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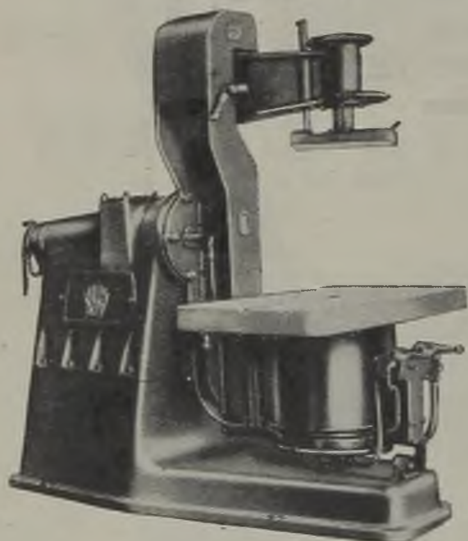

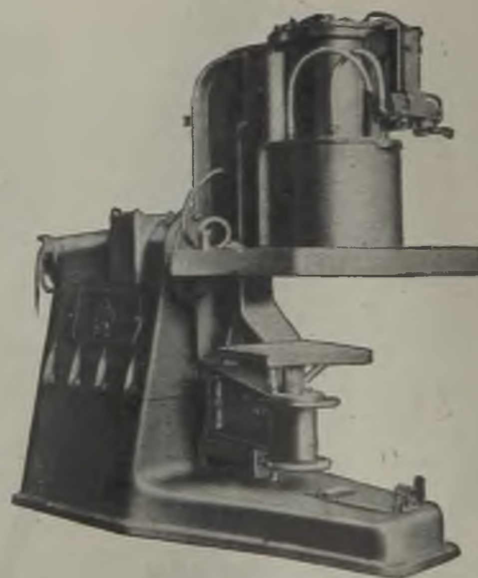

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"Pre-War" Quality

In the period between the two wars, anything designated "pre-war" was often interpreted as being of superior quality. There were, of course, exceptions, such as motor-cars, aircraft and goods which respond readily to fashion changes. With the deterioration of consumer goods during the second world war, there is more than a possibility of the establishment of a similar state of affairs in the post-war era. Prejudice is no doubt an important factor, yet it is undeniable that loss of craftsmanship during service under the crown, coupled with the existence of markets hungry for any type of saleable goods, creates conditions for making of quantity rather than quality. Consequent upon this many lines of manufacture acquire a reputation as being inferior to pre-war. Certain industries benefiting from the solution of war production problems, are quickly able to satisfy public opinion that the appellation "pre-war" is so derogatory that only shortage of cash allows the article to remain in use.

In this brave new world looming upon the horizon, how will that specialised group of individuals who buy castings regard the product of the foundry industry? Will the adjective "pre-war" be regarded by them as denoting a high level of quality now no longer obtainable, or just a memory of a semi-inspected material of uncontrolled properties? It all depends on the mass outlook of the whole of the foundry industry on its products. If its chief agencies of publicity—and there are many—are convinced that the industry as a whole has progressed *au fur et a mesure* with the aeroplane, tank, gun, radio and other engines of war, then and then only will post-war castings be regarded as being on a higher plane than pre-war. Mr. J. F. Kayser, in his Presidential Address to the London Branch of the Institute of British Foundrymen (printed elsewhere in this issue), strongly advised every foundry concern to acquire an X-ray apparatus as a means of ensuring and maintaining quality. Now, Kayser is not actively engaged in foundry practice, but as a metallurgist looking on the industry from without. As a technician, he sincerely appreciates the advantages to be derived from scientific control and inspection. The commercial side of business takes its cue from such pronouncements, and an authoritative statement from the foundry industry, that *x* number of foundries now supply X-ray inspected castings, would help materially to place castings on a higher level. Better still, as it is the larger type of concern which uses or will use X-ray apparatus, a statement that *y* per cent. of the total production of British foundries are so inspected would carry still more weight with the buyer.

An allied industry to which comparisons of pre- and post-war quality are of vital importance is the one undertaking vitreous enamelling. Their products have, as related in the last war, made this the adjective "pre-war" as applied to cookers, mean completely *demode*. For the last five years, this industry has been reduced to a shadow of its former self. Its younger craftsmen are now dispersed amongst armed services; its plant put to other uses, and some of its "strategic" materials in short supply or virtually non-existent. What is to be its policy? It can "oblige" customers by furnishing material which will "get them away," but thereby it will tend to place enamelled ware in that category where "pre-war" is the criterion of quality assessment. They can refuse to supply until unassailable quality is assured, or again they can create acceptance standards to be regarded as a minimum until the full resources of the industry are once more available. The Conference scheduled to take place in Manchester in November will give an opportunity of venting expert opinion on what is obviously a difficult situation. The fact that "pre-war" can mean a much higher or a much lower level of quality and performance must be realised at this important juncture by everybody who has the welfare of his industry—that is his living—at heart.

Contents

DR. HAROLD MOORE TO RETIRE

Dr. Harold Moore, C.B.E., who was appointed Director of the British Non-Ferrous Metals Research Association in 1932, will retire from that post on October 31 next, when, at the age of 66, he will have completed 12 years' service to the Association and 50 years in the study and practice of metallurgy.

As a pupil of the late Dr. J. E. Stead, F.R.S., Dr. Moore, at the beginning of his metallurgical career, was brought closely into touch with the iron and steel industry of his native town, Middlesbrough, and for many years his interests were more ferrous than non-ferrous. After graduating in the University of London he obtained industrial experience in a small Northamptonshire blast-furnace plant and then in the Parkhead steelworks of William Beardmore & Company, Limited.

In 1904 he went to the research department, Woolwich, as chief metallurgist and, after the expansion of his scientific staff from four to 40 during the 1914-18 war, he was designated Director of Metallurgical Research. As metallurgical adviser to the War Office and to the Ordnance Department of the Admiralty, Dr. Moore had much experience of Service problems, both ferrous and non-ferrous, and for his work on these he received the C.B.E. in 1932.

Co-ordination of Research Work

Dr. Moore always held strongly that the research work carried out by Government establishments should be part of the general stream of scientific progress, and he did much to promote the co-operation of his department with industrial laboratories and works, and scientific and technical institutions and University and other research establishments. He and his fellow workers at Woolwich published many scientific Papers. Perhaps the best known of these, for which Dr. Moore was himself largely responsible, were a number of Papers on the season-cracking of brass. He joined, and is still a member of, three of the joint technical committees of the Iron and Steel Institute and the British Iron and Steel Federation, and was for a time chairman of the Steel Castings Research Committee. He became a member of Council of the Institute of Metals and was chairman of its Publication Committee for six years. Successful research on several industrial problems carried out for the British Non-Ferrous Metals Research Association at Woolwich led to his being invited to serve as a member of the Association's Council, and later, on Dr. R. S. Hutton's election to the Goldsmith's Chair of Metallurgy at Cambridge, to Dr. Moore succeeding him as Director.

From 1934 to 1936 Dr. Moore was President of the Institute of Metals, and he has taken a prominent part in its activities for many years. The Institute has shown its appreciation of this work by awarding him its Fellowship. In 1943, he received the Institute's Platinum Medal, awarded annually "for outstanding services to non-ferrous metallurgy." He has represented the Institute and also the British Non-Ferrous

(*Continued at foot of next column.*)

NOTES FROM THE BRANCHES

London Branch, Slough Section.—About 40 members and visitors were present on September 14 at the first general meeting, which was held in the lecture theatre of High Duty Alloys, Limited. Mr. V. C. Faulkner (Past-President of the Institute) presided. Mr. A. Logan was elected chairman of the Section; Mr. R. B. Templeton and Mr. Ian Ross, vice-chairmen; Mr. E. John Pike, honorary secretary; and Messrs. T. Freeman, E. W. Hardy, F. McKenning, S. B. Michael, E. Raybould and G. Skript, members of the Council.

After the business meeting, Mr. F. H. Hoult, general manager of Kent Alloys, Limited, introduced the American sound film, "Wartime Calls on Women to Make Aluminium Air-cooled Cylinder Heads," in association with Mr. Gregory's Paper on the subject. An excellent discussion ensued and Mr. Hoult was cordially thanked by Mr. Logan and Mr. Raybould on behalf of the members. Acknowledgment was also made to High Duty Alloys, Limited, for the use of the room and to Mr. Faulkner for presiding.

South African Branch.—The annual general meeting of the Branch was as usual preceded by a festival dinner. This was held at the Victoria Hotel, Johannesburg, on June 27, Mr. J. M. Stones presiding. In his valedictory address, Mr. Stones reported that the membership, at 203, placed the Branch high up in the list. During the year sections had been formed at Cape Town and Durban. In connection with the former, he expressed the thanks of the Council to Mr. Zwanziger for the part he had played in its creation. Another important recent development was the opening of a technical library by the Branch, and co-operation with the Johannesburg Public Libraries had been assured. He expressed the sincere thanks of the members to Mr. Skok for his excellent work as honorary secretary. On a motion proposed by Mr. Tonge, seconded by Mr. Nimno, Mr. Stones was very cordially thanked for his address.

The following officers were elected for the forthcom- session:—*President,* Mr. P. L. Ward; *vice-president,* Mr. Holdsworth; *hon. secretary,* Mr. Skok; *members of council,* Mr. B. Stuthridge, Captain Ticton and Mr. Retief.

Mr. Ward delivered a short address on the post-war prospects for the South African foundry industry.

(*Continued from previous column.*)

Metals Research Association on the executive of the Parliamentary and Scientific Committee.

Dr. Moore has for some years been chairman of the Non-Ferrous Industry Committee of the British Standards Institution, and has served on large numbers of its technical committees. He is, for the second time, a member of the Council of the Royal Institute of Chemistry.

SPECIFICATIONS, QUALITY CONTROL AND INSPECTION

Mr. J. F. Kayser's Presidential Address to London Branch

The London Branch of the Institute of British Foundrymen opened its 1944-45 session with a meeting at the Waldorf Hotel, Aldwych, W.C.2, on August 31, at which, in spite of flying-bomb attacks on the Metropolis, there was a good attendance of members to witness the inauguration of their new President, Mr. J. F. Kayser, and to wish him well during the coming session. Mr. Kayser delivered his Presidential Address.

Mr. R. B. Templeton (Past Branch President) presided during the early part of the meeting, in the absence of the retiring president, Mr. H. W. Lockwood.

Apologies for absence were received from Mr. Lockwood and Mr. G. R. Webster.

Induction of Branch President

Welcoming Mr. Kayser as Branch President, and inviting him to occupy the chair, Mr. Templeton said that all who had attended the Branch meetings had been impressed by Mr. Kayser's refreshing outlook on Papers that were presented. His criticisms had always been kindly and, though fairly severe, had always been constructive: he possessed a mind of a type which was an invaluable asset in discussion. He was not complacent; he had a spirit of "divine discontent," and would not accept everything that was said without expressing some little doubt. In contemplating Mr. Kayser's elevation to the Presidency of the Branch one felt rather as lawyers might feel when a brilliant K.C. was elevated to a Judgeship; that which was lost in discussion would be compensated by the exercise of his abilities judicially while he occupied the Presidential Chair. One could think of no more fitting climax than that Mr. Kayser, having delivered his Presidential Address, should return temporarily to the body of the hall and criticise it!

