipped with modern machinery and using the cement-sand process of mould making, which afforded many advantages in production and gave cleaner conditions of working. The company had recently concluded a licence with the well-known firm of J. Stone (Charlton) Limited, for the manufacture of their Heliston design of propeller and in this way they hoped to add substantially to their production.

Viscosity Control of Fuel Oil

Unfavourable effects of viscosity variations on uniform firing and combustion control of open-hearth furnaces have called for a change in previous technique in America states Harvey Krouse in a Paper on the subject published in *Iron and Steel Engineer*, September, 1951. Since fuel oils as supplied are not uniform in consistency, the conventional temperature control of the recirculating fuel oil to the open-hearth does not eliminate the effects of variable viscosity. Attempts have been made to devise a control device which will sense and maintain a given viscosity and a viscometer has been developed and utilised for continuously measuring viscosity of fluids in kinetic units.

THE FORMATION of a new subsidiary, Main Refrigeration, Limited, is announced by Glover & Main, Limited, gas engineers, of London, S.W.1. The subsidiary is to produce an absorption-type refrigerator for operation by town or butane gas, electricity, or kerosene, and may at a later stage develop air-conditioning equipment.

News in Brief

FROM DECEMBER 9, 1951, the Ministry of Food will pay £72 per ton ex farm for home-grown linseed of 90 per cent. purity bought for crushing.

EMPLOYEES of the Derby locomotive works, of British Railways, were allowed to take their families through the different departments of the works, on December 8.

A GIFT OF £30,000 has been made to Sheffield Corporation by Geo. Jowitt & Sons, Limited, grinding wheel manufacturers, of Sheffield, for the purchase of property to house old people.

DESPITE STRONG COMPETITION from overseas companies, the Incandescent Heat Company, Limited, Smethwick (Staffs), has secured a £24,000 contract for furnace equipment for a works at Milan (Italy).

THE NOVEMBER INFORMATION SHEET of British Standards Institution announces under the heading of "New Standards Issued" a specification (No. 1788:1951) covering street lighting lanterns (price 3s.).

CONTRACTS for the construction of three steamers—two of 2,500 tons d.w. and the third of 1,600 tons d.w.—have been received by Henry Robb, Limited, Leith, from Ellerman's Wilson Line, Limited, Hull.

FIVE WORKMEN were injured on November 30 in an explosion at the factory of the Wolstenholmes Bronze Powders, Limited, Sharples, Bolton, while fighting a fire in a shed containing aluminium powdering machinery.

ABOUT ANOTHER £100,000,000 will be added to employers' wage bills now that the agreement granting a wage increase of 11s. a week and an additional week's holiday to engineering and shipbuilding workers has been signed.

THE LORD MAYOR of Sheffield, Mr. T. W. Bridgland, acted as host at a recent reception held at Sheffield Town Hall to 600 employees of the Steel, Peech & Tozer branch of the United Steel Companies, Limited, of which he is catering manager.

THE ENGLISH ELECTRIC COMPANY, LIMITED, is to make a rights issue, designed to raise a gross sum of £3,243,837, to ordinary stockholders. They will be offered 1,179,577 ordinary £1 shares at 55s. per share in the proportion of two new shares for every £7 of ordinary stock held on November 17.

THE SWEDISH BOARD OF TRADE has formally requisitioned the country's entire stocks of copper and certain copper alloys, thus implementing the agreement made between the Marshall countries in Paris that the use of copper and certain alloys for the manufacture of a number of non-essential consumer goods shall be forbidden.

A RECORD SUM OF £1,060 was distributed on December 3 in the form of money prizes, ranging from £11 10s. to £2 10 ., among 230 apprentices and junior staff of the Sheffield works of the English Steel Corporation, Limited, under its education and training schemes. The prizes were presented by the Master Cutler, Mr. Geoffrey Flather.

AT A MEETING of the Foundry Society of the National Trades Technical Societies (Derby section) a "brains trust" was formed which included Derby foundry managers, foremen, and operatives; questions were answered on all matters dealing with foundrywork. The question master was Mr. C. H. Hudson, president of the Derby Foundry Society.

