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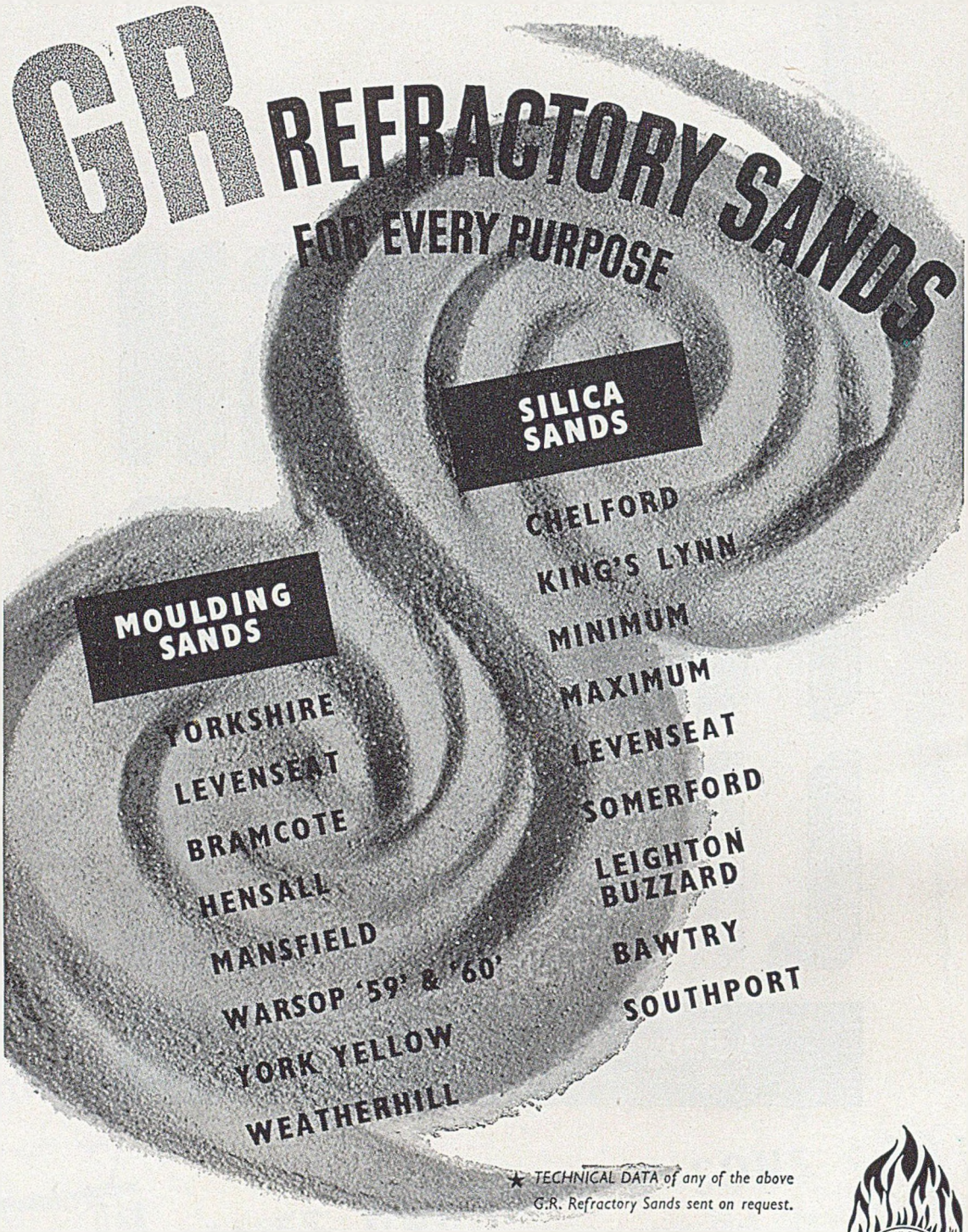
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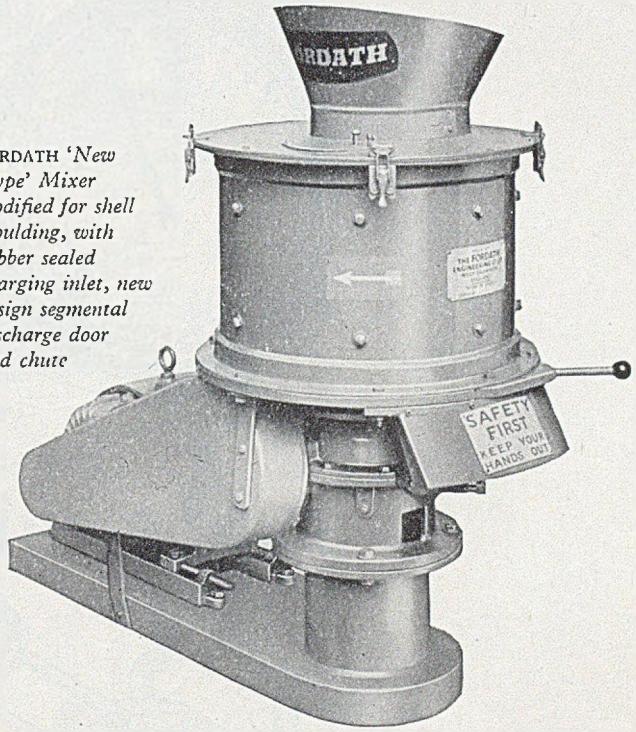

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Modified by additional components providing perfect protection for operatives, the Fordath Mixer has all the advantages:

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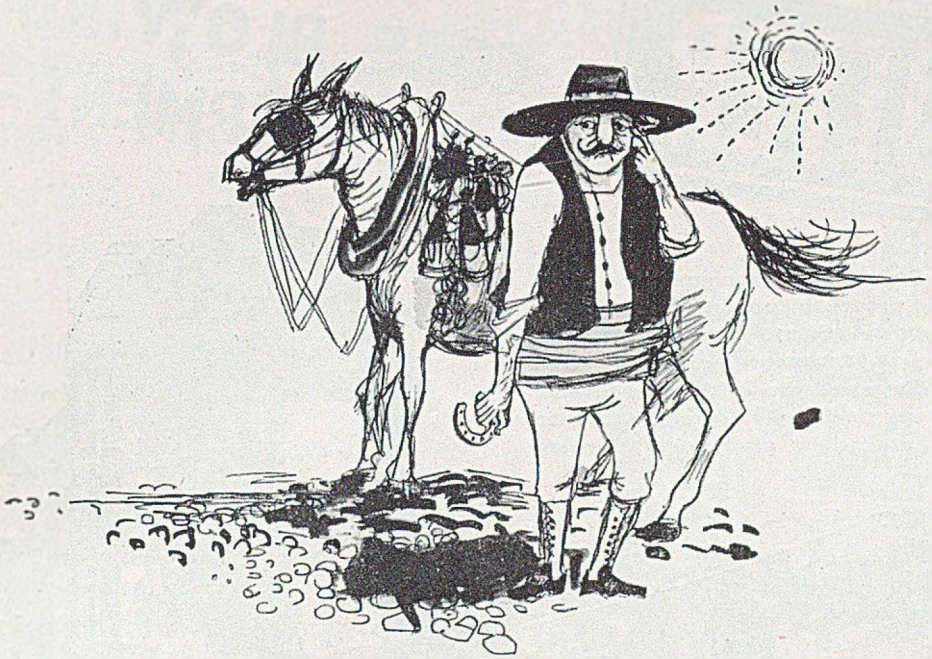

THE PHILOSOPHY OF CASTING - No. 3

Casting a Shoe

"Por un punto se pierde un zapato."
For want of a nail the shoe is lost
For want of a shoe the horse is lost
For want of a horse the rider is lost
For want of a rider the battle is lost
(Spanish saw)

The man who is careful in small matters, usually will prosper in great affairs. Neglect of detail can so easily wreck the generously conceived plan. Where industry is concerned, when time is money, and the fate of a project can be settled in terms of pennies on the market price of goods, a new method of production may mean the difference between fortune and failure. In the field of foundry work, time and cost go hand in hand. The use of Cellobond foundry resins, for example, may seem a very small thing in the chain of intricate mass production—almost as small as a nail in a horse-shoe! Cellobond phenolic resins for shell moulding produce the perfect shell and their short curing time ensures high output thus reducing production costs. Cellobond binder resins, phenolic and urea, are low in initial cost and save production time because of their short curing time and ease of knock-out. Time saved is profit earned; so if you are concerned with essential detail, please ask us for samples and full particulars of Cellobond foundry resins.