On behalf of the Branch, Mr. Templeton wished Mr. Kayser every success and happiness during his period of office.

Presidential Address

MR. KAYSER, having formally occupied the chair, amid applause, presented his Presidential Address, in which he said:

Mr. Templeton and Gentlemen,—I cannot tell you how pleased I am to be elected President of the London Branch. It is an honour which I value just as much as I value the diploma which you gave me many years ago for a Paper which I had read. This is the first occasion on which I have been elected President of anything: perhaps you are the only people who care to risk it!

Generally speaking, I am very disappointed in the foundry industry nowadays. I am engaged mainly in engineering work, and it grieves me that so many parts are being made from drop forgings, or even machined from the solid, whereas they could be made in the form of castings. Very often I suggest that a certain part should be made as a casting, but usually my suggestion is turned down; then along comes a story, probably grossly exaggerated with the passing of the years, concerning what happened in connection with a casting which was made long, long ago. But I agree that there are still many bad castings made to-day, and I think it is possible to make some advancement.

There is an old Latin proverb or motto, "Qui non profecit, defecit," which, being translated, means "Who does not advance, goes back." I do think that that is particularly applicable to the foundry industry. Therefore, I will discuss briefly three of the foundation stones on which success can be built. I am not for a moment suggesting that there are only three. I do not like to hear people talking of their pet hobby as if it were the only hobby in the world.

There are many foundation stones on which are based the success of any business. The three with which I shall deal, in relation to the foundry, are specifications, quality control and inspection. All three are very closely related.

Specifications

One of the soundest sentences I have ever read with regard to specifications was published recently in "The Engineer," and was written by Mr. Harry Brearley. He wrote: "Specifications are often compromises between competing commercial interests mixed with tough prejudice from a bygone generation and decorated with one or more of the fashions in pretentious learning."

When reading some specifications, one cannot decide what they are all about and to whom they are addressed. Some clauses seem to be addressed to the customer or user of the product, others to the manufacturers, and others seem to savour somewhat of working instructions. I think a specification should be a perfectly straightforward document, telling the manufacturer what the customer wants; or, alternatively, if the manufacturer states that he can supply a product to specification XYZ, then the customer should know exactly what he is buying. I do not think that a specification should do any more or any less than that.

In particular, I do not think that a specification should consist of working instructions; that is quite a different matter. There must be working instructions, of course, but I do not think they are connected in any way with the specification. A specification should indicate merely the product that is being produced. If I am selling anything, I state what I have for sale, and that is my specification. Sometimes it is the easiest thing in the world to say directly what is wanted.

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Consider a childishly simple example. Suppose we want to make up a special alloy and wish to add nickel in the form of a ferro-nickel. There we should have a really direct specification. The customer would specify an alloy containing, say, 20 per cent. ($\pm$ 2 per cent.) of nickel, the balance to be iron, impurities not to exceed, say, $1\frac{1}{2}$ per cent. Such a specification would be very nearly a working instruction, but not quite. Consider another very simple example. Suppose I want to buy some round cast-iron rods of, say, 1-in. dia. I do not care what they are made of. Again I have a direct specification, stating that the diameter must be 1 in. ($\pm$ 0.1 in.). That also would be a working instruction.

But there are cases very much more difficult than that. Suppose I have a complicated machine, such as an internal combustion engine, and I have a new sort of piston working at a new speed or with a new fuel. What must I do? First, I can call on past experience, which will lead me to think that the cylinder should be made in cast iron, by and large. Then I shall make up a number of different cylinders and ring the changes on the cast iron; and ultimately I may conclude that cast iron A is the best and is the one that I want. If I try to be a really clever guy, of course, I can specify "cast iron suitable for the manufacture of this cylinder block," which must have a life of 10 years at 10.000 r.p.m., or something of that sort. But it would be necessary to give an indirect specification. I should want to give the analysis; and probably I should tag on a tensile, perhaps an Izod and a Vickers diamond hardness, a Brinell and, if you like, a fatigue. People have a tendency just to tag on things.

If I am lucky, it may be that, because of that collection of constants and physical properties, the thing can be controlled so that I can avail myself of the peculiar physical property that I want, such as non-distortion at the temperature which is attained in the engine, or can achieve the proper action or reaction between the piston and the cylinder walls. It seems to me that, when an indirect specification such as that is used, the supplier must just keep to it.

Mode of Manufacture and Analysis

But there are other kinds of specifications where I should object to the inclusion of anything other than the requirements. Suppose I want a part that has to be stressed. I think it should be sufficient to calculate the stresses and then to state that the material must have certain physical properties, which can be given; I should state a compression, a tensile, elongation, Young's modulus—just what I want. The specification should contain only that, and should make no reference at all to mode of manufacture or to analysis.

From time to time I draw up specifications on those lines, and the manufacturers might ask me about the analysis. But I tell them that I must leave it to them. Of course, if a manufacturer is not really skilled in his art and does not know how to achieve the results I require, and if I have to give the work to such a manufacturer, I may tell him that, in order to achieve the physical properties required, the material will have to be made in a certain way and must be cast under certain conditions. But that means encroaching upon the manufacturer's prerogative. When I was in the steel trade and customers tried to suggest how we should achieve what they wanted and when they tried to bind us to the methods they suggested, we did not like it at all. Sometimes we reached the ridiculous stage at which two parts of a specification were absolutely incompatible. There were some matters which did not concern the foundry directly, and if the instructions on heat-treatment were followed, the physical properties required would not be achieved. That is more than awkward.

Now let us consider the manufacturer who has accepted an order for something. Consider first the very simple case of the nickel-iron alloy I have mentioned. There the specification is to all intents and purposes a working instruction; it is the target at which the manufacturer must shoot, and he will know whether or not he has hit it. Has he got 20 per cent. nickel (within the limit of $\pm$ 2 per cent.), and has he confined the impurities to within the top limit of $1\frac{1}{2}$ per cent.? That is a very simple case. If you want castings you may consider merely an indirect specification, such as a statement of physical properties, but it is of no use telling the steelfounder that you want steel castings of 45 to 55 tons per sq. in. tensile: that would not be a direct target for the steelmaker and the maker of the castings. You must specify things so that they provide a direct aim.

First you must decide on the metal, and must ensure that the founder always has the same target in front of him. It is for the person responsible for turning out the metal to see that he hits as nearly as possible the centre of that target, which may be even a series of targets if there are different constituents to control.

Control

Further, everything else must be controlled. There must be control of the sand and of the way the mould is made—not merely a stipulation as to where the runners and risers go. The question arises as to how and when are you going to control the various factors. For many years I have been so mixed up with mass-production that it is bound to influence my mind. When one is turning things out in countless thousands every day, one thinks of everything else being turned out in countless thousands. I want you to visualise that it is a foundry proposition to turn things out in thousands every day and every month throughout the year. There is no reason at all mechanically, and even perhaps metallurgically, why you should not have sand bins, melting furnaces and moulding machines in a line, so that the sand can be fed down shutes and put into the moulds, the metal poured at the proper time, and the boxes being shaken out at the other end of the line. You can do things like that mechanically.

But the great thing about mass-production is that you must decide where and when you are going to break the circuit for examination purposes, for control of quality and for taking out the parts that are bad; defective workmanship always arises. Sometimes it will be necessary to have an operation controlled all by itself and there must be a complete stop for purposes of examination before the work goes on. I am afraid that in the foundry it would be necessary to break in very many different places if you are to ensure turning out a good product. It is a question as to where inspection starts and where quality control starts in the foundry.

I am not considering quality control merely by the use of statistical methods, about which one reads so much nowadays. Quality control by those methods may have its uses; but I think it is a passing fancy, and I have not arrived at that conclusion rashly. Since I first read about it, some three or four years ago, I have studied it most deeply and have gone into the theory of statistics. Whilst I do not quarrel, I do not think that its application, as offered by some people, is the right one. There is a very great deal to be learned from statistics; and I do think that every foundry, however small, if it has any control at all, should present its results upon what one might call a statistical basis.

The Frequency Diagram

My favourite basis, which I think is applicable to practically everything, is the frequency diagram. It can be applied right the way through—to the moistening of the sand, the percentage of wasters, and everything else. You can really present results usefully in the form of a frequency diagram. It is so clear that you can show it to a comparatively untutored workman who, though he may not follow exactly what it is all about, will appreciate the point you are making. You can show him that the points which indicate results are extending over one or other of two red lines, whereas they should be in the centre. From experience I have found that if you talk like that to a man, he will appreciate that the points should be in the centre, for everybody has the idea that if you have a target, you should hit it in the middle.

Frequency diagrams are published in the engineering and metallurgical journals. Generally speaking, a frequency diagram, whether it relates to the moisture content or clay content of the sand, or to anything else, should be symmetrical and should have a certain slim shape. The manager of a very complicated organisation can have frequency diagrams placed before him every day and will be able to see at a glance whether or not the various aspects of the work are proceeding as they should. Even without knowing whether a particular diagram deals with tensile results or carbon content or anything else, he would know at once whether or not things were going right, for, if there were anything wrong, he would notice it at once by reason of the shape of the diagram. Unless there is something wrong, there is no need to bother at all. That is an exceedingly useful application of statistical methods.

Inspection

With regard to inspection, I should like to see a greater tendency to inspect moulds. When I am purchasing castings, I always ask if I may look at the moulds; but very few people do that, although there are exceptions. Surely, having inspected the sand, as you should do in order to ensure that it is of the right sort and is properly milled and mixed, you should also inspect the mould.

I had a very severe training in that connection. Before I had had any experience at all I was appointed manager of a small foundry—indeed, I had to start it off—and did not know that there was such a thing as a fettling shop. Consequently, I set out to make castings, with the assistance of one or two very enthusiastic moulders, and we had no fettling department; so that, if anything went wrong with a casting, there was no hope for us. We had to avoid scabs and we had no means of welding in a chip, so that we had to get things right in the foundry. I think that if some foundries had to do without their fettling shops their castings would be very much better; there are so many people who rely on others to put right their failures. That happens in engineering, and the last man in the chain, who has to assemble an engine or some other apparatus, has to "carry the baby." In many ways the fettling shop has to "carry the baby" for the foundry, and that is wrong. Not long ago I saw a man in a fettling shop drive a chunk of steel into a hole in a casting and weld over it. That did not create a good impression in my mind. If there had been no fettling shop, that casting would never have left the foundry; the maker would have known that it was "his baby."

That is one reason why you should inspect moulds. I do not suggest that if you are making a stern post, for example, you should break up the mould for inspection; but for ordinary products you should inspect the moulds, just as you inspect a finished casting. I would not have a patched-up mould. Pull one to pieces to ensure that it is uniformly rammed. Then, when the boxes are being closed, I would certainly open one in order to see what it looks like. That is where inspection should start, and it should continue throughout.