IN VIEW of the Government's intention to return the steel industry to private enterprise the directors of Brown Bayley's Steel Works, Limited, are of the opinion that no action should at present be taken which might prejudice the reabsorption of Brown Bayley Steels, Limited, into the group, says Mr. J. W. Garton, the chairman, in his statement issued with the full accounts to July 31, 1951.

THE DIRECTORS of Associated British Engineering, Limited, have announced that they have received consent from the Capital Issues Committee to issue ordinary shares to the nominal value of £700,000 by way of capitalisation of reserves. Steps are being taken to effect the capitalisation and the issue of free bonus shares, which will be on the basis of seven new shares for every three now in issue.

TO MARK THE TWENTY-FIFTH ANNIVERSARY of the Yorkshire Repetition Castings Company, Limited, Bradford, Mr. W. G. Thornton (managing director) presented four of his original employees, Mr. A. Bates, Mr. W. Catton, Mr. G. H. Scarfe and Mr. R. Taylor with twenty-five pounds each at a ceremony held in the works canteen, on November 30.

A CONFERENCE of sales representatives of Follsain-Wycliffe Foundries, Limited, from all parts of Great Britain was held at the Town Hall, Lutterworth, recently, following an inspection of the new machine-shop and other improvements and extensions being made at the works. The conference was followed by a dinner and entertainment. On the following day a similar gathering was held at the firm's subsidiary company, Varatio-Strateline Gears, Limited, at Slough, where new additional premises were inspected and a range of the Company's new models were on view. The Conference terminated with a dinner in London followed by a visit to a theatre.

SPEAKING at the annual dinner of the Birmingham branch of the Institute of Welding on December 6, Capt. A. M. Holbein, chairman of the technology committee and of the examinations board of the City and Guilds of London Institute stated that he felt the City and Guilds welding course was "nothing like high enough" and that another course ought to be imposed on it. He urged more craft training, and insisted that the initiative must come not from the technical colleges but from industry itself.

Taking up the point about increased facilities for training, Mr. Howard Thompson, president of the Institute referred to the probability that the Institute would be in a position to suggest to the universities an undergraduate course in welding. Mr. A. Robert Jenkins, vice-president of the Institute, said that in his opinion the American worker's high standard of technical education created keen competition for promotion in the middle grades of management, and that this factor was largely responsible for the high productivity of the United States.

AT A MEETING of the T.U.C. Regional Advisory Committee in Birmingham on December 6, a unanimous resolution was passed urging the T.U.C. to obtain from the Government a clear indication of their intentions regarding steel supplies, before the introduction of the steel allocation scheme in February. Mr. James Leask, regional trade group secretary of the Transport and General Workers' Union, stated that unless assurance on steel supplies were given soon after Christmas, there would be widespread movement of labour in Birmingham and Coventry. "There is something radically wrong at the moment," he said, "it is well known that there is a black market in steel and non-ferrous metals."

Mr. J. L. Jones of Coventry, chairman of the Advisory Committee, stated that the declining output due to shortage of metal is causing great frustration among managements and other personnel. Mr. A. Keats, Midlands chairman of the Engineering Industries Association, pointed out that many small firms have no promise of delivery of steel supplies under 18 months, a condition which jeopardises their very existence.

Raw Material Markets

Iron and Steel

With more furnaces in blast, pig-iron output is higher, but the foundries receive little of the increase, almost all of it going to the steelworks. But even with the additional quantities, the steelworks are still short of raw materials, particularly scrap. Thus, unless further blast furnaces are blown in for the production of the foundry grades of pig-iron, which is unlikely at present owing to shortage of coke and labour, the foundrymen's position will remain difficult.