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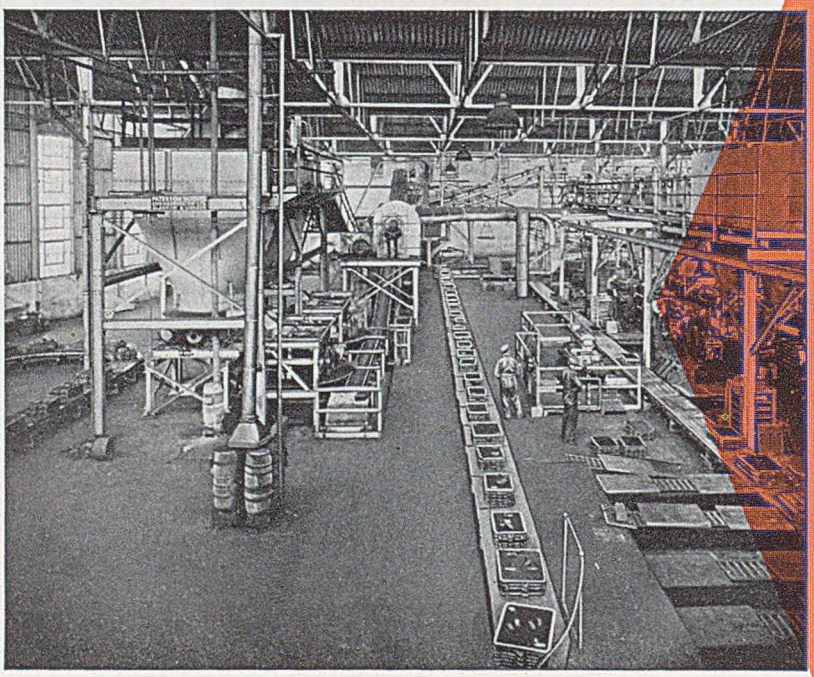
mechanical handling in the foundry

No. ONE *Introductory*

As pioneers in the mechanisation of all types of foundry work we have been closely associated with the industry for over 30 years.
The proper application of mechanical handling aids is essential to the progress and productive efficiency of any industry, particularly the foundry industry where it has also done much to improve working conditions.
There are few problems for which we cannot prepare an efficient handling scheme and a discussion with one of our sales engineers can open the door to increased productive efficiency.
This new series of advertisements will deal in turn with different aspects of mechanical handling in the foundry and we hope that readers will find something of interest in each one of our future announcements.



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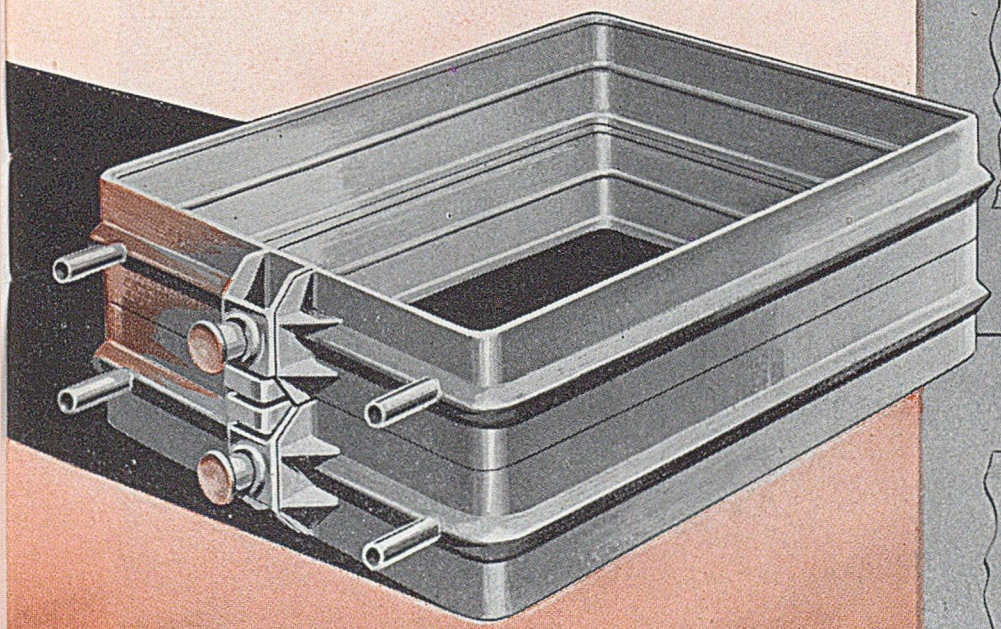
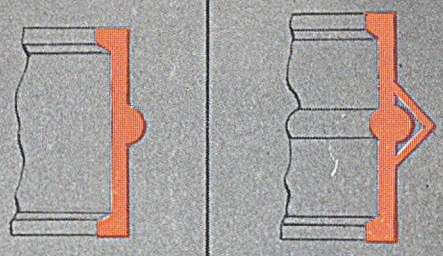


STERLING FOUNDRY SPECIALTIES LTD. BEDFORD



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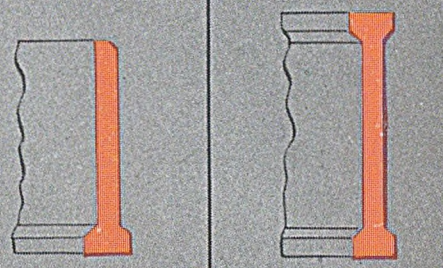

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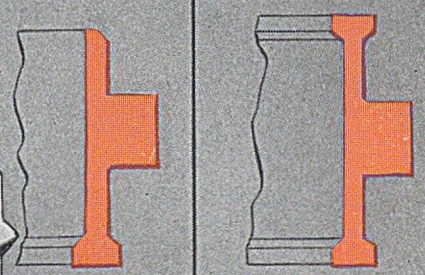
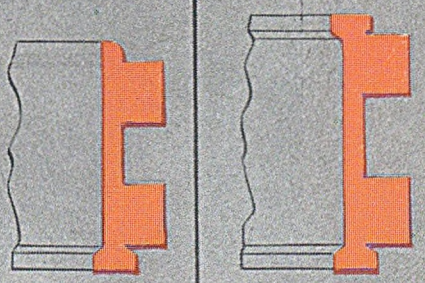


ALL FOUNDRY



CONDITIONS

Oh ! the merry piping time of Christmas !
Never let us permit thee to degenerate
into distant courtesies and formal salutations.

Charles Lamb

"TITAN"

To all our friends . . .

A JOYOUS and Happy Christmas is our wish for you and yours at this time. May the New Year of 1954, heralding, we hope, a successful approach to World Peace and tranquillity, bring you Good Health and Prosperity.

D.H.W.