Are we to rely on statistical methods in examining the castings themselves? It means that we are going to judge the quality of a very large number of castings by a few samples, not by inspecting a sample here and there after all the castings have been made, but by taking a number of samples in the course of production. It can be done within limits, but that is not 100 per cent. inspection. If you want 100 per cent. inspection, to be absolutely certain that all your castings are sound—I do not think it is possible except in the most special cases—you must X-ray them.

It is suggested in connection with X-rays that you can inspect by screening. If the defects are so bad

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that you can see them by screening, then you have not got very far. The defects which are awkward to get rid of, and which will crop up from time to time, could not be seen by screening, and you would have to take photographs. Photographing is a very big job, and I do not think the richest of firms would decide to X-ray all its castings, though it would probably X-ray special castings, such as aeroplane components.

I think that every foundry, however small, should try to get enough money together to buy an X-ray set, and should use it. I suggest that, to start with, it should not be used by the inspection department, but by the person responsible for production; and always X-ray the prototypes of castings. An X-ray set which will show up defects in very thick parts is exceedingly expensive, though it enables us to avoid cutting up the casting. The best course, I think, is to slice it up and examine it. If you are making biggish castings and cannot afford a large X-ray set, there is no reason at all why the use of X-rays should not be combined with a slicing-up process. A skilful man in the foundry will often know where to anticipate trouble and will cut right into it. But he can be wrong; trouble may occur in an unexpected place.

At our works we could not get a permit for an X-ray set when we wanted it. But we do X-ray razor blades successfully with a second-hand medical set costing £92. In the case of one or two larger castings, which we cannot inspect right through by X-rays, we cut them into slices for examination. Very often a comparatively low-powered set can be used quite successfully in that way.

Vote of Thanks

Mr. F. H. Hoult, proposing the hearty thanks of the members to Mr. Kayser, commented on the application of specifications, quality control and inspection to his presidency. In the first place, he said that Mr. Kayser could fulfil the specification for a President in every respect. Secondly, with regard to quality control, there was no doubt that he could control the quality of the discussions in a manner which left little to be desired. Third, the function of inspection lay in the hands of the general body of members, and he hoped that they would criticise very strongly the problems raised in discussion. The members as a whole, he concluded, looked forward to a very interesting session under Mr. Kayser's guidance.

Mr. V. Delport (Past-Branch-President), seconding, commended Mr. Kayser's interesting address-*cum*-Paper to the study of the members. Bearing in mind Mr. Kayser's wide experience—indeed, he was a specialist on some of the matters raised—his address would be very useful, and foundrymen were well advised to read it at leisure when published. In particular it should help them to discuss specifications which might appear to be unreasonable. No doubt also the members would bear in mind that not too much reliance should be placed on the department in which defective castings could be made passable. Finally, Mr. Delport wished Mr. Kayser a very happy and successful year of office.

Mr. R. B. Templeton (Past-Branch-President), adding his support of the vote of thanks, said he did not agree with all that Mr. Kayser had said. For example, he did not see how one could run a foundry without a fettling shop: that seemed to be a Utopia which could not be achieved. After all, it was necessary to remove sand, risers, etc. The case mentioned by the President, where a man in a fettling shop had looked around for a piece of odd steel, and had used it to fill a hole in a casting and had welded over it, was extraordinary, and he hoped there was no foundry in the London area in which that sort of thing was done. He would be ashamed if there were.

With regard to inspection, Mr. Templeton believed that, if one applied a good system and maintained it rigidly to a standard, one was able to develop and maintain a type or grade or quality of casting which would sell itself. Indeed, he believed that the inspection department would eventually supersede entirely the outside salesman; if one could make regularly a product so good that it would sell itself, one was on the right lines.

In order to show that the standard of inspection had been tightened up considerably during the last 100 years, Mr. Templeton recalled some rather provocative correspondence published in "The Times" about a year ago concerning the mouldings at the bottom of Nelson's monument in Trafalgar Square, London. The monument was built, he said, in 1852, at a cost of about £40,000. The mouldings or sculptures at the bottom were called "base-reliefs"; they were about 15 ft. square and were made in non-ferrous metal. The contracts for the four base-reliefs were given to two foundries. In due course one foundry had produced two mouldings. But on the day before they were ready to be fixed to the plinth of the memorial an anonymous letter was received by the Ministry of Works asking that the mouldings should be inspected. An inspector was sent along, and he had noted the beautiful bronze colour both at the front and at the back. Tapping the back with a hammer and chisel, he had discovered a plaster coating; but, on digging more deeply into it, about a ton of iron had fallen out.

That was a sad story; but the saddest part was that the contracts for the replacement castings was placed with the firm which had not delivered, and the two directors and the works production committee of the first firm were arraigned before the Court and sentenced to terms of imprisonment. The castings had weighed about 3 tons each, and were filled with a ton of iron. However, that was not a reflection on those concerned with non-ferrous founding in the Institute.

(The vote of thanks to the Branch-President was carried with acclamation, and Mr. Kayser briefly responded.)

(*Continued on page* 78, *column* 2.)

FIRST REPORT ON THE BASIC CUPOLA BY THE MELTING FURNACES SUB-COMMITTEE

Examination of results obtained in practice with basic-lined cupolas

(*Continued from page 59.*)

Discussion of Results

As with other processes concerned with dephosphorisation, if any useful degree of phosphorus removal is to be obtained, the silicon must be removed by intense oxidation. In the present series of experiments using pig-iron only in the charge, Tables III and IV, the iron ore added with the intention of creating an oxidising slag proved to be almost ineffective. The low FeO content of the slag (Table V) indicates that the iron ore was reduced by the incandescent coke at a higher level than the melting zone.

With low silicon materials, as in the experiments using steel scrap, Table VI, up to 80 per cent. dephosphorisation was obtained without the addition to the charge of an oxidant. This suggests that in the absence of silicon, the molten droplets of metal are easily oxidised and this inherent oxidation is sufficient to allow the iron oxide formed to react with the phosphorus. As shown in Table VII, the inclusion of ferro-silicon in the charge reduced the dephosphorisation to around 40 per cent., but the reduction was not in proportion to the quantity of ferro-silicon added. In this series the silicon is not present in that portion

TABLE IX.—*Details of Production Cupola.*

1.—Diameter of shell	60 in.
2.—Internal diameter of lining	36 in.
3.—Number of tuyeres in bottom row ..	6—9in. by 3 in.
4.—Number of tuyeres in top row ..	6—7 in. by 3 in.
5.—Height from base plate to centre of bottom tuyeres	3 ft. 4½ in.
6.—Height from centres of bottom tuyeres to centres of top tuyeres	2 ft.
7.—Height from base plate to top of basic lining	11 ft.
8.—Height from base plate to charging sill	21 ft. 6 in.
9.—Approximate wind belt pressure ..	12—15 in. water gauge.
10.—Approximate tapping temperature of metal during tests.	1,450 deg. C. to 1,480 deg. C., taken with "Optix" optical pyrometer read on corrected scale

TABLE X.—*Details of Melt. Ex. D.P.9.*

Cupola Charge—Wrought Iron and Steel Scrap.						Slag Analysis.							
Sample No.	C	Si	Mn	P	S	SiO_2	Al_2O_3	CaO	MgO	FeO	MnO	S	P
C 1	2.82	0.67	—	0.045	—	—	—	—	—	—	—	—	—
C 2	3.03	0.14	0.20	0.030	0.120	—	—	—	—	—	—	—	—
C 3	2.92	0.14	—	0.025	—	—	—	—	—	—	—	—	—
C 4	2.75	0.096	0.20	0.029	0.120	—	—	—	—	—	—	—	—
C 5	2.82	0.096	—	0.022	—	—	—	—	—	—	—	—	—
C 6	2.63	0.096	0.15	0.023	0.122	28.0	15.46	38.41	13.61	1.74	2.05	—	0.026
C 7	2.53	0.096	—	0.023	—	—	—	—	—	—	—	—	—
C 8	2.55	0.048	0.15	0.025	0.112	—	—	—	—	—	—	—	—
C 9	2.51	0.048	—	0.027	—	—	—	—	—	—	—	—	—
C10	2.54	0.048	0.13	0.027	—	—	—	—	—	—	—	—	—

Average phosphorus, 0.028 per cent. Calculated phosphorus in charge, 0.133 per cent.

Details of Cupola Charge.

		Average Analysis. Si	Mn	P	S
Steel scrap ..	900 lb.	0.20	0.46	0.06	0.07
Wrought-iron scrap ..	400 ,,	0.05	0.15	0.33	0.05
Coke	216 ,,				
Fluorspar	20 ,,				
Limestone	100 ,,				
Bed height	46 in. above top tuyeres,				
Air supply	250 lb. per min.				

Melting Furnaces Sub-Committee

of the metal charge to be dephosphorised as distinct from the pig-iron experiments, where both silicon and phosphorus are present in the same constituent of the charge. The series reported in Table VIII indicates the limiting effect of pig-iron additions on dephosphorisation, the object of each melt being described in the Table.

Reviewing the results as a whole, it may be deduced that when the silicon is present in that constituent of the charge to be dephosphorised, the phosphorus reduction is relatively low, depending to a certain extent on the percentage of the high phosphorus constituent in the charge. Alternatively, when the silicon is not present in the portion of the charge to be dephosphorised, and is concentrated in a small percentage of the charge (as ferro-silicon) as in Table VII, the possibility of phosphorus removal is greater (compare Table IV).

TABLE XI.—*Details of Melt. Ex. D.P.13.*

Cupola Charge—Steel Scrap and Ferro-silicon.

	Metal Analysis.					Slag Analysis.							
Sample No.	C	Si	Mn	P	S	SiO_2	Al_2O_3	CaO	MgO	FeO	MnO	S	P
C 27	2.76	0.53	—	0.038	0.110	—	—	—	—	—	—	—	—
C 28	2.85	0.24	0.30	0.038	0.116	—	—	—	—	—	—	—	—
C 29	2.45	0.29	—	0.034	0.120	33.20	9.12	43.33	11.08	1.00	1.75	0.53	0.056
C 30	2.73	0.29	0.25	0.030	0.110	—	—	—	—	—	—	—	—
C 31	2.72	0.29	—	0.037	0.100	—	—	—	—	—	—	—	—

Average phosphorus, 0.035 per cent. Calculated phosphorus in charge, 0.060 per cent.
,, silicon .. 0.33 ,, ,, ,, silicon ,, ,, 0.90 ,, ,,

Details of Cupola Charge. *Average Analysis.*

		Si	Mn	P	S
Steel scrap	1,300 lb.	0.20	0.46	0.06	0.07
Ferro-silicon	10 ,,	78.00	—	—	—
Coke	216 ,,				
Fluorspar	20 ,,				
Limestone	100 ,,				
Air supply	250 lb. per min.				

TABLE XII.—*Details of Melt, Ex. D.P.17.*

Cupola Charge—Steel Scrap, Wrought Iron and Ferro-silicon.