Some users of high-phosphorus pig-iron will benefit by the blowing-in recently of another furnace in the Derbyshire area, but there is, however, such a wide gap between the supply and demand that the allocations to individual foundries will not alleviate to any great extent present supply difficulties. The light and jobbing foundries have plenty of work on hand already and the housing drive will call for more castings. No improvement can be recorded in current deliveries of pig-iron to the engineering and speciality foundries, nor does there seem to be any prospect of early improvement. The low- and medium-phosphorus irons are in fairly regular supply, but hematite deliveries are spasmodic. Refined irons could be taken up in much larger tonnages, while available supplies of Scotch foundry iron are readily accepted.

Many foundries are interested in the purchase of foreign iron. Small tonnages of Belgian high-phosphorus pig-iron have been taken up by light foundries and engineering foundries would purchase low- and medium-phosphorus irons and hematite if these could be obtained from abroad.

Foundry coke deliveries are steady, but there is still little opportunity to add to stocks, which should be built up at this period of the year. Ganister, limestone, and firebricks are received to requirements.

The efforts of the re-rollers to obtain increased supplies of steel semis are proving abortive. Home steelworks are sending what tonnages they can from present reduced outputs, but these are barely sufficient to sustain short-time operations at the mills, and there appears to be little hope of a recovery in their position until more foreign steel can be secured. Outputs of sections, bars, and strip are much reduced, although there is heavy pressure for supplies from consumers at home and abroad. The sheet re-rollers are also badly handicapped by shortage of sheet bars. All arisings of defectives and crops are readily taken up, but quantities are small and give little relief to the general supply position.

Non-ferrous Metals

The tone of the tin market at the end of last week was not very firm, and there is an inclination to think that the bottom of the fall has not yet been seen. The check to the decline last week was provided by a report from Singapore that a tentative inquiry had been received from the United States as to the prospects of obtaining some 30,000 tons of tin over next year. Obviously, it would be impossible for buying on this scale to be put through on a free market without the price being affected to a considerable extent.

Whether anything will come of this remains to be seen, but the administrator of the Reconstruction Finance Corporation seems very determined to hold off unless it proves possible to buy at a lower level than the present one. If 103 cents is their idea of a right value for tin, then the Americans are hardly likely to see their wish gratified, at the present time at any rate. The equivalent of 103 cents is £824, and it will be a long time before the London market gets down to that level—or at any rate it would appear so at the moment.

London Metal Exchange official tin quotations were as follow:—

Cash—Thursday, £932 10s. to £935; Friday, £935 to £937 10s.; Monday, £945 to £947 10s.; Tuesday, £945 to £950; Wednesday, £925 to £930.

Three Months—Thursday, £915 to £917 10s.; Friday, £917 10s. to £920; Monday, £929 to £930; Tuesday, £936 to £937 10s.; Wednesday, £912 10s. to £915.

Non-ferrous Scrap Prices

The Minister of Supply has made an Order bringing secondary unwrought copper under price control and reducing the controlled prices of secondary copper alloys. The copper prices will be equivalent to the Ministry of Material's selling prices for virgin copper, and to permit the production of refined copper at these prices, the prices of copper scrap are being reduced by £8 a ton. Prices of copper alloy scrap are being reduced in proportion to the copper content. The Order contains a provision permitting contracts already entered into at higher prices to be completed within a certain time, and permits additions for special shapes.

The Order, the Non-ferrous Metals Prices (No. 9) Order (SI 1951, No. 2174), consolidates and revokes all earlier Orders in the series. It came into operation yesterday (Wednesday).

The new prices for secondary unwrought copper are:—

Ingot bars and wire bars: electrolytic, £225 10s.; fire-refined, equivalent to H.C., £225 10s.; fire-refined, min. 99.88 per cent. copper, £225; fire-refined, min. 99.70 per cent. copper, £224 10s.; fire-refined, min. 99.50 per cent. copper, £224; cathodes, £224 10s.; all other types and specifications, £200.

The reduced prices are:—

Brass—To B.S.S. No. 218 or 249 (*a*) Cropped billets £225, (*b*) uncropped billets, £223, (*c*) ingots £220; 65/35 casting quality, £219; 70/30 casting quality (min. 68 per cent. copper), £224; 63/37 strip ingot for rolling, £231; 70/30 strip ingot for rolling, £235.