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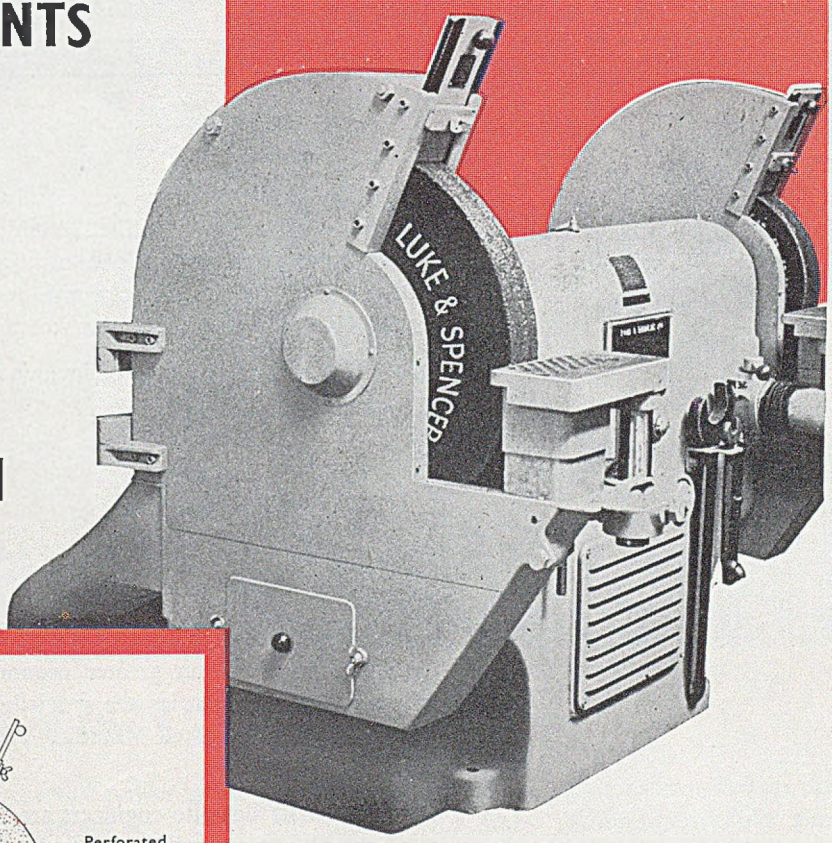

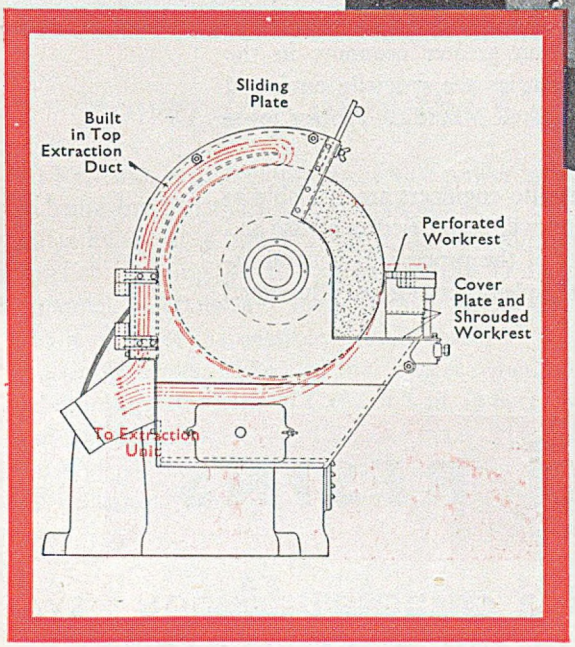

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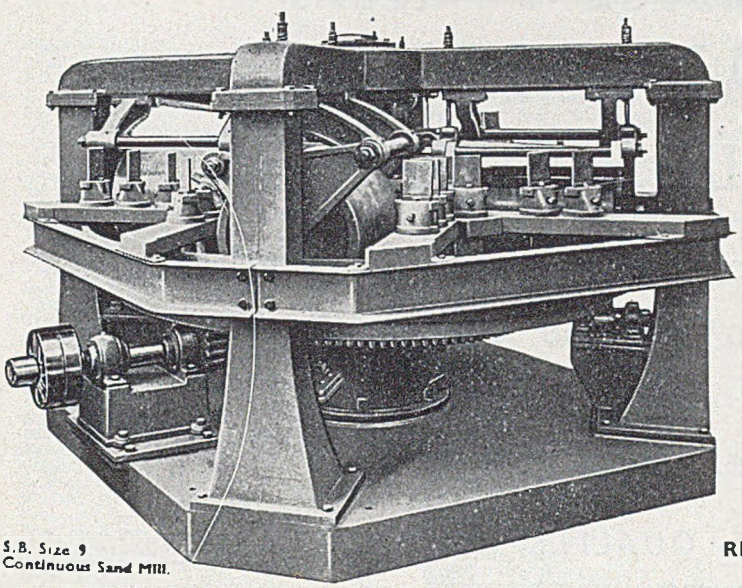

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Continuous Sand Mill.

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for a visit from one of our representatives

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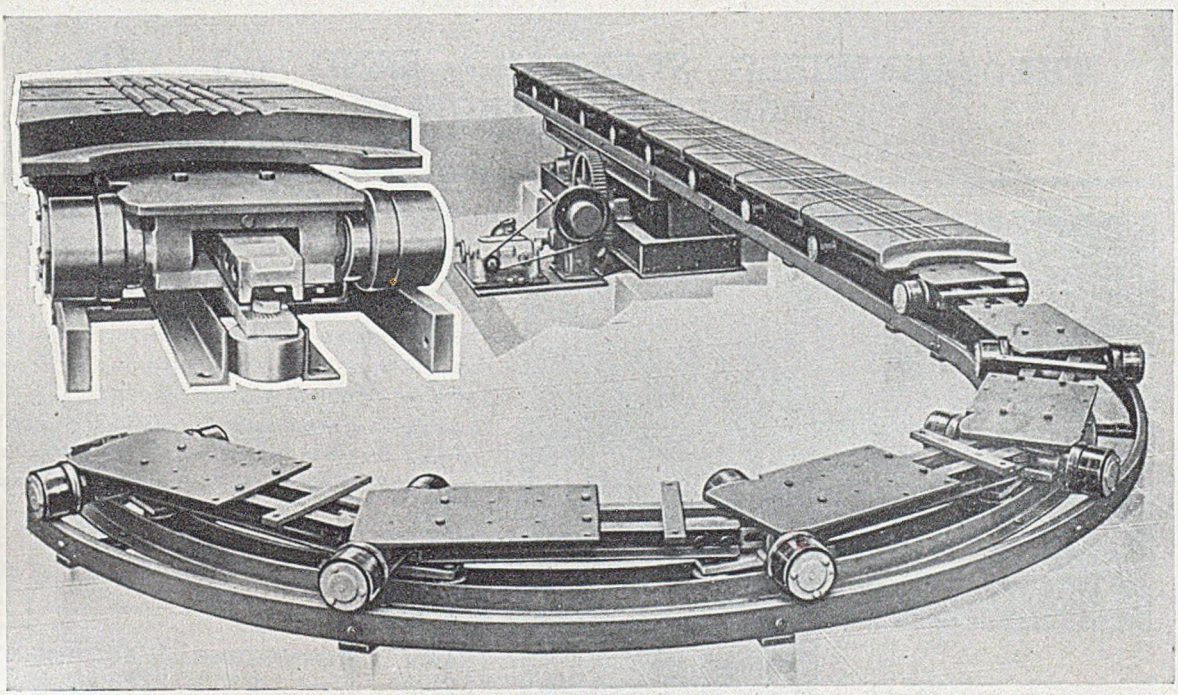

We are Manufacturers of :

Complete Mechanised Plants, Continuous and Semi-continuous Casting ● Sand Preparation Plants ● Sand Mills, Continuous and Batch ● Disintegrators ● Screens ● Belt Conveyors ● Elevators ● Mould Conveyors ● Moulding Machines ● Sand Dryers, etc.