	Metal Analysis.					Slag Analysis.							
Sample No.	C	Si	Mn	P	S	SiO_2	Al_2O_3	CaO	MgO	FeO	MnO	S	P
C 17	2.54	1.05	—	0.058	0.070	—	—	—	—	—	—	—	—
C 18	2.78	1.19	0.26	0.053	0.066	—	—	—	—	—	—	—	—
C 19	2.71	1.01	0.23	0.051	—	—	—	—	—	—	—	—	—
C 20	2.47	0.91	0.30	0.066	0.068	35.4	8.10	44.8	9.65	1.10	1.26	0.69	0.19
C 21	2.65	0.96	0.32	0.075	0.070	—	—	—	—	—	—	—	—
C 22	2.75	1.19	0.31	0.067	0.068	—	—	—	—	—	—	—	—

Average phosphorus, 0.061 per cent. Calculated phosphorus in charge 0.11 per cent.
,, silicon 1.06 ,, ,, ,, silicon ,, ,, 1.37 ,, ,,

Details of Cupola Charge. *Average Analysis.*

		Si	Mn	P	S
Steel scrap	1,100 lb.	0.20	0.46	0.06	0.07
Wrought-iron scrap ..	200 ,,	0.05	0.15	0.40	0.05
Ferro-silicon	20 ,,	78.00	—	—	—
Coke	216 ,,				
Fluorspar	20 ,,				
Limestone	100 ,,				
Air supply	250 lb. per min.				

The experimental work so far carried out has shown that if conditions are suitable for the removal of phosphorus, desulphurisation is restricted. Oxidising conditions favourable to dephosphorisation are unfavourable to desulphurisation.

It should be noted that the total quantity of phosphorus lost by the metal has not been accounted for in the slag (Tables X, XI, XII and XIII), the constitution of which is in no way comparable with that of dephosphorising slags associated with other processes. It may be assumed that such a cupola slag would be incapable of retaining any quantity of phosphorus as calcium phosphate due to its low oxidising properties and relatively low basicity, compared with dephosphorising slags produced in the electric and open-hearth furnaces. As the cupola lining material used in these experiments was stabilised dolomite which contains up to 20 per cent. silica, the slag basicity was undoubtedly lower than it would have been with a more basic refractory, such as magnesite. An analysis of the fritted portion of the lining taken from the melting zone showed a certain amount of phosphorus absorption to the extent of 0.30 per cent. This, however, does not account for the total quantity of phosphorus removed; the remainder may possibly be discharged with the stack gases, but a preliminary attempt to absorb it in water was unsuccessful.

TABLE XIII.—*Details of Melt, Ex. D.P.19.*

Cupola Charge—Wrought Iron. Steel Scrap and Hematite Pig-iron.

	Metal Analysis.					Slag Analysis.							
Sample No.	C	Si	Mn	P	S	SiO_2	Al_2O_3	CaO	MgO	FeO	MnO	S	P
C 20	2.94	0.96	0.40	0.055	0.100	—	—	—	—	—	—	—	—
C 21	2.91	0.86	0.45	0.064	0.078	—	—	—	—	—	—	—	—
C 22	2.70	0.53	0.41	0.063	0.102	—	—	—	—	—	—	—	—
C 23	2.70	0.38	0.40	0.066	0.102	—	—	—	—	—	—	—	—
C 24	2.78	0.70	0.40	0.065	0.100	34.8	9.83	38.14	10.19	0.95	2.73	0.78	0.126
C 25	2.78	0.58	0.40	0.069	0.098	—	—	—	—	—	—	—	—

Average phosphorus, 0.064 per cent.
,, silicon, 0.67 ,, ,,

Calculated phosphorus in Charge, 0.107 per cent.
,, silicon ,, ,, 0.95 ,, ,,

Details of Cupola Charge. *Average Analysis.*

		Si	Mn.	P	S
Steel scrap	840 lb.	0.25	0.55	0.060	0.070
Wrought iron	200 ,,	0.05	0.20	0.400	0.050
Hematite pig-iron	260 ,,	3.75	0.87	0.053	0.050
Coke	216 ,,				
Fluorspar	20 ,,				
Limestone	100 ,,				
Air supply	250 lb. per min.				

Lining Wear

It should be pointed out that lining wear over long periods when operating a cupola under the oxidising conditions necessary for dephosphorisation has not yet been studied. Although experience has shown that, when a basic cupola is worked under the relatively non-oxidising conditions required for desulphurisation, lining erosion is not more severe than in an acid cupola, it is possible that operating conditions will have some influence on lining life. From the short experimental melts so far carried out under conditions favourable to dephosphorisation, there is no evidence that excessive attack on the lining may be expected.

Proposed Lines for Investigation

The present work reveals the necessity for a considerable amount of further experiment before any positive theory of the nature of the reactions can be formed. The relatively small amount of dephosphorisation which was obtained in the above reported experiments on pig-iron appears to justify a continuation of the work which would probably involve some modification in the design of the cupola. In order to intensify the dephosphorisation, some means should be found of inducing a more oxidising condition in the melting zone, and work could be carried out on the effect of operating with excess air and low coke bed heights consistent with obtaining metal at a reasonable spout temperature. Further attempts should be made to create a slag with a composition more strongly basic and oxidising. Investigation could be made on the use of larger quantities of limestone and lime, and its effect on increasing the basicity of the slag.

The continuous tapping system employed in the reported experiments may have some bearing on the results, as in this method of operation, the well contains a relatively large volume of slag with a

(Continued overleaf, column 1.)

FIRST REPORT ON THE BASIC CUPOLA BY THE MELTING FURNACES SUB-COMMITTEE

(*Continued from previous page.*)

minimum quantity of metal. Therefore, any well reactions would be modified in the more conventional type of cupola using intermittent tapping as the ratio of slag to metal, and the contact time would be totally different. The effect of these two factors together with receivers and well depth require to be examined. It would, of course, be an obvious advantage to obtain simultaneous dephosphorisation and desulphurisation, and, with a more intimate knowledge of the reactions, this dual reaction may prove to be possible.

Applications of the Basic Cupola

The opportunity offered by the basic cupola for desulphurisation has obvious applications in the manufacture of steel by the converter process, and also in processes where low sulphur cupola melted metal is required to be tapped direct into a batch-type furnace for duplexing, as in the manufacture of short cycle anneal malleable, etc. It may also be of value in enabling charges containing large proportions of scrap to be used in the production of light castings and in other applications where cupola melted metal of consistently low sulphur content is required.

The work so far carried out on dephosphorisation implies a fulfilment of certain immediate requirements of the cupola/converter process, and possible advantages to this process may be stated as follow:—(1) To make possible the use of higher phosphorus steel scrap; (2) to substitute higher phosphorus pig-iron for hematite iron in the cupola charge; (3) to produce a steel with lower phosphorus content than is normally obtained from the acid converter, thus closely approaching the analysis of basic electric steel, and (4) to off-set the phosphorus increase in the steel produced due to the metallic losses in the cupola and converter.

Successful application to practice will depend on obtaining economical refractory life and in the development of a correct operating procedure best determined by practice based on a more complete understanding of the reactions involved. The basic cupola may also prove of value for the melting of ferro-alloys, such as ferro-manganese, where the slag produced is of a nature which rapidly attacks an acid lining.

An aspect of the subject not considered in this report, but which is engaging the attention of the sub-committee, is the influence of basic cupola melting on the properties of grey cast iron. The work of Heiken suggests that an abnormal pick-up of carbon may be expected, but no confirmation of this has so far been obtained when operating a basic cupola under conditions favourable for desulphurisation. It will be noted also that the carbon contents reported in the section on dephosphorisation are of the same order as those obtained when melting similar mixtures in an acid furnace.

INSTITUTE OF VITREOUS ENAMELLERS

CONFERENCE AT MANCHESTER

The annual general meeting and conference of the Institute of Vitreous Enamellers will be held at the Midland Hotel, Manchester, on November 24 and 25 next. The Council feels that this, the 10th annual meeting, will be the most important conference that has been held in the history of the Institute. The splendid progress made by the Allied Armed Forces makes it obvious that in the immediate future, momentous and historical decisions will be made, which must inevitably affect economic and industrial life internationally. In particular, the Institute is concerned with its ultimate and prospective effect on the industry of this country. Enamelling plants throughout the British Isles have been entirely utilised in providing support for the national war effort, and this alone has entailed complete dislocation of plant and normal methods of procedure.

Many problems will arise during the transitional period from war to peace, and the Council believes that this conference will provide a unique opportunity for all members of the industry to make intimate personal contact with each other—to discuss numerous problems to the mutual interest and satisfaction of all concerned—and for these reasons believe that they can confidently depend upon every individual member not only giving this conference his personal support, but will ensure its complete success by inviting his friends and associates connected with the industry. A number of important Papers have been arranged, and discussion of these is invited.

Members attending the conference who desire to stay at the Midland Hotel, should write direct to the hotel, mentioning that they are attending the conference.

Conference Programme

Friday, November 24.—3 p.m., meeting of Council; 8 p.m., technical meeting, at which the following Papers will be given: "Research and the Vitreous Enamelling Industry," by Gordon Abbott, B.Sc., A.R.I.C., and "Enamelling of Heavy Vessels," by E. J. Heeley, I.C.I., Limited (Dye-stuffs Division).

Saturday, November 25.—10 a.m., annual general meeting; 11.15 a.m., technical meeting, at which the following Papers will be given: "Personal Observations on the Latest American Practice," by S. Vickery; 11.45 a.m., "Latest Methods of Pickling," by Norman Swindin, M.I.Chem.E., A.M.I.Mech.E.; 2.30 p.m., "The Use of Infra-red Radiation Convection Ovens in the Drying of Finishes," by H. Silman, B.Sc., A.I.C., A.M.I.Chem.E.; 3 p.m., "The Milling of Enamels," by A. Biddulph; 3.30 p.m., "The Principles and Practice of Induction Heating," by S. G. King.

Luncheon will be served at 12.45 for 1 p.m., and there will be a buffet tea at 4.15 p.m.

WARTIME CALLS ON WOMEN TO MAKE ALUMINIUM AIR-COOLED CYLINDER HEADS

By M. J. GREGORY

Discussion on the American Foundrymen's Association Exchange Paper presented at the Annual Conference of the Institute of British Foundrymen. Mr. D. H. Wood occupied the chair. Mr. Gregory's Paper was printed in our issues of June 22, June 29, and July 6.

Mr. J. J. Sheehan, B.Sc., who presented the Paper, said that the cinematograph film harmonised very well with the written Paper and its illustrations, and the Paper itself was very well introduced, paragraphed and sectioned. Being much interested in sand control himself, he observed that the success of the methods described was largely due to the especial care which had been taken in that connection.

Future International Gatherings

Mr. F. J. Cook, M.I.Mech.E. (Past-President), understood that the cinematograph film had been presented to the Institute by the American Foundrymen's Association. It demonstrated that throughout the process described a great deal of thought and care and attention had been paid to every detail. He assumed that the best thanks of the Institute had been tendered to the donor of the film.

The Chairman replied that the gift had been suitably acknowledged, and that a suitable expression of thanks had also been conveyed to Mr. Gregory for his most interesting and instructive Paper.