Copper Scrap—Clean bright—untinned or tinned wire: commutator bar, £202; fire box cut to crucible size, £202; fire box not cut, £197; No. 1 wire, £192; clean heavy, £187; No. 2 wire, £182; braziery, £166.

Admiralty Gunmetal Scrap—In any form: (*a*) not less than 9 per cent. tin and not more than 0.5 per cent. lead, £250. (*b*) other than (*a*) above, in proportion.

Commercial Gunmetal Scrap—in any form, £212.

Cupro-nickel Scrap—70/30 process scrap, £246; 70/30 used condenser tubes, £205; 80/20 process scrap, £223.

Gilding Metal Scrap—In any form, £199.

Brass Scrap—QF cases free from primers, £197; QF cases not free from primers, £191; SAA cases mechanically treated or fired, £187; SAA cases muffled or furnaced, £181; cuttings, £189; red and fuse scrap not burned, £179; swarf, £169; heavy, £164.

The Minister draws attention to the paramount need for scrap metal at the present time and hopes that industry will continue to co-operate in the speedy return of scrap for re-use.

Iron and Steel Values

A further list of three iron and steel securities for which values have been agreed with stockholders' representatives was published on November 26 by the Ministry of Supply.

Out of 146 securities, the number now agreed is 143, of which 55 are quoted and 88 unquoted; the three remaining securities are all unquoted. The total compensation value of the agreed securities is approximately £236,800,000. The compensation value of the present batch of securities is approximately £1,470,000.

ORDINARY STOCKS AND SHARES

Barrow Ironworks £1, 20s.
Nassington Barrowden Mining Company £1, 35s.
Santon Mining Company £10, £29.

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

(Delivered, unless otherwise stated)

December 12, 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, £15 7s.; South Zone, £15 9s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £15 17s.; South Zone, £15 19s. 6d.

Cold Blast.—South Staffs, £17 5s. 6d.

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. Coast and N.-W. Coast of England, £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, £22.

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. 6d. per unit; 70/84 per cent., £56 2s. 6d., basis 75% Si, scale 16s. per unit.

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. 8¾d. 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.

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

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

Ferro-manganese (blast-furnace).—78 per cent., £40 8s. 9d.

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 11s. 6d.; tested, 0 08 to 0.25 per cent. C (100-ton lots), £22 1s. 6d.; hard (0.42 to 0.60 per cent. C), £23 19s.; silico-manganese, £29 15s.; free-cutting, £24 15s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £27 16s.; case-hardening, £28 4s.; silico-manganese, £30 16s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £25 15s.; basic, hard, over 0.41 up to 0.60 per cent. C, £26 15s.; acid, up to 0.25 per cent. C, £28 4s.

Sheet and Tinplate Bars.—£21 16s.

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.—52s. 1½d. per basis box.

NON-FERROUS METALS

Copper.—Electrolytic, £227; high-grade fire-refined, £226 10s.; fire-refined of not less than 99.7 per cent., £226; ditto, 99.2 per cent., £225 10s.; black hot-rolled wire rods, £236 12s. 6d.

Tin.—Cash, £925 to £930; three months, £912 10s. to £915; settlement, £927 10s.

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), £175; ditto (Empire and domestic), £175; "English," £176 10s.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £211 10s.; rolled zinc (boiler plates), all English destinations, £209 10s.; zinc oxide (Red Seal), d/d buyers' premises, £205.

Other Metals.—Aluminium, ingots, £124; antimony, English, 99 per cent., £365; quicksilver, ex warehouse, £73 to £73 10s.; nickel, £454.

Brass.—Solid-drawn tubes, 25d. per lb.; rods, drawn, 32⅞d.; sheets to 10 w.g., 30⅛d.; wire, 31¾d.; rolled metal, 28⅜d.