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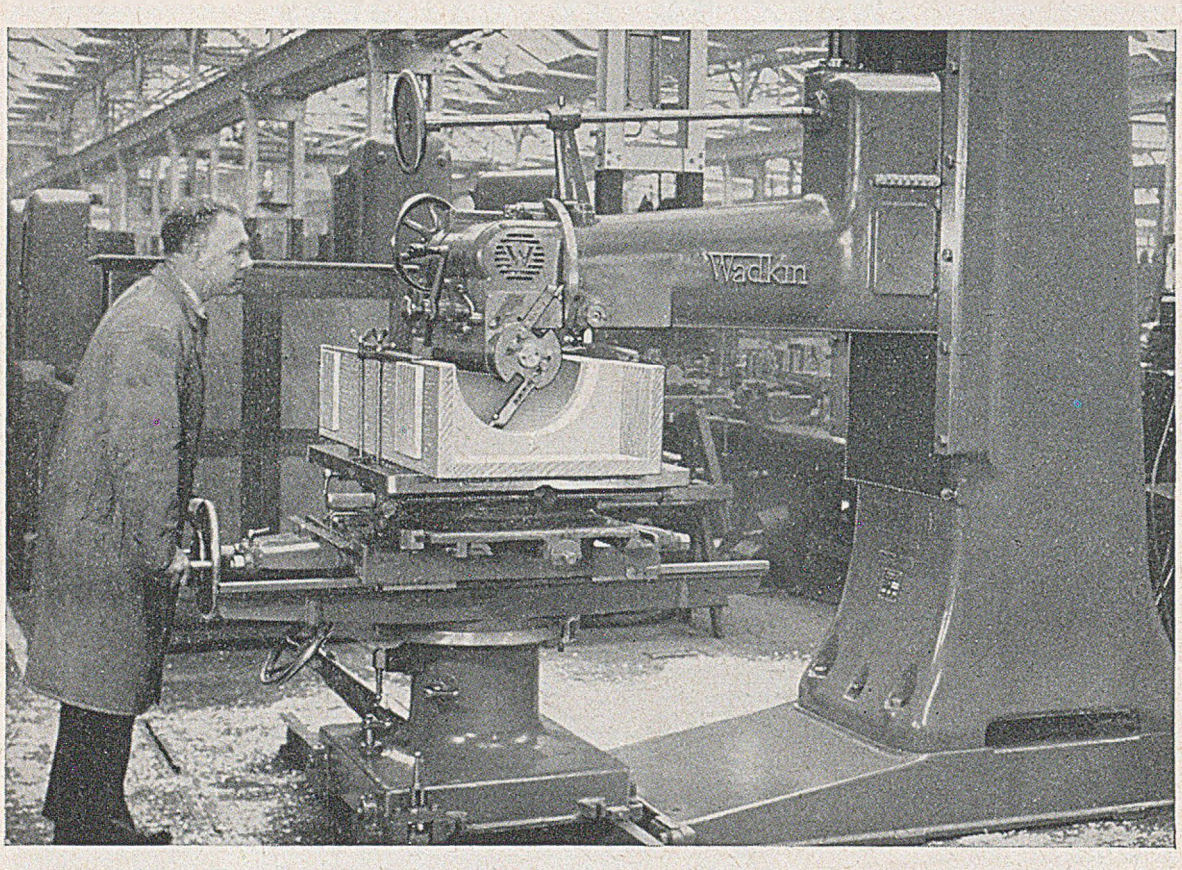

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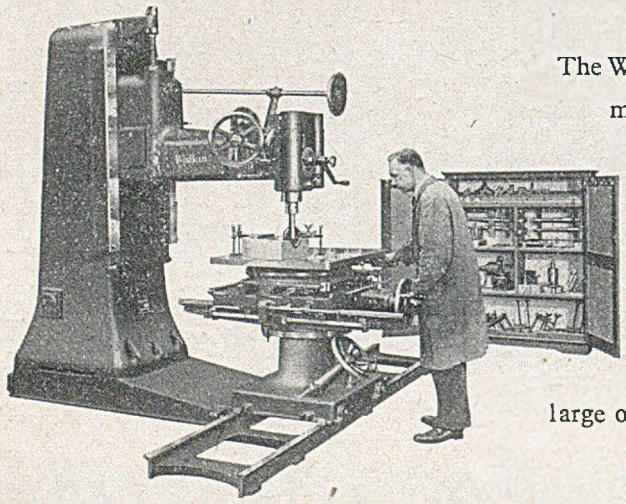

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FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

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PRINCIPAL CONTENTS

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

Mechanism of Exports

Last month the Federation of British Industries held an export sales conference and have now published a report* on the subject. It is exactly what it claims to be—a "report" and not a wearisome verbatim account of what people said. Moreover, it is easily the best treatise we have ever read on the subject, yet it must be borne in mind that it treats the matter quite generally. A word of wisdom culled from an opening address by Sir William Rootes, is that it is not much use showing at exhibitions, unless the exhibitions are themselves money makers. It is obvious that exports fall into two categories, and they are so treated in this booklet; these being, capital and consumer goods. The foundry industry participates in a variable manner in both categories. In the capital-goods' section it is often a case of castings embodied in machinery, but the export of cast-iron pipes has to be included. If the definition of consumable goods be those which are bought by the general public, then stoves, grates and hardware enter this classification.

The advice given under "capital goods," unless the manufacturer has great experience in the export trade, is that he should place the business in the hands of a reliable merchant. It is essential for every component of the plant to be sent as one consignment. We well remember for a plant to be put into commission on the French/Swiss border the various parts were shipped through four ports as widely separated as Dunkirk and Genoa. This resulted in delays and dissatisfaction. The appointment of overseas selling agents is at best a gamble, and a firm is lucky to find a winner initially. This report is especially useful in pointing out all the factors one has to envisage when drawing up an agreement. One personal hint we can give is in connection with the selection of an arbitration authority and that is to choose, say, a chamber of commerce located in an area somewhat remote from the actual operating base of the agreement.

A sensible suggestion about overseas fairs, is for trade associations to get first-hand reports from a member who has actually shown previously. Dealing with the possibility of using trade and technical journals as a medium for increasing exports, the report states that their circulation in many important markets is negligible. This certainly does not apply to the FOUNDRY TRADE JOURNAL—with the exception of Canada, and here our position seems to accord with that generally found with that Dominion. A recent survey (October) showed that of our total circulation no less than 40.83 per cent. is overseas. This list is headed by the U.S.A. with 13.22 per cent. of the export total. Then comes Australia (11.52) followed by Japan (9.15); India, Ceylon, and Pakistan (8.51); U.S.S.R. (7.44); South Africa (5.10); Sweden (3.79); France (3.55); Italy (3.55); Spain (3.27); New Zealand (3.07); Germany (3.01); Belgium (2.64); South America (2.58); Holland (2.23); Norway (2.22) and Canada (2.09). The rest of the world—27 countries—takes 13.22 per cent. Amongst other precepts enumerated in the report cited is that strong efforts should be made to enter a wide variety of overseas' markets. Thus it would appear that the technical Press is a suitable medium for a preliminary test of the potential value of any of the outlets for British products.

* "Exports in a Buyers' Market," published by the Federation of British Industries, 21, Tothill Street, London, S.W.1; price 3s. 6d.

B.I.S.F.'s New President

At a meeting of the council of the British Iron and Steel Federation last week, Mr. G. H. Latham was appointed president of the Federation from January 1, in succession to Sir Ellis Hunter. Mr. A. G. Stewart was appointed president-elect.

Mr. Latham is chairman and managing director of the Whitehead Iron & Steel Company, Limited, Godins, "The Rollers of Steel Sections," Limited, W. A. Baker & Company, Limited, engineers and foundrymen, of Newport (Mon), and Whitehead, Hill & Company, Limited, wire manufacturers, of Cwmbran (Mon), deputy chairman and managing director of the Whitehead Thomas Bar & Strip Company, Limited, and a director of the British Iron & Steel Corporation, Limited. From 1946 to 1949 he was a member of the original Iron and Steel Board.

Sir Ellis Hunter, who is chairman and managing director of Dorman, Long & Company, Limited, has been president of the B.I.S.F. since 1945.

Mr. Stewart has been chairman and managing director of Stewarts and Lloyds, Limited, since 1945. He is a director of the United Steel Companies, Limited, Tube Investments, Limited, and other companies.

High Rate of Accidents in Scotland

Although Scotland has only a tenth of the factories in Britain, the country's industrial accidents stand at about one-eighth of the British total. In the past year there were more than 100 fatal accidents reported in Scottish industries, excluding coal mining, and 22,500 accidents each involving more than three days' absence from work. And these figures do not include minor accidents officially classified as unreportable. Even allowing for the fact that Scotland's share of heavy industry—shipbuilding, engineering, ironfounding, etc.—is large, and helps to account for the figures, the proportion is still alarmingly high.

Giving the inaugural address at a one-day conference on industrial safety, organized in Glasgow by the Scottish Industrial Groups Advisory Council, the Earl of Home, Minister of State for Scotland, said that it was the duty of everyone to see that the various statutory regulations for industrial safety were fully and adequately attended to. That meant sound co-operation between employers, workers, and inspectors. Everything could not be done by Government regulation, and factory management must accept a big responsibility. Planning to make work easier and quicker was good, but it was better if it also made work safer. This was an industrial age and we must educate ourselves to keep alive in it, he went on. He did not mean that we should reduce people to a state of permanent nervousness, but that they should be made alert to the possibility of accidents and quick to react to prevent them.