Mr. V. Delport (Member), speaking in his capacity as the official representative of the American Foundrymen's Association in Europe, said that since the commencement of hostilities contact with many other technical associations had ceased. A notable exception, however, was that of the American Foundrymen's Association. Not only had the principle of exchanging Papers between the two organisations been maintained, but it had been so much enlarged upon that there was now an exchange of Papers between Branches of the Institute and Chapters of the American Foundrymen's Association. It was hoped that there would be even more numerous exchanges in the future.

It was not probable that there would be a real international congress for some years after the cessation of hostilities. Attempting to look into the not too far distant future he thought that the first real contact which would occur with other technical institutions would be through a still further linking up with those in America. Personally he was looking forward to the first inter-allied congress taking place in America soon after the war. Furthermore, he would like to confirm the greetings which the Institute had received by cable from the American Foundrymen's Association, and to express the hope that their friendly contact would be increased in strength year by year.

Avoiding Turbulence

Mr. M. R. Hinchcliffe (Associate Member) congratulated the Author of the Paper upon having produced a very brilliant piece of work. Both the layout of the foundry and the technique were of the highest order, while the presentation of the Paper did not leave anything to be desired. There was one observation made by the speaker of the "talkie" film which should be qualified. Reference was made to the necessity for avoiding turbulence in the aluminium when transferring it from the furnace to the mould, but when it was taken to the mould it seemed to be literally thrown into it. What means were taken to avoid oxide inclusions in the casting, and to ensure rapid filling of the mould without undue turbulence?

Mr. Sheehan said the point had occurred to him also when he saw the film for the first time. Great trouble was taken to avoid turbulence in the first place in going from the furnace to the ladle as well as in every one of the operations of melting. It would be noticed that a chemical inhibitor was sprayed on the mould, and it was stated in the text that an inhibitor was incorporated in the facing sand. All this care to avoid turbulence in the first place, and of minimising its effects in the second place, was an indication of thoroughness. Looking at the film a little more closely it would be seen that the two down-gates were very large—wide in opening and short in depth. The ladle was specially designed and teemed as if turning over a basin. There was not the turbulence of a stream. The turbulence was outside the mould, also the splash, but the fact was that there was very little turbulence in the mould. The care which had been taken with regard to the design of the ladle and the down-gate was evidence of the pains which had been taken to avoid turbulence.

Value of the Film

Mr. R. D. Lawrie said foundrymen in this country ought to do more than they have done in the past in the way of exhibiting moving pictures, for, after all, it was one thing to read a Paper but quite another to see the same thing on the screen. There is an old Chinese proverb which states that "One picture is worth a thousand words," and it will be conceded that the quickest way to the brain is by way of the eye. With regard to the subject itself, he (Mr. Lawrie) was not too familiar with aluminium foundry-work, and there were one or two points upon which he would like some further information. It had been stated that there were two types of sand used, one being a facing sand and the other a backing sand; was it absolutely necessary to have two sands? Another point was with regard to the Brinell test; there seemed to be only one impression taken. Was this quite sufficient for aluminium? He thought there might have been at least ten readings taken at different points and then averaged.

He understood the commentator to make reference to a combined air and water test. What was meant by this? On the screen the only test seen was a water test, and his idea of an air and water test was to seal the casting, introduce the air under pressure, and then submerge the whole job to a tank of water and look for air bubbles. With regard to pouring temperatures, he noticed a "close up shot" of the recording dial

Air-Cooled Cylinder Heads

of the pyrometer, but there seemed to be quite a considerable period of time elapse before the job was poured. He, personally, always insisted on the pyrometer being kept in the ladle until the actual time of pouring. Was this necessary or otherwise?

Mr. Sheehan said from reading the text of the Paper he realised the necessity of using both facing and backing sands. The facing sand was an extremely fine one, as would be observed by the fineness number and the screen test itself, so that it was very carefully designed for a specific purpose. The clay content was selected to give a fine finish between the fins. Normally this would be an expensive sand, and needed only at the face of the casting. The backing sand was a rough silica sand which required a considerably less amount of binder to give it the same physical properties. So that use of the facing and the backing sands were purely a matter of economy. If it were possible to make either as cheaply as the other there would appear not to be any great necessity for using the two. It would be noticed, however, that in the text it was stated that facing sand was mixed with inhibitors, and they cost a certain amount of money. Therefore the tendency would be to reduce their use in the mill. The Brinell hardness test, of course, was shown as merely one test; but he thought Mr. Lawrie would agree with him that it would be somewhat monotonous to show a Brinell test in ten different places on the film. It merely showed a routine test, and 100 per cent. Brinell on every casting was quite a good result. Personally he felt certain there would be also a very much involved laboratory control.

Water Test Operation

In connection with the water test, it was stated in the text that "the water test operation is located at the end of the preliminary cleaning, which might show that scrap heads may be rejected before the final cleaning is started. The casting is removed from the conveyor and placed in a special fixture, where it is clamped and sealed with a steel-backed rubber pad; 70 lbs. per sq. in. air pressure is applied and maintained inside the head, and the whole fixture is lowered into a tank of water for testing. Any leaks are instantly disclosed by a stream of air bubbles" (see operation on left in Fig. 17). Thus while this was not illustrated in the film it was contained in the text.

Mr. Lawrie said no doubt there were others present who had experience in the manufacture of trench mortar bombs which had to be subjected to 100 lbs. air pressure; he felt sure they would agree that substituting water for air in the casting was quite a different matter, as air would escape where water would not.

Mr. Sheehan quite understood the point. He did not quite follow Mr. Lawrie on the temperature question, but he would think as far as that was concerned that the temperature picture was taken in such a way as to accommodate the camera; that the temperature would be taken normally with a thermo-couple and kept at that particular temperature almost immediately before pouring. It would be understood that it was not very easy to photograph every individual action.

Why not a Die-Casting?

Mr. J. Vickers (Member) said an example had been exhibited that it would be well for foundrymen in this country to copy. As contrasted with the previous lantern slide method the motion picture of an actual operation was infinitely better. He would also like to congratulate Mr. Gregory on his really fine Paper. It outlined the features of an American factory which was mechanised to the last degree, with the human element removed as far as possible, while the fatigue factor was also reduced to a minimum. One could not help but wonder whether, in considering a casting of the type described, in view of the experience in this country on certain air-cooled aero engine cylinder heads such as the Bristol "Hercules," etc., die-casting was thought of in connection with the particular problem.

Mr. Sheehan would imagine that die-casting had been considered, and he thought that die-casting methods had also been adopted in the States. No one knew better than Mr. Vickers that die-casting was a great hardship to operators. The conditions were very difficult to make suitable for female labour, and it would be very disagreeable on a hot day in a die-casting shop.

Oiled Core Edges

Mr. A. Augstein (Member) was particularly impressed by the synchronised mechanisation of the core making. The fact that practically all cores were made on coreblowers, and the manner in which they were assembled, proves that a sand with a high flowability and a rather low green bond was employed. These types of mixtures usually possess a very high dry bond, and should normally produce a core hard enough to prevent brittle edges. He would like to know why it is necessary to increase the dry bond by oiling the edges.

Mr. Sheehan said the flowability was good, and there was a specially designed and selected rounded grain. The green bond was low because the necessity for a high green bond was not very obvious, particularly when drier shells were used for smaller cores. Mention had been made concerning the oiling of the edges. He was not quite sure whether it was in the film or in the text, to take the gauge points. This appeared to be quite a good idea. All the cores were jigged and gauged, and wherever they were jigged and gauged the gauge contacted the core. It was oiled in order to give it a hard skin; and this appeared to be the main reason for such an operation. The dry strength was adequate, the green strength was adequate, the flowability was good, and a special hard point was made only where a hard metal jig touched the core face.

Mr. M. R. Hinchcliffe said that mention was made in the text of metal being melted in cast-iron

(*Continued on page* 78, *column* 1.)


DALE
DALE
The High-Quality Iron for High-Duty Castings.
Made in seven standard grades or to individual requirements, this iron has a close grain structure and fine graphitic carbon content. It replaces Hematite, and tones up high phosphorus irons.
We also make Dale Refined Malleable Iron to any required specification.
STANTON
DALE Refined PIG IRON
THE STANTON IRONWORKS COMPANY LIMITED
NEAR NOTTINGHAM

WARTIME CALLS ON WOMEN TO MAKE ALUMINIUM AIR-COOLED CYLINDER HEADS

(*Continued from page* 76.)

pots. In this country it seemed to be the practice to use plumbago pots in order to prevent contamination. Was it the general practice in America to use cast-iron pots for melting aluminium?

Mr. Sheehan thought that in the case of the particular type of alloy which allowed an iron content of up to 0.55 per cent. that such would be the case. It would be the general practice in this country to melt in an iron pot, particularly if it was protected with the usual washes, of which there were very many proprietary kinds. He would think also that the position was influenced to some extent by the shortage of plumbago. America was not very well placed with plumbago supplies, their principal source of supply being Mexico, and moreover it was not of the very high quality of the plumbago this country was fortunate enough to obtain from Ceylon.

Vote of Thanks

Mr. Vickers had pleasure in proposing that a hearty vote of thanks be accorded to Mr. Gregory for his Paper, and to Mr. Sheehan for reading it. Very particularly, also, for the way in which he had so ably answered the questions put to him.

Mr. A. S. Worcester (Member), in seconding, said that both the Paper and "talkie" film proved that the Americans had brought mechanisation to a very high degree of excellence. The Institute were particularly fortunate in being presented with the film in order that it might be shown throughout the country, and it was to be hoped that the members of the West Riding Branch would have an opportunity of viewing it. The Institute had also been very fortunate in enjoying the charming personality of Mr. Sheehan, who had so ably answered the questions put to him.

Mr. Sheehan, in suitably responding to the vote of thanks, said that his task had been much lightened by both the Paper and the film being presented in such a clear and precise manner.

The Chairman, in closing the discussion, said he understood that secretaries of all the Branches of the Institute had been notified that the film was available for exhibition purposes, provided they could obtain a satisfactory "talkie" apparatus with which to operate it. It was to be hoped that every Branch would take advantage of the opportunity presented to them, although he, personally, was not in a position to guarantee that Mr. Sheehan would be able to make a personally conducted tour in every case.

Among the new standards issued by the British Standards Institution is "Air Drying Black Paint for Cooking Appliances." Its number is 1176/1944 and costs 2s. Available for inspection by members is an American Federal Specification No. QQ-B691b, "Bronze Castings."

IRONFOUNDRY FUEL NEWS—XXII

While the drying of new silica sand for oil-sand cores should, whenever possible, be done with waste heat from other processes, as mentioned in last week's article in this series, most firms will find it necessary to dry their sand in plant designed for the purpose. Theoretically, about 2 lbs. of coke are required to evaporate each 1 per cent. of moisture in a ton of sand, but as the plant cannot, of course, be 100 per cent. efficient, the actual amount of fuel required will be appreciably in excess of the figure mentioned.