Copper Tubes, etc.—Solid-drawn tubes, 26d. per lb.; wire, 254s. per cwt. basis; 20 s.w.g., 281s. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £245 to £280; BS. 1400—LG3—1 (86/7/5/2), £260 to £300: BS. 1400—G1—1 (88/10/2), £330 to £360; Admiralty GM (88/10/2), virgin quality, £330 to £360 per ton, delivered.

Phosphor-bronze Ingots.—P.B1, £340 to £370; L.P.B1, £295 to £315 per ton.

Phosphor Bronze.—Strip, 38½d. per lb.; sheets to 10 w.g., 40¾d.; wire, 43¼d.; rods, 38½d.; tubes, 36¾d.; chill cast bars: solids 4s., cored 4s. 1d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 2s. 7¼d. per lb. (7%) to 3s. 7½d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 3s. 1¾d. (7%) to 4s. 1½d. (30%); to 12 in. wide × .056, 3s. 2d. to 4s. 1¾d.; to 25 in. wide × .056, 3s. 4d. to 4s. 3¾d. Spoon and fork metal, unsheared, 2s. 10¾d. to 3s. 10½d. Wire, 10g., in coils, 3s. 7¾d. (10%) to 4s 7¼d. (30%). Special quality turning rod, 10%, 3s. 6¼d.; 15%. 3s. 11½d.; 18%. 4s. 3¾d. All prices are net.

Forthcoming Events

DECEMBER 17

Junior Institution of Engineers.

Sheffield and district section:—"Aluminium Alloys in General Engineering," by M. H. Le Vie, 7.30 p.m., at the Co-operative Educational Centre, 201, Napier Street, Sheffield, 11.

Sheffield Society of Engineers and Metallurgists

"A Rational Theory of the Hardening of Steel," by A. R. Marks, 7.30 p.m., in the University Building, St. George's Square, Sheffield, 1.

Institution of Production Engineers

Derby section:—"Recent Developments in the Economic Use of Materials," by G. F. P. Fox, 7 p.m., at the Midland Hotel, Derby.

Manchester section:—"Management Ethics," by H. E. Roff, 7.15 p.m., at the College of Technology, Sackville Street, Manchester.

Incorporated Plant Engineers

West and East Yorkshire branch:—"Museums—their work and assistance to Industry," by C. M. Mitchell, 7.30 p.m., at Leeds University.

DECEMBER 18

Institute of British Foundrymen

East Anglian section:—"Great Names"—Lloyd's film, 7 p.m., in the Central Hall, Public Library, Ipswich.

Incorporated Plant Engineers

Glasgow branch:—"Safety in the Use of Portable Electric Tools," by J. L. Wood, 7 p.m., at the Engineering Centre, 351, Sauchiehall Street, Glasgow.

DECEMBER 19

Institute of Welding

North London branch:—"Application of the Reeve Cracking Test," by Dr. H. H. Reeve, 7.30 p.m., at Manson House, Portland Place, W.1.

Institution of Production Engineers

Liverpool section:—"Brains Trust," 7.15 p.m., at the Exchange Hotel, Tithebarn Street, Liverpool, 2.

DECEMBER 20

Institution of Production Engineers

Glasgow section:—"Legal Aspects in Industry," by A. E. Armour, 7.30 p.m., at the Institution of Engineers and Shipbuilders in Scotland, 29, Elmbank Crescent, Glasgow, C.2.

DECEMBER 29

National Institute of Industrial Psychology

Vocational Guidance Conference in conjunction with the Conference of Educational Associations in the Great Hall, King's College, Strand, W.C.2. (Further details from the secretary.)

Pig-iron Shortage Closes Welsh Furnaces

Because of the scarcity of pig-iron, Richard Thomas & Baldwins, Limited, decided to close down 10 of its 27 open-hearth furnaces in west Wales last week. The arrival at Swansea docks on December 4 of 5,200 tons of pig-iron from France, however, averted the need to close five of these furnaces, which were ready for charge last Wednesday. Another consignment was due to arrive last Thursday, followed by 10 other shipments in the next fortnight, giving a total of 2,800 tons of scrap and 21,550 tons of pig-iron from the Continent.