Forty Years Ago

In our issue of December, 1913, there is an interesting article by Brearley on the annealing of steel in a continuous furnace—actually the Dressler tunnel oven, and a second by Buchanan, who related his experience with a basic-lined cupola, which was a complete failure. He also records an experiment in which he used anthracite dust and boiled tar for this purpose. It is apparent that in 1913 there was still a large body of opinion which favoured solid-bottom cupolas.

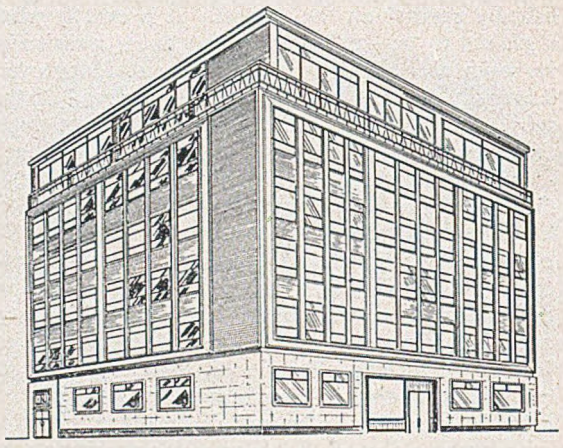
University Seeks Aid from Industry

Industry's increased use of technology if it is to keep abreast of scientific development is becoming obvious everywhere, but money has to be provided for the furthering of technical knowledge. Sheffield University, for example, has appealed to industry in the city for £30,000 annually towards the upkeep of the metallurgy and engineering departments.

That the university was well able to supply the goods was emphasized by Lt.-Col. W. H. Olivier, the treasurer, recently, when he pointed out that the university's fame as a metallurgical centre was unique. There, and nowhere else, could the technology of special steels be studied in close association with industry. The Department of Fuel Technology, one of two in the country, was the only one primarily concerned with coal, and the Department of Mining, situated at the centre of a large coalfield, was the only one with a post-graduate school designed primarily for students seconded from industry.

The financial aspect was less happy. Col. Olivier said that the year's surplus had been considerably greater than expected: there had been available for appropriation £24,000 against the budgeted figure of under £3,000, but nearly all the saving had resulted from deferment of commitments. Unless they could secure substantial additions to their income, he went on, they would have the hardest fight to provide for necessary developments and still make ends meet.

Provision is made in the expansion plans for new Chairs in civil, electrical, mechanical, and chemical engineering and developments in technology.



An architect's impression of the finished building, the future headquarters of the FOUNDRY TRADE JOURNAL *and its associated publications, now in course of erection on the corner site of* 17 *and* 19, *John Adam Street, and* 1, *York Buildings, in the Adelphi, London, W.C.2.*

THE HIGH AUTHORITY of the European Coal and Steel Community has decided to take action against price-fixing by producers' associations. In the words of the British Iron and Steel Federation, it is making "a novel attempt to solve a perennial problem—that of encouraging competition while at the same time preventing the freedom thus granted from being abused." Price competition in the Schuman community is examined by the Federation in an article in its November statistical bulletin.

Experiences in Degassing Aluminium Alloys

By Cdr. (E) D. P. Sparham, R.N. and E. A. Moult†*

The production of gas-free aluminium-alloy castings has engaged the interests and energies of metallurgists and founders for many years. The Authors think it may be of interest to record their experiences in this field at one of H.M. Dockyard foundries. This foundry, where the work is essentially of a "jobbing" nature, is concerned almost exclusively with the manufacture of castings for marine purposes.

Early Light-Alloy Castings

Prior to 1922, only simple light-alloy castings such as crankcase covers and handwheels were produced, where quality was not of paramount importance. Melting facilities available consisted of two oil-fired crucible furnaces of 130 lb. capacity each and a battery of crucibles of 100 lb. capacity in improvised coke-fired furnaces. About 1922, a requirement arose for Diesel-engine piston castings in L.M.14 alloy up to 22 in. dia., involving a melt of up to 1,200 lb. Although no additional furnace facilities were available, the quality of castings produced compared favourably with those manufactured by the limited number of commercial foundries on similar production at the time.

With the installation in 1930 of two lip-axis oil-fired crucible furnaces of 5-cwt. capacity each, the problem of melting was certainly eased, but the gas pick-up, whilst reduced, was not eliminated. Many types of fluxes and degassers were given extensive trial in an effort to produce gas-free metal, but the results achieved were rather disappointing. However, despite a fair number of gas pinholes in the pistons, they withstood a water-pressure test of 1,000 lb. per sq. in. at the crown, which had a section thickness of almost four inches. These pistons had a reasonable service life, but the roughness caused by the gas inclusions invited carbon build-up at the crown.

Later Developments

With the increasing demand by industry for large Diesel-engine pistons of high standard, research on degassing treatments for aluminium alloys was in progress at a number of research establishments, and in 1936, the British Non-Ferrous Metals Research Association's method (British Patent 435104) was adopted. This process was carried out by covering the metal surface with a mixed flux, having a melting point of 680 deg. C., and containing 5 parts potassium chloride, 5 parts sodium chloride and 2 parts sodium fluoride. The amount of flux used was 2 per cent. of the weight of the metal charge. The melt was then stirred by a mechanically-driven hematite-iron paddle, the pitch of which gave directional flow towards the bottom of the crucible. This paddle was only inserted 2 in. below the metal surface and that part of it in contact with the molten alloy was allowed to retain its "as cast" skin to reduce attack and to keep the iron content of the "Y" alloy to a minimum. A stream of dry nitrogen was then introduced to fill the space between the metal/flux surface and the top of the furnace. The nitrogen was not bubbled through the molten alloy but was used merely to give an inert atmosphere over the metal surface.

The introduction of this method of degassing met with immediate success. To assess its efficiency, it was customary to cast a sample, as shown in Fig. 1, in an oil-sand mould. This sample was then sectioned longitudinally and one half roughly polished; the gas pinholes, if present, could be seen easily and the quantity of gas

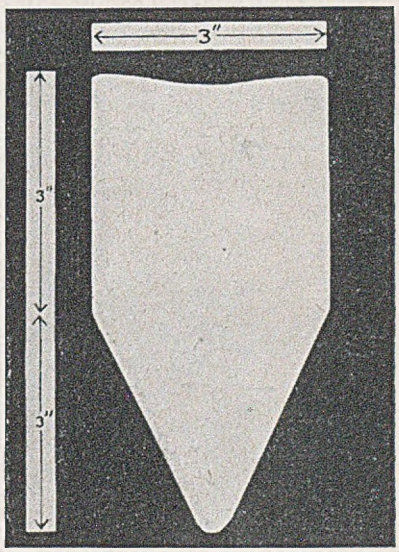


FIG. 1.—*Section of the Aluminium-alloy Sample taken longitudinally to determine the Pinhole Content and hence to assess "Gassiness" of the Metal.*

* Formerly Engineering Department, H.M. Dockyard, Chatham.
† Royal Naval Scientific Service.

assessed. When these samples were cast under identical conditions, the amount of "sink" at the surface was also a guide to the amount of gas present.

Although it is not the intention of this article to discuss the development of moulding techniques for producing large Diesel-engine pistons, it should be stated here that, in 1938, a rather revolutionary change was made. Instead of using an orthodox cast-iron mould, as had been standard practice for many years, a steel, water-cooled mould was substituted; this brought about a further marked improvement in the quality of the castings and this practice, with a few refinements, is still in use. Many hundreds of sound pistons have since been produced. Other types of castings produced, mainly in LM-6 alloy, were made of metal melted in oil-fired crucible-type furnaces and were degassed with proprietary fluxes and modified by the "salts" method. Although these castings were of reasonable quality, they were not of high standard. As, however, they were not subjected to significant cyclic loading, a certain degree of "gassiness" was acceptable.