The Fuel Officer of the Ironfounding Industry Fuel Committee has recently analysed the figures supplied by a number of ironfoundries visited by the Regional Panels and, while no account could be taken of the moisture content of the sand being dried, the results indicated that any consumption figure in excess of 56 lbs. of coke per ton of sand could probably be regarded as inefficient. In the case of rotary driers, which are generally more efficient than the stationary type, it appeared that the maximum fuel consumption should be fixed at about 28 lbs. of coke per ton of sand dried, or its equivalent in gaseous or liquid fuels—700 cub. ft. town's gas, 2.2 galls. fuel oil or creosote-pitch mixture. Will you compare your figure with those given above?

NEW CATALOGUE

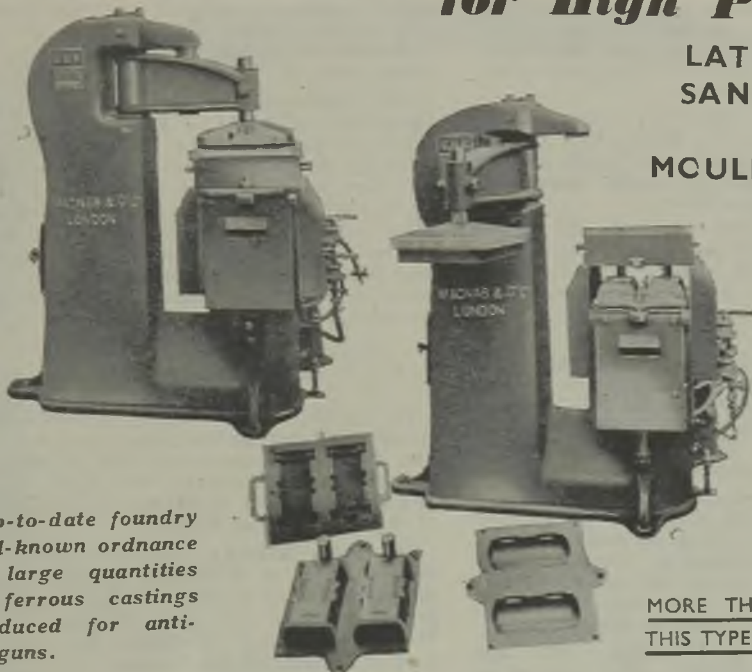
Calculator for Non-ferrous Alloy Pouring Temperatures. We have received from Foundry Services, Limited, Long Acre, Nechells, Birmingham, 7, not only a descriptive pamphlet, but also the calculator, which it describes and illustrates. After two minutes of experimenting the reviewer found it exceedingly simple to find the casting temperature of most of the non-ferrous alloys based on copper. Provision is made for additions of zinc, lead, tin, aluminium, manganese, phosphorus, nickel and iron. Moreover, adjustments can be made to allow for the section thickness of the casting to be poured. Of circular shape, the contraption is of good appearance, well made, and its price (7s. 6d.) is reasonable.

SPECIFICATIONS, QUALITY CONTROL AND INSPECTION

(*Continued from page* 70.)

Following the Presidential Address, Mr. C. Monseur (a Belgian member of the London Branch, who was resident in Liège until the German invasion in 1940) gave an interesting account of some of his experiences from that time until his arrival in this country a year or so ago. During that period he had lived in France, had returned to Belgium, and subsequently had travelled to Spain, Portugal, the Belgian Congo and ultimately to Britain.

Since he arrived in Britain, Mr. Monseur has attended the meetings of the London Branch. The President renewed the expression of sympathy and welcome which had previously been extended to him


MACNAB & CO LONDON
MACNAB & CO LONDON

NEWS IN BRIEF

THE AWARD of an increase of 1s. 3d. per week on the present special war bonus of 5s. 3d. by the National Arbitration Tribunal to patternmakers in the light-castings industry is announced.

A LIGHT ENGINEERING COMPANY has made inquiries regarding suitable premises in Arbroath. Representatives of the company visited the town and inspected various premises along with town officials.

THE PRESIDENT of the Manchester Association of Engineers, Mr. H. H. Asbridge, M.B.E., M.I.Mech.E., will deliver his inaugural address at 6.30 p.m. on October 6, at the Engineers' Club, Albert Square, Manchester.

THE COUNCIL of the Cumberland Iron Ore Miners' Association has passed a resolution urging the re-opening of the Crowgarth (Cleator Moor) No. 2 mine, in order to ensure continuity of work for local miners, both now and in the post-war era.

A DECISION TO FORM A Hardware Trade Alliance was reached at a meeting in Birmingham recently of manufacturers and wholesale and retail distributors, together with members of various associations connected with the hardware trade.

The ANNUAL GENERAL MEETING of the British Standards Institution, which was postponed on July 18, will be held at the Institution of Mechanical Engineers, Great George Street, London, S.W.1, on October 17, at 2.30 p.m., with Sir Percy Ashley, K.B.E., C.B., in the chair.

AN EXTRAORDINARY GENERAL MEETING of Harland & Wolff, Limited, shipbuilders and engineers, and separate meetings of the holders of the "A" ordinary shares and the "B" ordinary stock, have been called for October 5, with the object of making certain changes in the capital structure of the company.

SHEFFIELD TRADES TECHNICAL SOCIETIES was founded in November, 1918, for the discussion of technical matters associated with the cutlery, file and tool trades. The name has now been changed to "National Trades Technical Societies." A new section, comprising four societies, has been formed at Darlington, and shortly it is intended to establish a section at Birmingham.

KEIGHLEY ASSOCIATION OF ENGINEERS open their winter session to-morrow (Friday) with a lecture on "Composite Materials and Tools for Industry," by Mr. F. Gardner, M.I.Met., M.I.S.I., of Spear & Jackson, Limited. The president, Mr. W. Womersley, will be in the chair. Meetings in the new session will be held in new premises at Devonshire Buildings, Devonshire Street, Keighley.

IN HIS STATEMENT to the shareholders of Qualcast, Limited, Mr. J. E. V. Jobson, the chairman and managing director, says that there is a good deal of loose thinking and ignorant talking in these times about the iniquities and inefficiencies of "Big Business." Of the company's revenue for the five years of war for every £1 received manufacturing costs and taxation accounted for 19s. 4d.; shareholders got 6½d.; and 1½d. went to reserve.

LARGE ENGINEERING WORKS, covering 300 acres, where "nearly everything" will be manufactured from mass-produced to specialised articles, is to be built on the banks of the Vaal River near Vereeniging, 45 miles outside Johannesburg. The new works, planned by Dr. H. J. Van der Bijl (Director-General of Supplies in the South African Government) as part of a new township to house 250,000 people after the war, will be close to the new steelworks on the Vaal.

B.S. SPECIFICATION FOR RAW COPPER (B.S. 1035-1040), published in 1942, did not include specifications for deoxidised copper and arsenical coppers, as research work was in hand to determine permissible limits for certain impurities, particularly selenium and tellurium. As a result of evidence now available, the specifications have been completed, and have been issued as B.S. 1172-4. Copies can be obtained from British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s.

THE FEDERATION OF BRITISH INDUSTRIES has forwarded to the Board of Trade a memorandum containing proposals for the raising of the standard of industrial design in this country. It is suggested that the Government should set up a Central Design Council which would act as a centre of information, advice and propaganda on the subject and that the various industries concerned should establish Industrial Design Centres to conduct research and development in regard to design, in co-operation with the proposed Council.

PERSONAL

DR. L. M. PIDGEON, head of the department of metallurgical engineering in the University of Toronto, who developed a process for the production of magnesium from dolomite, has been awarded the McCharles prize of $1,000 by the board of governors of the University of Toronto.

MR. FRED WARWICK has been appointed managing director of A. & R. Brown, Limited, engineers and ship-repairers, Liverpool, of which firm he has been general manager for about 20 years. MR. V. S. MANGHAM, assistant manager, has been appointed general manager of the company.

MR. C. D. H. MACARTNEY-FILGATE has been elected a director of Tube Investments, Limited. Mr. Macartney-Filgate joined the group in January, 1925, and, in addition to being joint managing director of Tubes, Limited, and of Perfecta Tube Company, Limited, he is on the board of Bromford Tube Company, Limited, and of several of the subsidiaries.

MR. J. L. ADAM, owing to pressure of work, has tendered his resignation as a vice-president of the Institution of Engineers and Shipbuilders in Scotland. DR. G. G. W. WEBSTER has been co-opted vice-president for the unexpired period of Mr. Adam's term of office, and MR. W. H. CARSLAW has been co-opted a member of council to fill the vacancy caused by the appointment of Dr. Webster.

COMPANY RESULTS

(Figures for previous year in brackets)

Clayton Dewandre—Interim dividend on the ordinary shares of 4% (same).

British Aluminium Company—Interim dividend of 3% (same) on the ordinary stock.

Cochran & Company, Annan—Final dividend of 2½%, tax free, making 4%, tax free (same).

Darlington & Simpson Rolling Mills—Dividend on the 5½% first and 6% second cumulative preference shares for the half-year to September 30.

Leeds Fireclay Company—Net profit for the year to June 30 last, £16,894 (£39,999), after debenture interest of £8,030 (£8,588); from dividend equalisation reserve, £8,000; to post-war renewals, £5,000; no dividend on the ordinary shares (4%); dividend of 4% (6%) on the 6% non-cumulative preference shares; forward, £26,850.

Sheepbridge Coal & Iron Company—Net profit for the year ended June 30, £159,148 (£159,566); total dividend for the year of 8%, free of income-tax, on the preference shares and ordinary stock; to reserves for renewals, deferred repairs and war damage contributions, £20,000; to reserve fund, £20,000; forward, £121,454 (£120,096).

Staveley Coal & Iron Company—Net trading profit for the year to June 30 last, including dividends from investments, £1,029,437 (£967,917); written off stock values, £90,000 (same); war damage insurance, £4,988 (£7,637); taxation, £421,000 (£375,350); depreciation, £203,044 (£210,718); fees, £11,000 (same); to general reserve, £50,000 (same); final dividend of 4½% (4%), free of tax, making 7% (6½%), free of tax; forward, £151,059 (£138,629).

Stothert & Pitt—Trading profit for the year to June 30, after crediting £6,152 over-provided for E.P.T., £143,529 (£170,371); interest, etc., £8,973 (£6,424); income-tax, £44,351 (£42,493); to tax reserve, £2,050 (nil); E.P.T., £35,000 (£76,097); net profit, £52,257 (£44,461); preference dividend, £1,995 (same); to war contingency reserve, £30,000 (£20,000); ordinary dividend of 10%, £12,500 (same); bonus of 5% (2½%), £6,250 (£3,125); forward, £32,432 (£30,920).

A. C. Wickman—Balance on trading account for 1943, after providing for E.P.T. in the case of 1942 and crediting E.P.T recoverable amounting to £255,000 in the case of 1943, £203,865 (£189,078); investment income and interest on tax reserve certificates, £8,127 (£2,339); depreciation, £70,021 (£63,800); bank interest, £7,749 (nil); income-tax provision, £90,000 (£85,000); net profit, £43,787 (£42,317); expenses of new capital issues, less £4,159 allocated from capital reserve, £1,499; capital redemption reserve, £3,812 (£3,967); dividend on the 6% redeemable cumulative preference shares, £9,117 (£7,610); dividend on the 6% cumulative participating and redeemable preference shares, £4,367 (nil); 2% participating dividend, £2,500 (nil); final ordinary dividend of 3% (7½%), making 8% (12½%), less tax, £11,000 (£17,188); to general reserve, nil (£5,000); forward, £49,311 (£37,819).