A spokesman of the company said that the closure of all 10 of the furnaces would have meant a loss of approximately 5,000 tons of ingots scheduled mainly for distribution to local tinplate works. All the workmen affected have been found alternative work since they had a guaranteed four shifts a week. This week's consignment of pig-iron is expected to allow the closed furnaces to be restarted.

The position was further alleviated on December 5 by the arrival at Swansea of 2,300 tons of pig-iron from Holland. The improvement made possible the re-gassing of some of the furnaces in anticipation of an early restart.

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

CORESHOP FOREMAN (40) desires change. 25 years' experience steel foundry (coremaking, moulding, closing and casting). Used to trainees.—Box 1440, FOUNDRY TRADE JOURNAL.

AGENCY, Office Management.—Retired Manager, Grey and Malleable Ironfoundry, for London and South; fully qualified Metallurgist.—Box 1421, FOUNDRY TRADE JOURNAL.

METALLURGIST, Indian B.Sc. (age 27), with experience of sand control, metal melting and production of high duty iron, requires temporary or permanent position in order to receive further training at a nominal wage.—Box 1416, FOUNDRY TRADE JOURNAL.

YOUNG ASSISTANT IRON FOUNDRY MANAGER/METALLURGIST, desires change. Sound all-round practical and technical experience in Jobbing and Modern Production Mechanised Plants. Good knowledge of Pattern-making. Foreman's post considered. House essential.—Box 1422, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

METALLURGICAL CHEMIST required for routine analysis of Aluminium and Aluminium Bronze Alloys to A.I.D. Standards, also Physical Testing and Microscopic analysis.—Write to VOWLES ALUMINIUM FOUNDRY CO., LTD., Bank Street, West Bromwich, in the first instance.

EXPERIENCED METALLURGIST required for Research Department in North West area. Must have personality and ability to control Inspection Section, as well as technical qualifications of normal average calibre. Permanent position.—Apply Box 1423, FOUNDRY TRADE JOURNAL.

TECHNICAL ASSISTANT required for Metallurgical Research Department, Metallurgical experience essential and possession of Higher National or equivalent certificate desirable. Age about 21-23. —Apply in writing with full particulars to SECRETARY, Magnesium Elektron, Ltd., Lumm's Lane, Clifton Junction, Nr. Manchester.

FOREMAN PATTERNMAKER required for West of Scotland Pipefoundry. Applicant must have sound technical training and experience in Bank pipe moulding with Sandslingers and both Greensand and Pressure Castings. Write stating training, age and experience.—Write 29NO, WM. PORTEOUS & Co., Glasgow.

MOULDERS.—Jobbing Moulders required for Iron Foundry; rate 3s. 6d. per hour, plus £2 week bonus, plus merit bonus. Also all classes of Foundry Labour. —P.M.A., 136, Bramley Road, W.10. LAD. 3692.

SITUATIONS VACANT—*Contd.*

ASSISTANT METALLURGIST required to take charge of Metal and Sand Control in Foundry producing Light Engineering Castings. Age 21 to 25 years. National Certificate in Chemistry or Metallurgy. Write, giving full details of training, experience and education to PERSONNEL MANAGER, Newman Industries, Ltd., Yate, Nr. Bristol.

FOREMAN MOULDER for West Riding Jobbing Foundry producing Medium and Light Machine Tool Castings. Some experience with Hand Moulding machines essential. Full details experience, salary required. — Box 1433, FOUNDRY TRADE JOURNAL.

A FOUNDRY FOREMAN or TECHNICIAN required to take over responsibility for estimating and layout of equipment for grey iron castings production. Good practical knowledge of floor and machine moulding essential. This is a staff appointment offering excellent scope for advancement and successful applicant will be given assistance with housing.—Apply stating age and experience to PERSONNEL MANAGER, Box 1441, FOUNDRY TRADE JOURNAL.

FOREMAN required for small partly mechanised foundry, also plate and loose patterns, one accustomed to Rate Fixing, able to work on floor, for firm engaged on Ranges, Grates and Engineering Castings, "Baxi" Patent Fires and Products; small house will be found if required. Apply in writing, stating full particulars, age, wage required and experience.—RD. BAXENDALE & SONS, LTD., Engineers and Ironfounders, Albert Street, Chorley.