Establishment of Present Practice

In 1947, plate-type castings in LM-6 alloy were required for a special project. These castings were up to 7 ft. long, 15 in. wide and ¼ in. thick. One side of these castings had strengthening ribs and bosses of various diameters; the other side was flat and had to be fully machined and hand polished to a high standard. The presence of pinholes on the finished surface was not acceptable. After several not entirely unsatisfactory attempts to produce castings of this type to the standard called for, it was clear that improved methods of de-gassing were essential if an undue percentage of waste castings was to be avoided.

At the suggestion of the B.N.F.M.R.A. it was decided to substitute for the earlier de-gassing technique, the passing of a vigorous stream of nitrogen through the molten alloy, and, at the same time, to institute control of the degree of de-gassing obtained by this method by means of a reduced-pressure apparatus. The requirements for this test have been described elsewhere[1] but essentially the apparatus consists of a vacuum pump, an autoclave with a heat-resistant glass window, a reservoir whose volume is at least 25 times that of the autoclave and a vacuum gauge. A view of the original apparatus is shown in Fig. 2. With this apparatus, a small sample of the melt is allowed to solidify under vacuum. The gas content of the sample is then indicated by observing the behaviour of its surface during solidification.

For the purposes of foundry control it was necessary to make the apparatus mobile, and in this form it is illustrated in Figs. 3 and 4.* For convenience and to speed up testing the apparatus was finally constructed with two autoclaves.

In use, iron sampling crucibles are immersed in the molten metal to drive off gases and moisture; a sample approximately 2 oz. in weight is then taken and quickly placed in the autoclave and the self-sealing lid put on. The apparatus is operated when the gauge, which is connected to the reservoir, registers 29 in. of mercury.

Results Obtained with the New Technique

Before proceeding with the manufacture of further plate castings of the type previously mentioned, it was clear that gas-free metal obtainable

* Now manufactured in this form by W. Edwards & Company (London), Limited.

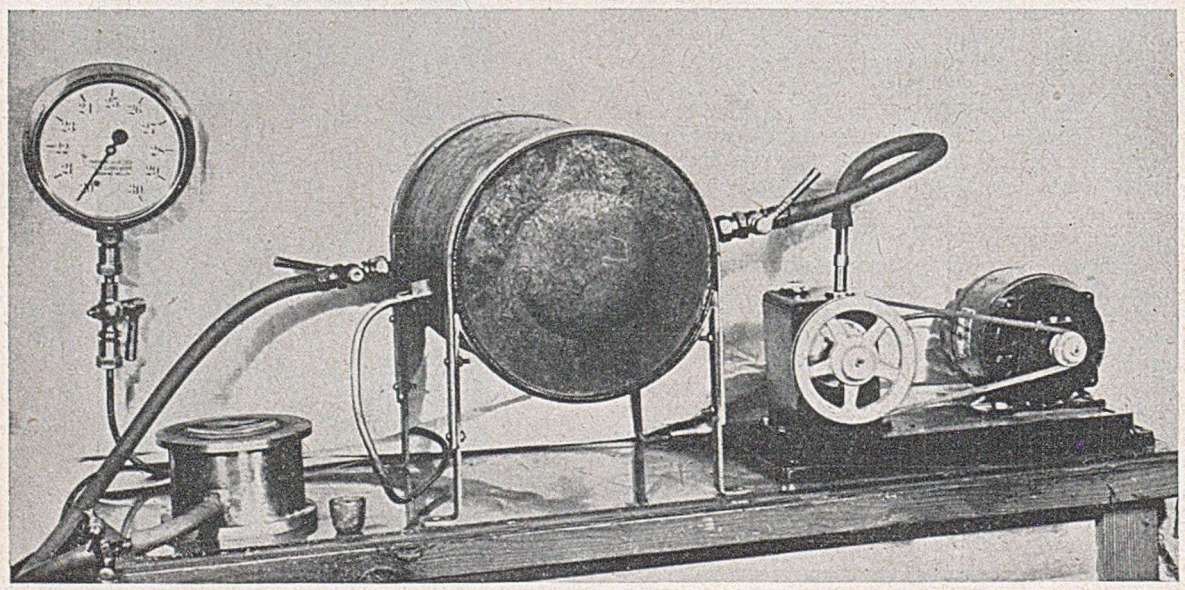


FIG. 2.—*Original Apparatus devised for carrying out the Reduced-pressure Test on a Solidifying Alloy.*

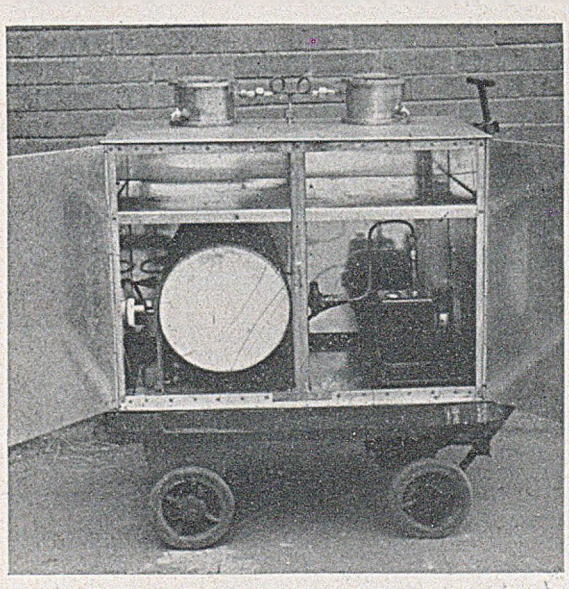
TABLE I.—*Data Supplied by the Test Specimens Selected.*

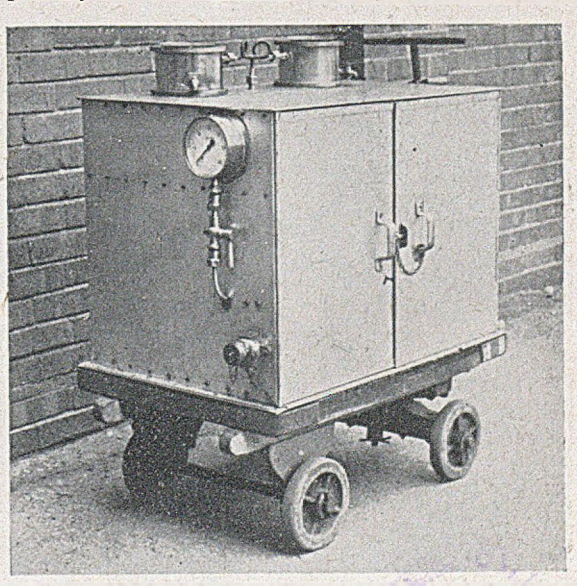
Melt ref. no.	Degassing. Method.	Degassing. Temp., deg. C.	Modification. Salts.	Modification. Temp., deg. C.	Casting temp., deg. C.	Sample cooled in.	Illustrated in Fig. No.
M (i)	None	—	None	—	740	Air	5 (*a*)
(ii)	,,	—	,,	—	740	R.-P.A.	5 (*b*)
A (i)	None	—	None	—	750	R.-P.A.	6 (*a*)
(ii)	5 mins. N_2*	820	,,	—	820	,,	6 (*b*)
(iii)	,, ,,	820	H.T. salts†	780	740	,,	6 (*c*)
B (i)	None	—	None	—	740	R.-P.A.	7 (*a*)
(ii)	5 mins. N_2*	800	,,	—	800	,,	7 (*b*)
(iii)	,, ,,	800	L.T. salts‡	740	720	,,	7 (*c*)
C (i)	None	—	None	—	750	R.-P.A.	8 (*a*)
(ii)	½ per cent. proprietary flux	760	,,	—	760	,,	8 (*b*)
(iii)	As (ii) but with	800	,,	—	800	,,	8 (*c*)
D (i)	None	—	None	—	700	R.-P.A.	9 (*a*)
(ii)	½ per cent. proprietary flux	750	,,	—	750	,,	9 (*b*)
(iii)	,, ,, ,,	750	L.T. salts‡	740	720	,,	9 (*c*)

* Commercial cylinder nitrogen suitable, cylinder discarded when pressure fell below five atmospheres.
† H.T. salts :—2 parts NaF + 1 part NaCl (two parts by weight used).
‡ L.T. salts :—1 part NaF + 2 parts NaCl (four parts by weight used).