OBITUARY

MR. ERNEST HOLT NIXON, a director of G. A. Harvey & Company (London), Limited, died on September 17, at his home at Orpington, Kent.

MR. THOMAS PROSSER, for many years steelworks manager at the Cleveland works of Bolckow Vaughan & Company, Limited, died at his residence at South Bank on September 17, at the advanced age of 81. He had lived many years in retirement.

MR. HARRY BAILEY, foreman coremaker for Modern Foundries, Limited, Halifax, Yorks, died recently. Mr. Bailey was one of the pioneers in oil-sand coremaking, and as far back as 1908 he was employed by Spermolin, Limited, in the capacity of demonstrator.

MR. ERNEST GORDON WALKER died in tragic circumstances while on holiday at Brodick recently. He had been employed by James Howden & Company, Limited, since he was discharged from the Army in 1915. For many years he acted as representative in Scotland for the sale of the company's products. His high integrity and technical ability, combined with his charm of manner and kindly disposition, gained for him the confidence and affection of a great host of friends. The knowledge he gained in his business connections of power plants in Scotland made him a valuable member of the voluntary Engineers' Panel of the Scottish Regional Fuel Efficiency and Economy Committee (Ministry of Fuel and Power). His helpful advice on fuel problems was eagerly sought by many local engineers. He was one of the first members of the Scottish branch of the Institute of Fuel.

BLAST-FURNACE WORKERS' WAR RECORD

Mr. A. Callighan, of Middlesbrough, general secretary of the National Union of Blastfurnacemen, Ore Miners, Coke Workers and Kindred Trades, addressing the annual council meeting at Leeds, on Tuesday last, stated that the memorandum of the Executive Committee on the post-war policy of the union had been accepted by every delegate board. Their task was to take every possible and practical step to secure its full and complete implementation. The union had reason for pride in its record during the difficult period of the war, no strikes or stoppages of any kind, either official or unofficial, having occurred. Alluding to the necessary stoppage of plants and the consequent displacement of labour, Mr. Callighan urged that a "seniority agreement" was a better safeguard of the workers' interests than the Essential Work Order.

"If I read the signs of the times correctly," said Mr. H. France, of Kettering, in his presidential address, "the trend of industry is towards monopoly. I believe that for some considerable time those in control of industry have been working towards this end. From their point of view this may be desirable, but from the point of view of the workers and the public I believe it is wrong."

Raw Material Markets

IRON AND STEEL

Since mid-summer, stocks of pig-iron at the foundries have been substantially reduced, and any improvement in the volume of orders for castings would at once be reflected in increased calls for supplies from the blast furnaces. Of this, however, there are at the moment only slender hopes. Scarcity of work in the jobbing and light-castings shops is universal, and even the engineering trades are less actively employed. Hence the flow of specifications for pig-iron is still sluggish, although the demand for low-phosphorus and refined irons is less restricted than that for high-phosphorus grades. The only exception to this slack demand is hematite pig-iron. Foundries are eager to secure supplies, but the Control have not relaxed their restrictions on its use, and only a limited number of licences are being granted. Supplies of alloys such as ferro-silicon and ferro-manganese are plentiful.

There has been a further improvement in the scrap position. Wrought-iron and steel scrap are now in much better supply, and the demand is mainly concentrated on the heavy grades. The requirements of the foundries for cast-iron scrap are fairly adequately covered, but the demand for first-class machinery metal still exceeds the supply. Good heavy steel scrap continues to find a ready outlet,

As announced in our last issue, blast-furnace coke has now been increased in price by 5s. 6d. per ton. When foundry coke prices were advanced by 6s. on August 1, no decision was reached regarding blast-furnace coke, and the matter has been under consideration since then. This advance brings the price of Durham blast-furnace coke to 54s. per ton. The supply position of all grades of coke is tightening. During the winter it is expected that the situation will become more difficult. Works have been trying to accumulate as large stocks as possible while supplies are available.

Makers of bar iron have had a fairly satisfactory run of business during the summer months, but the tide is ebbing, and they are now seeking orders to ensure continuity of operations until the turn of the year, both crown and common bars being only in limited demand.

Large tonnages of billets, blooms, wire rods and sheet bars are being regularly supplied to the re-rolling mills, and the extent of the orders in hand promises a continuance of this substantial demand for semis throughout the fourth period. Any deficiencies in supplies could no doubt be covered by withdrawals from emergency stocks of imported material, but this has recently been obviated by the use of defectives, crops, etc., and any further supplies of this material which is suitable for re-rolling can be very promptly cleared.

The position in regard to steel plates has not suffered further deterioration, and at some of the mills a slight improvement is recorded. Locomotive engineers and boilermakers provide steady support, and although lighter sizes now predominate in the specifications from the shipyards, the aggregate tonnages on order will suffice to keep the mills in fairly constant operation for the next month or so. Light sections are also in brisk demand, and the sheet mills are assured of a steady run for a month or two ahead. Orders for the most part are for black and painted sheets, but the restrictions in regard to galvanising have been relaxed a little.

NON-FERROUS METALS

War production orders are continuing to fall off, but so far there have been no announcements by the Control regarding the general use of non-ferrous metals for civilian purposes, although from time to time restrictions are eased here and there. No figures have been released, but it is fairly certain that, of copper at any rate, we now hold substantial stocks. Some anxiety has been caused to manufacturers in this country by the slowness of the Government in announcing their plans for the change-over from war to peace production. The American policy in this matter seems to be the gradual release of materials for essential civilian production as early as possible. The War Production Board has decided to remove the controls immediately on the defeat of Germany. In this country, the labour question is probably the stumbling block at the moment.

Tin supplies, as it is to be expected, are not so plentiful as those of copper, but there is ample metal in hand to meet all demands for war production, while stocks now held are believed to be fairly substantial. At the same time, it is unlikely that the Allies command sufficient reserves to send any large tonnage for the requirements of the liberated countries until there is a more definite prospect of supplies from the Far East being again available.

CURRENT PRICES OF IRON, STEEL AND NON-FERROUS METALS

(Delivered, unless otherwise stated)

Wednesday, September 27, 1944

PIG-IRON

Foundry Iron.—CLEVELAND No. 3: Middlesbrough, 128s.; Birmingham, 130s.; Falkirk, 128s.; Glasgow, 131s.; Manchester, 133s. DERBYSHIRE No. 3: Birmingham, 130s.; Manchester, 133s.; Sheffield, 127s. 6d. NORTHANTS No. 3: Birmingham, 127s. 6d.; Manchester, 131s. 6d. STAFFS No. 3: Birmingham, 130s.; Manchester, 133s. LINCOLNSHIRE No. 3: Sheffield, 127s. 6d.; Birmingham, 130s.

(*No. 1 foundry 3s. above No. 3. No. 4 forge 1s. below No. 3 for foundries, 3s. below for ironworks.*)

Hematite.—Si up to 3.00 per cent., S & P 0.03 to 0.05 per cent.; Scotland, N.-E.Coast and West Coast of England, 138s. 6d.; Sheffield, 144s.; Birmingham, 150s.; Wales (Welsh iron), 134s. East Coast No. 3 at Birmingham, 149s.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, 140s. 6d., delivered Birmingham.

Scotch Iron.—No. 3 foundry, 124s. 9d.; No. 1 foundry, 127s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, 174s.; South Zone, 176s. 6d.

Refined Malleable.—North Zone, 184s.; South Zone, 186s. 6d.

Cold Blast.—South Staffs, 227s. 6d.

(NOTE.—*Prices of hematite pig-iron, and of foundry and forge iron with a phosphoric content of not less than 0.75 per cent., are subject to a rebate of 5s. per ton.*)

FERRO-ALLOYS

(Per ton unless otherwise stated, basis 2-ton lots, d/d Sheffield works.)

Ferro-silicon (5-ton lots).—25 per cent., £21 5s.; 45 per cent., £25 10s.; 75 per cent., £39 10s. Briquettes, £30 per ton.

Ferro-vanadium.—35/50 per cent., 15s. 6d. per lb. of V.

Ferro-molybdenum.—70/75 per cent., carbon-free, 6s. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, 1s. 3½d. lb.

Ferro-tungsten.—80/85 per cent., 9s. 8d. lb.

Tungsten Metal Powder.—98/99 per cent., 9s. 9½d. lb.

Ferro-chrome.—4/8 per cent. C, £46 10s.; max. 2 per cent. C, 1s. 3¾d. lb.; max. 1 per cent. C, 1s. 4½d. lb.; max. 0.5 per cent. C, 1s. 6d. lb.

Cobalt.—98/99 per cent., 8s. 9d. lb.

Metallic Chromium.—96/98 per cent., 4s. 9d. lb.

Ferro-manganese.—78/98 per cent., £18 10s.

Metallic Manganese.—94/96 per cent., carb.-free, 1s. 9d. lb.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms and Slabs.—BASIC: Soft, u.t., 100-ton lots, £12 5s.; tested, up to 0.25 per cent. C, £12 10s.; hard (0.42 to 0.60 per cent. C), £13 17s. 6d.; silico-manganese, £17 5s.; free-cutting, £14 10s. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £15 15s.; case-hardening, £16 12s. 6d.; silico-manganese, £17 5s.

Billets, Blooms and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £13 17s. 6d.; basic hard, 0.42 to 0.60 per cent. C, £14 10s.; acid, up to 0.25 per cent. C, £16 5s.

Sheet and Tinplate Bars.—£12 2s. 6d. 6-ton lots.

FINISHED STEEL

[*A rebate of 15s. per ton for steel bars, sections, plates, joists and hoops is obtainable in the home trade under certain conditions.*]

Plates and Sections.—Plates, ship (N.-E. Coast), £16 3s.; boiler plates (N.-E. Coast), £17 0s. 6d.; chequer plates (N.-E. Coast), £17 13s.; angles, over 4 un. ins., £15 8s.; tees, over 4 un. ins., £16 8s.; joists, 3 in. × 3 in. and up, £15 8s.

Bars, Sheets, etc.—Rounds and squares, 3 in. to 5½ in., £16 18s.; rounds, under 3 in. to ⅝ in. (untested), £17 12s.; flats, over 5 in. wide, £15 13s.; flats, 5 in. wide and under, £17 12s.; rails, heavy, f.o.t., £14 10s. 6d.; hoops, £18 7s.; black sheets, 24 g. (4-ton lots), £22 15s.; galvanised corrugated sheets (4-ton lots), £26 2s. 6d.; galvanised fencing wire, 8 g. plain, £26 17s. 6d.