A DIE DESIGNER for Gravity Die Casting is required by well-known Firm of Aluminium Founders in London area. Applicant must have had wide experience of modern gravity die technique and be able to supervise design, manufacture and foundry operation. This is a staff appointment, pensionable, and carries a good salary, with excellent opportunity for advancement. Applicants should write, giving full details of experience and qualifications, which will be treated in strict confidence.—Box 1417, FOUNDRY TRADE JOURNAL.

PRODUCTION ENGINEER required, to take charge, after initial training, of production in Precision Foundry (young graduate preferred). Some knowledge of Chemistry and Metallurgy desirable. The post is at a South Yorkshire firm, and offers opportunity of advancement to a young man of initiative and drive. Write, giving full particulars to — Box 1439, FOUNDRY TRADE JOURNAL.

THE BRITISH CAST IRON RESEARCH ASSOCIATION is extending its Operational Research Team and invites applications for two vacancies from those experienced in foundry operations affecting production. Salaries in accordance with training and experience. A memorandum on the appointments is available from, and applications (which will be treated in confidence) should be made to the SECRETARY, Bordesley Hall, Alvechurch, Birmingham.

SITUATIONS VACANT—*Contd.*

NON-FERROUS AND CAST IRON MOULDERS required. Good rates. Canteen, etc.—Apply S.E.M., Pitsea Street, Stepney, E.1.

FOREMAN Non-ferrous Mechanised Foundry experienced in aircraft castings required in South East England.—Apply Box 1434, FOUNDRY TRADE JOURNAL.

ASSISTANT FOREMAN Iron Foundry required in South East England.—Apply Box 1435, FOUNDRY TRADE JOURNAL.

SKILLED MOULDERS, PLATERS, TURNERS, BORERS, etc., required by Distington Engineering Co., Ltd., Workington, Cumberland.—For further particulars apply to the LABOUR MANAGER.

FOUNDRY FOREMAN required for Essex Foundry; up to 20 tons grey iron castings, plate machine and loose pattern; experienced man.—Full particulars, age, wages, to Box 1428, FOUNDRY TRADE JOURNAL.

MECHANICAL DRAUGHTSMAN required, with knowledge of Drawing Office routine, capable of checking working drawings for Machine Shops, and supervising flow of work through Drawing Office. Write, giving full details of experience, qualifications and salary required to—Box 1438, FOUNDRY TRADE JOURNAL.

FERRANTI, LTD., have the undermentioned pensionable staff vacancy: A young ASSISTANT FOUNDRY METALLURGIST for development work. Candidates preferably not over 25 years of age, should have Higher National Certificate in Metallurgy or Licentiateship of the Institution of Metallurgists. Ref. J.D.Met.— Forms of application from MR. R. J. HEBBERT, Staff Manager, Ferranti, Ltd., Hollinwood, Lancs. Please quote reference.

FOUNDRY TECHNICIAN required for West of Scotland foundry. Capable of starting up own laboratory. Routine analysis of all materials and sand control. Applicant must have sufficient practical knowledge to apply results to casting production. Help given with housing if necessary. Commencing salary, £546 per annum. Write giving full details of age, education, training and experience to 07X6 WM. PORTEOUS & Co., Glasgow.

WELL KNOWN Midland Metallurgical Company requires TECHNICAL SALES REPRESENTATIVES for residual positions in South Africa, India and mobile duties in Scandinavia, Western Europe, South America and Far East. Applicants with metallurgical, chemical or practical foundry background preferred, but most important qualifications are initiative, adaptability, drive and good knowledge of languages where appropriate. Excellent prospects with likelihood of advancement to managerial positions in some instances. —Apply with full details, qualifications, to BOX 1442, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

FOUNDRY FOREMAN required for Grey Iron Foundry, Braintree district; small amount of non-ferrous work; must have experience of jobbing and repetition moulding.—State age, experience, wages, to Box 1427, FOUNDRY TRADE JOURNAL.