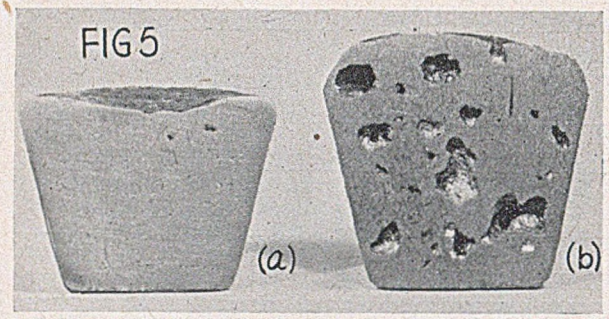
under foundry conditions was a pre-requisite. With this aim in view, experimental melts of LM-6 alloy were made using various degassing and modifying techniques; in each case the result was assessed by the reduced-pressure apparatus (R.-P.A.). From the considerable number of experimental melts, five have been selected to show the efficiency or otherwise of the methods of degassing employed and the effect of subsequent modification. It should be noted that modification by metallic sodium is not included, as experience has shown this to be a consistent source of gas pick-up. Details of the test specimens illustrated are given in Table I above.

Series M shows the effectiveness of the reduced-pressure apparatus in magnifying the amount of gas present in normal melts, when no degassing treatment was given. Series A shows the great improvement resulting from a five min. degassing treatment with nitrogen and how this improvement is maintained when modified by H.T. salts. In series B, degassing was incomplete after five min. treatment with nitrogen but the small amount of gas remaining in the alloy had been removed by the L.T. modifying salts; this series also shows the amount of "rise" or "sink" of the specimen which is a quick guide to the success or otherwise of the degassing treatment. In series C, proprietary flux was used for degassing and, being supplied in cardboard containers, was suspected of being damp. Improvement resulted from double treatment with this flux, but the temperature of the melt was then considered to be too high for further treatments to be successful. In contrast, series D demonstrates the successful use of proprietary flux for degassing; the improvement relative

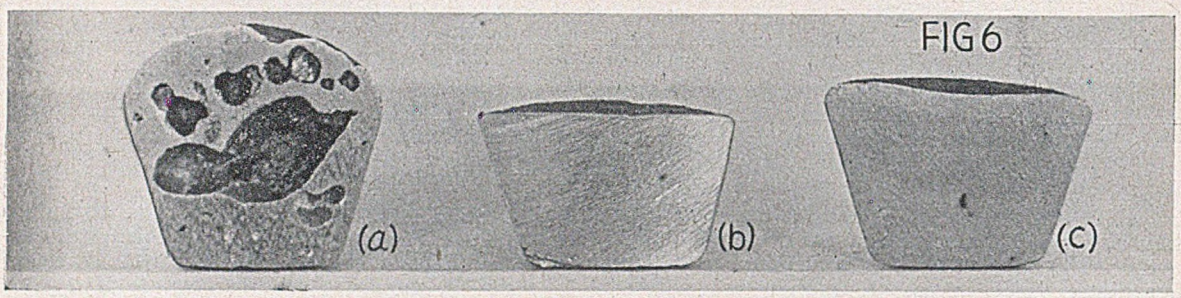


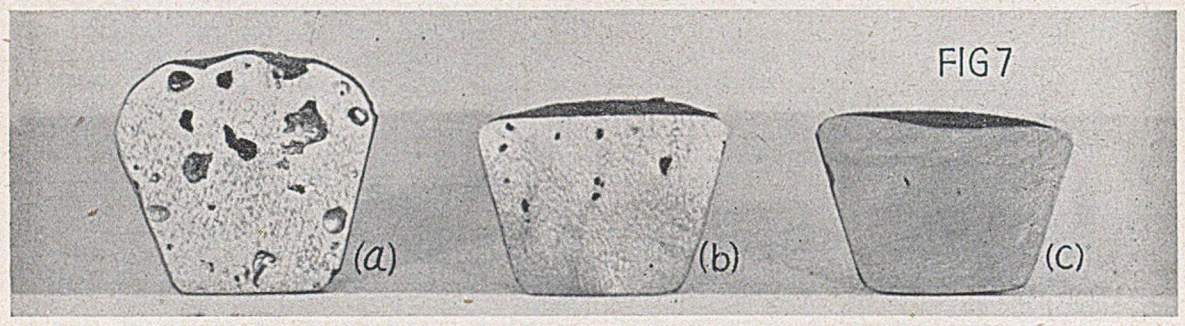


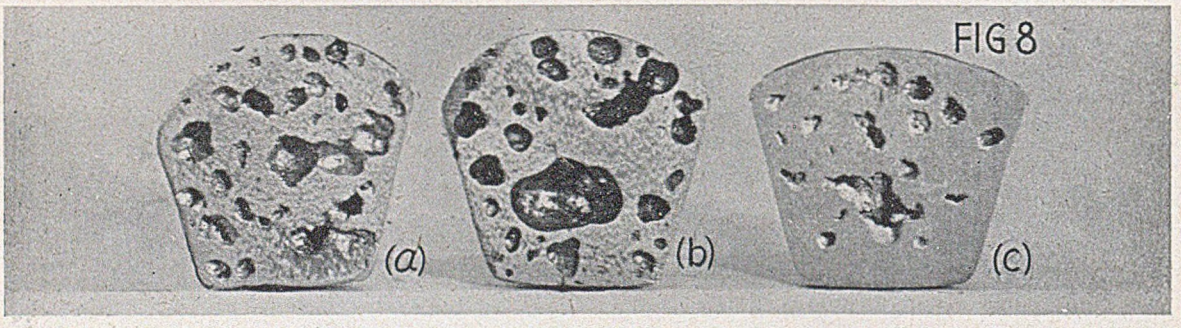
FIGS. 3 AND 4.—*Mobile Form of the Reduced-pressure Test Apparatus which was developed subsequently.*

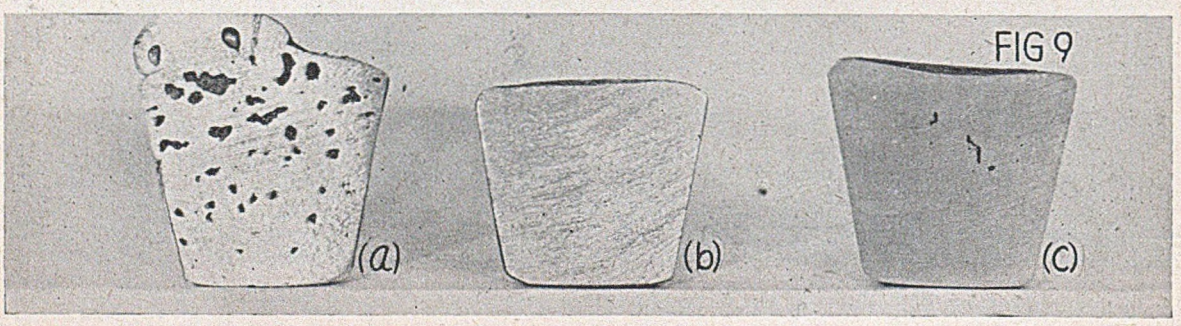


FIGS. 5 TO 9.—*Sections through LM16 Aluminium Alloy Test Samples after casting at Temperatures and with Treatments as detailed in Table I. All except Fig. 5(a) were from Samples cooled in the Reduced-pressure Apparatus, as shown in Figs. 2, 3 and 4.*









to series C is considered to be due to the lower temperatures employed and the extra care taken by all concerned to ensure that the degassing flux was delivered dry and stored under good conditions.

Application of the Technique

The experimental melts described earlier, and the results obtained from a large number of production heats, have enabled a reliable and satisfactory technique to be established for all aluminium alloys. Degassing with nitrogen is now standard practice, as it is considered to be more efficient and is cheaper to operate. A considerable increase in crucible life over fluxing methods of degassing is also obtained, for crucible attack at the metal surface is elminated.