Tinplates.—I.C. cokes, 20 × 14 per box, 29s. 9d. f.o.t. makers' works, 30s. 9d., f.o.b.; C.W., 20×14, 27s. 9d., f.o.t., 28s. 6d., f.o.b.

NON-FERROUS METALS

Copper.—Electrolytic, £62; high-grade fire-refined, £61 10s.; fire-refined of not less than 99.7 per cent., £61; ditto, 99.2 per cent., £60 10s.; black hot-rolled wire rods, £65 15s.

Tin.—99 to under 99.75 per cent., £300; 99.75 to under 99.9 per cent., £301 10s.; min. 99.9 per cent., £303 10s.

Spelter.—G.O.B. (foreign) (duty paid), £25 15s.; ditto (domestic), £26 10s.; "Prime Western," £26 10s.; refined and electrolytic, £27 5s.; not less than 99.99 per cent., £28 15s.

Lead.—Good soft pig-lead (foreign) (duty paid), £25; ditto (Empire and domestic), £25; English, £26 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, ex works, £37 12s. 6d.; rolled zinc (boiler plates), ex works, £35 12s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £30 10s.

Other Metals.—Aluminium, ingots, £110; antimony, English, 99 per cent., £120; quicksilver, ex warehouse, £68 10s. to £69 15s.; nickel, £190 to £195.

Brass.—Solid-drawn tubes, 14d. per lb.; brazed tubes, 16s.; rods, drawn, 11⅜d.; rods, extruded or rolled, 9d.; sheets to 10 w.g., 11¼d.; wire, 10¾d.; rolled metal, 10½d.; yellow metal rods, 9d.

Copper Tubes, etc.—Solid-drawn tubes, 15¼d. per lb.; brazed tubes, 15¼d.; wire, 10d.

Phosphor Bronze.—Strip, 14½d. per lb.; sheets to 10 w.g.; 15½d.; wire, 16½d.; rods, 16½d.; tubes, 21½d.; castings, 20d., delivery 3 cwt. free. 10 per cent. phos. cop. £35 above B.S.; 15 per cent. phos. cop. £43 above B.S.; phosphor tin (5 per cent.) £40 above price of English ingots. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 10d. to 1s. 4d. per lb.; rolled to 9 in. wide, 1s. 4d. to 1s. 10d.; to 12 in. wide, 1s. 4¼d. to 1s. 10¼d.; to 15 in. wide, 1s. 4½d. to 1s. 10½d.; to 18 in. wide, 1s. 5d. to 1s. 11d.; to 21 in. wide, 1s. 5½d. to 1s. 11½d.; to 25 in. wide, 1s. 6d. to 2s. Ingots for spoons and forks, 10d. to 1s. 6½d. Ingots rolled to spoon size, 1s. 1d. to 1s. 9½d. Wire, round, to 10g., 1s. 7½d. to 2s. 2½d., with extras according to gauge. Special 5ths quality turning rods in straight lengths, 1s. 6½d. upwards.

NON-FERROUS SCRAP

Controlled Maximum Prices.—Bright untinned copper wire, in crucible form or in hanks, £57 10s.; No. 1 copper wire, £57; No. 2 copper wire, £55 10s.; copper firebox plates, cut up, £57 10s.; clean untinned copper, cut up, £56 10s.; braziery copper, £53 10s.; Q.F. process and shell-case brass, 70/30 quality, free from primers, £49; clean fired 303 S.A. cartridge cases, £47; 70/30 turnings, clean and baled, £43; brass swarf, clean, free from iron and commercially dry, £34 10s.; new brass rod ends, 60/40 quality, £38 10s.; hot stampings and fuse metal, 60/40 quality, £38 10s.; Admiralty gunmetal, 88-10-2, containing not more than ½ per cent. lead or 3 per cent. zinc, or less than 9½ per cent. tin, £77, all per ton, ex works.

Returned Process Scrap.—(Issued by the N.F.M.C. as the basis of settlement for returned process scrap, week ended Sept. 23, where buyer and seller have not mutually agreed a price; net, per ton, ex-sellers' works, suitably packed):—

Brass.—S.A.A. webbing, £48 10s.; S.A.A. defective cups and cases, £47 10s.; S.A.A. cut-offs and trimmings, £42 10s.; S.A.A. turnings (loose), £37; S.A.A. turnings (baled), £42 10s.; S.A.A. turnings (masticated), £42; Q.F. webbing, £49; defective Q.F. cups and cases, £49; Q.F. cut-offs, £47 10s.; Q.F. turnings, £38; other 70/30 process and manufacturing scrap, £46 10s.; process and manufacturing scrap containing over 62 per cent. and up to 68 per cent. Cu, £43 10s.; ditto, over 58 per cent. to 62 per cent. Cu, £38 10s.; 85/15 gilding metal webbing, £52 10s.; 85/15 gilding defective cups and envelopes before filling, £50 10s.; cap metal webbing, £54 10s.; 90/10 gilding webbing, £53 10s.; 90/10 gilding defective cups and envelopes before filling, £51 10s.

Cupro Nickel.—80/20 cupro-nickel webbing, £75 10s.; 80/20 defective cups and envelopes before filling, £70 10s.

Nickel Silver.—Process and manufacturing scrap; 10 per cent. nickel, £50; 15 per cent. nickel, £56; 18 per cent. nickel, £60; 20 per cent. nickel, £63.

Copper.—Sheet cuttings and webbing, untinned, £54; shell-band plate scrap, £56 10s.; copper turnings, £48.

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South Wales.—Short heavy steel, not ex. 24-in. lengths, 82s. to 84s. 6d.; heavy machinery cast iron, 87s.; ordinary heavy cast iron, 82s.; cast-iron railway chairs, 87s.; medium cast iron, 78s. 3d.; light cast iron, 73s. 6d.

Middlesbrough.—Short heavy steel, 79s. 9d. to 82s. 3d.; heavy machinery cast iron, 91s. 9d.; ordinary heavy cast iron, 89s. 3d.; cast-iron railway chairs, 89s. 3d.; medium cast iron, 79s. 6d.; light cast iron, 74s. 6d.

Birmingham District.—Short heavy steel, 74s. 9d. to 77s. 3d.; heavy machinery cast iron, 92s. 3d.; ordinary heavy cast iron, 87s. 6d.; cast-iron railway chairs, 87s. 6d.; medium cast iron, 80s. 3d.; light cast iron, 75s. 3d.

Scotland.—Short heavy steel, 79s. 6d. to 82s.; heavy machinery cast iron, 94s. 3d.; ordinary heavy cast iron, 89s. 3d.; cast-iron railway chairs, 94s. 3d.; medium cast iron, 77s. 3d.; light cast iron, 72s. 3d.

(Note.—*For deliveries of cast-iron scrap free to consumers' works in Scotland, the above prices less 3s. per ton, but plus actual cost of transport or 6s. per ton, whichever is the less.*)

SITUATIONS

FOUNDRY GENERAL MANAGER (39), Inter. B.Sc., M.I.Brit.F., A.M.I.P.E., desires contact medium Grey and Malleable progressive founders; expert repetition; connection guarantee; get results.—Box 684, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

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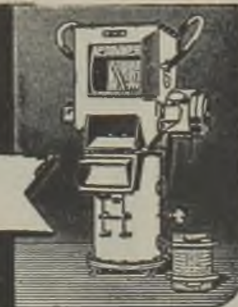

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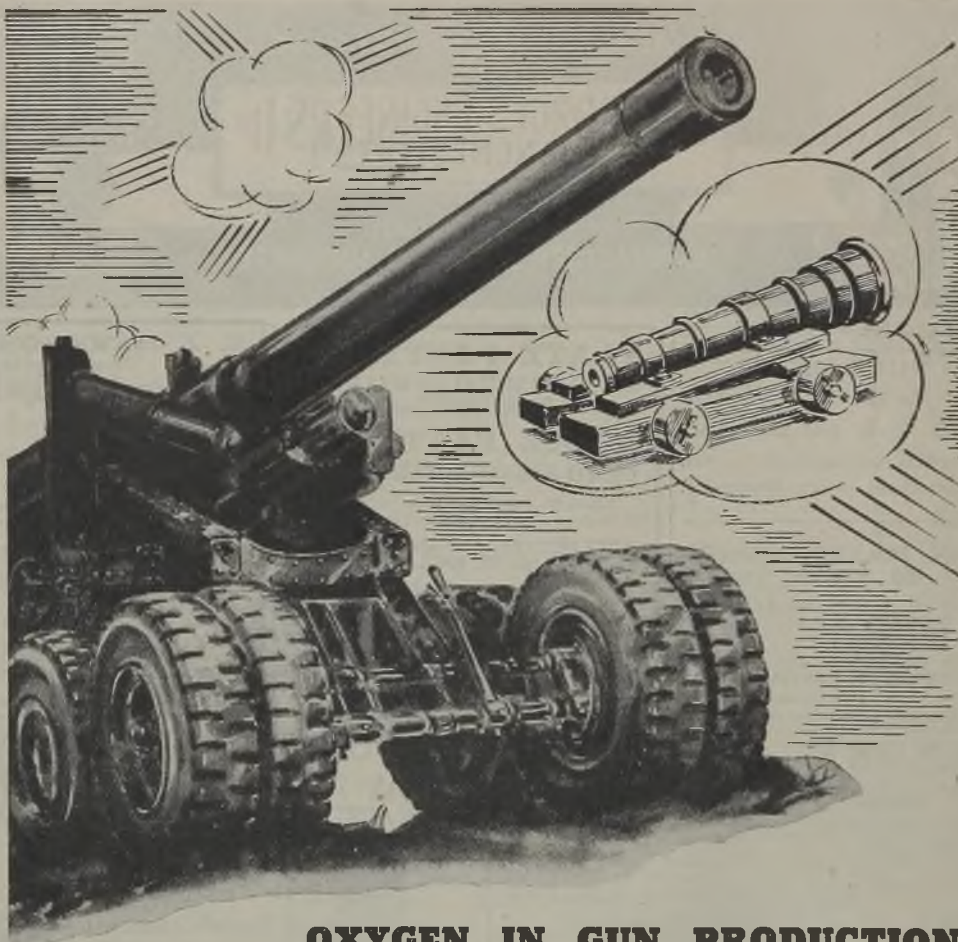

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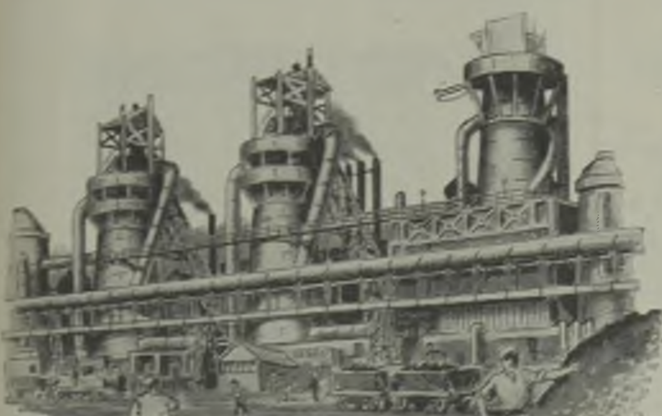

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