A TECHNICAL REPRESENTATIVE well connected with the Foundry Industry is required by a well-known firm of manufacturers of Corebinders, etc., to cover London and the South-East. Ownership of a car will be considered an advantage, although not an essential.—Box 1444, FOUNDRY TRADE JOURNAL.

IRONFOUNDRY.—HEAD FOREMAN wanted for Foundry in London on small to medium sized jobbing work. Part plate production. Must have thorough knowledge of trade, including cupola management. Metallurgical knowledge not necessary. Previous experience essential. Rent free house with job.—Write, giving full particulars and salary required, to Box 1445, FOUNDRY TRADE JOURNAL.

A LARGE Iron Foundry in South Wales has vacancies for TWO TECHNICAL ASSISTANTS. Candidates should be aged 23/30, with H.N.C. or equivalent standard of education, have either Metallurgical or Foundry experience, and be prepared to undertake either development or supervisory work as required. Duties will be of such a nature that they will be developing the individual for further advancement.—Apply, stating age, education, experience, and qualifications, to Box 1429, FOUNDRY TRADE JOURNAL.

WORKS ENGINEER aged between 30 and 45 required for a Steelfoundry in Yorkshire. A first class experienced person is required to take full control of steel foundry maintenance and future development. The applicant must possess drive and initiative and have good organising ability and only men with previous foundry experience should apply. Write giving details of experience to date with salary required, all of which will be regarded in the strictest confidence. A house will be found for the successful applicant.—Box 1431, FOUNDRY TRADE JOURNAL.

A VACANCY exists for a first class CHIEF METALLURGIST in a modern Steelfoundry. It would be preferable if the applicant had experience of converter and arc furnace practice together with a wide knowledge of steelfoundry practice. The position will only be filled by a person having had previous experience of modern practices and one having a practical and progressive outlook coupled with the ability to integrate research and development work into actual production. Please give, in confidence, full details of age, experience and salary required. Housing accommodation will be found if necessary for the successful applicant.—Box 1432, FOUNDRY TRADE JOURNAL.

REQUIRED, promptly, for re-organisation of old-established Yorkshire Ironfoundry, experienced and energetic FOREMAN (age 40 to 45), to control all operations from raw materials to finished castings. Tactful and used to rate fixing for piecework. Required to produce high-class castings for machine tools, tank plates, jobbing pipes up to 30 in. dia., and general engineering castings in a Foundry used to producing 2,000 tons per annum, but now working to only 50 per cent. capacity. The post would be permanent for the right man, with good house and Staff Pension Scheme. Preference will be given to a really first-class applicant with a commensurate salary.—Applications, giving full particulars of training, experience, and positions held, to Box 1425, FOUNDRY TRADE JOURNAL.

AGENCY

FIRM of Three Technical Representatives, calling upon all Foundries in the North of England, desire to represent Manufacturer of Moulding Boxes, on a commission basis. Other lines may also be of interest.—Box 1426, FOUNDRY TRADE JOURNAL.

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ENGINEERING OR ALLIED INDUSTRY.—Advertiser, with substantial financial resources, desires to acquire an interest in (or would purchase outright) an Established Concern with good profit-earning record. Continuity of management and personnel essential.—Address Box 1268, FOUNDRY TRADE JOURNAL.

PATENTS

THE Proprietor of British Patent No. 52655, entitled "Continuous furnace for heating billets and the like," offers same for license or otherwise to ensure practical working in Great Britain.—Inquiries to SINGER, STERN & CARLBERG, 14, East Jackson Boulevard, Chicago 4, Illinois, U.S.A.

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WANTED.—Jolt Pin Lift Moulding Machine. 1,000 lbs. capacity or nearest. Also Pipe Core Spinning Machine, Paterson Hughes or equal. Cores 3 in. to 1 in. dia. by 6 ft. long. Full details to—Box 1437, FOUNDRY TRADE JOURNAL.

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