Nitrogen degassing followed by "salts" modification was successfully used for the production of the large plate-type castings which originally showed the need for an improved degassing process. Experience at that time, however, showed that a crucible-degassed melt did not necessarily mean a completely gas-free casting, because gas pick-up during teeming could occur. For normal production purposes, however, a completely gas-free metal is not generally desirable as increased piping results, necessitating a corresponding increase in the size of risers and feeding heads.

Conclusions and Acknowledgments

Practical foundry trials have demonstrated that the B.N.F.M.R.A. reduced-pressure apparatus gives a practical and reliable measure of the extent of gas in aluminium alloys. With the aid of this apparatus, trials have shown that the nitrogen method of degassing is to be preferred as it was found to be more reliable and economical in use. It is now standard practice in the foundry at H.M. Dockyard, Chatham.

This Paper is published by permission of the Lords Commissioners of the Admiralty but the responsibility for any statements of fact or opinions expressed rests solely with the Authors. The Authors wish to record their appreciation of the help given in this work by Mr. Squires, foundry foreman at Chatham.

REFERENCE

[1] W. A. Baker, *Jnl.* Inst. Metals, 1945, 71, 166-7.

Shortage of Mathematics and Science Teachers

In a report to the Minister of Education (H.M.S.O., price 6d. net), the National Advisory Council on the Training and Supply of Teachers declare that the shortage of graduate teachers of mathematics and science constitutes a national problem. The needs of the schools are fundamental; unless enough men and women with suitable abilities and qualifications come forward to teach in schools, there must be serious long-term effects both on the general quality of education of the nation and on the future supply of scientists and technologists. The situation in the schools should therefore be of direct interest to the universities and industry—and indeed to all those concerned with the supply and use of scientific manpower.

Production for Plenty

Exhibition and Conference for 1954

A "Production for Plenty" Exhibition, planned to arouse the interest of leading industrialists and the general public in research and its application to improved productivity, will be held in London at Olympia during July, 1954.

The exhibition will be sponsored by the Institution of Production Engineers, who are also arranging for a conference to take place at the exhibition; this will provide a platform for speakers of international authority to talk on the relationship between research and production in a number of important fields. The main purpose of the exhibition and conference is to show both how improved production methods are reducing the time lag between research and production and how research into greater productivity ensures that more, better and cheaper goods become available to the consuming public.

As far as is practicable, the exhibits will demonstrate many different ways of improving productivity. The exhibition will provide an opportunity for showing designs, methods, processes and specialized equipment, which not only speed production and reduce costs, but add to the comfort, convenience and prosperity of the worker. Although the exhibition is not primarily intended to be a trade show in the usual sense of the word, exhibitors will, of course, be able to offer their products for sale. The "Production for Plenty" Exhibition will be complementary to, and not competitive with, other exhibitions. The exhibition is planned to be of interest not only to management, but to all groups of industrial workers, and employers will be encouraged to make special arrangements for their employees to visit the exhibition. Details of the exhibition are available from the secretary, the Institution of Production Engineers, 36, Portman Square, W.1.

Industrial Building Easier

There was a cordial welcome for the announcement in the House of Commons by the Minister of Works of the extension of the free limit for industrial building. The free limit at present in force is £2,000 for industrial and agricultural work. The Minister, Sir David Eccles, said that the Government wished to stimulate investment in productive enterprise and the free limit for industry and agriculture would therefore be raised for the year 1954 to £25,000.

As a further step towards simplifying licensing procedure, from January 1 applications for building licences for all classes of buildings except housing should be sent to the Regional Licensing Office of the Ministry of Works. If in any area the load on the building industry appears likely to become excessive, the Regional Officers of the Ministry of Works will operate the starting date procedure and thus preserve a balance between building work in the private and public sectors of the economy.

In answer to a question, Sir David said that sponsoring arrangements whereby the building owner who wanted to put up a factory goes to the Board of Trade or to the Ministry of Supply, would cease, and only in cases where the area was in danger of a severe overload would the Ministry of Works now apply to the Board of Trade or the Ministry of Supply to know whether the building was of vital importance.

Pneumoconiosis

Some Medical Aspects

While it is generally accepted that quartz fractions are the most important factors in the causation of fibrosis in the lungs of underground workers in coal mines, points out Dr. W. E. George in a paper entitled "Pneumoconiosis of New South Wales Workers," presented at the Empire Mining and Metallurgical Congress, Australia and New Zealand, 1953, it is possible that other constituents of dust may play some part. It has been suggested that in the reticular type of dust there might be more of a mechanical than a chemical response to the pulmonary defences by large quantities of a dust which is harmless in small quantities. In this type of fibrosis only sufficient fibrous tissue is produced to fix the amount of dust present.

Symptoms and Signs

In uncomplicated cases, the cardinal symptom is increased breathlessness on exertion. The degree of this varies considerably in different patients, but usually in moderately advanced cases, the patient may be able to carry out normal work. Many men affected by pneumoconiosis are of an age group (50-60 years) when some slight degree of cardio-vascular degenerative disease is common and the contribution made by this condition to such a common symptom, even among the physically normal, is difficult to assess. Others, states the author, who have reached the retiring age and have carried out their normal duties, may during a medical examination in consequence of a claim for compensation, complain of increased breathlessness. Obviously, he continues, since they were able all along to carry out their normal work, this can not be extreme. Much of the breathlessness is possibly bronchiolar. Many pneumoconiotics develop emphysema or chronic bronchitis, and these generally contribute to breathlessness.

Pain in the chest is a common complaint. This, however, is usually vague or fleeting in character. It is generally made worse by coughing. Cough, usually worse at night and in the early morning, is a frequent complaint. It is usually non-productive, but may be accompanied by expectoration. In advanced disease, the cough may become more severe and sputum may be copious and discoloured by coal dust. Blood-stained sputum is rare, but may occur when tuberculous infection is associated with pneumoconiosis. A complaint of loss of strength or increased weariness at the end of a day's work is common and may be present even in the absence of tuberculous infection. Complaint of loss of weight is uncommon and gastro-internal symptoms are rare; the appetite remains good.

On clinical examination, concludes the author, signs of pneumoconiosis are surprisingly few. Radiological appearances, however, are specific, and he stresses the importance of the taking of an accurate and detailed history of patients at the time of a clinical examination.

Steel Output Again Up

Fresh output records are announced by the British Iron and Steel Federation. New all-time peak levels for both steel and pig-iron output were achieved in November. Steel output was at an annual rate of 18,878,000 tons, compared with the previous month's 18,460,000 tons, which was also a record. The annual rate of steel output in November, 1952, was 17,951,000 tons. Thus, for the fourth month during this year a new steel output peak has been reached. It now seems likely that the industry will overhaul its target for the year of 17,500,000 tons.

Pig-iron production in November was at an annual rate of 11,883,000 tons, against the previous month's record of 11,519,000 tons. In the corresponding month a year ago output was at the rate of 10,753,000 tons. Latest steel and pig-iron output figures (in tons) compare as follow with earlier returns:—

	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1953—October ..	221,500	11,519,000	355,000	18,460,000
November ..	228,500	11,883,000	363,000	18,878,000
11 months ..	213,800	11,110,000	338,600	17,607,000
1952—October ..	204,200	10,616,000	327,800	17,044,000
November ..	206,800	10,753,000	345,200	17,951,000
11 months ..	202,000	10,504,000	309,400	16,087,000

Does Planning Aid Industry ?

The importance of planning is a subject which is often discussed nowadays. Just how much is industry assisted in its efforts to increase productivity by the planner? According to Mr. P. A. Macrory, chairman of the Federation of British Industry's location of Industry Committee, not very much. In fact he is of the opinion that planning has had a negative effect and has acted as a brake. In an address to the Town Planning Institute in London, Mr. Macrory stated that he and some colleagues had recently considered the question and had decided with complete unanimity that, up to date, planning had been very little other than a drag upon the efficiency of industry—in short, an almost unmitigated nuisance. He added, however, that there were instances—unfortunately exceptional—where planning and industry had been able to help each other.

One criticism he voiced was that planners rarely recognized the importance of good communications to industry. A good deal of the heavy traffic which was now cluttering up our already congested roads would not be there at all if the railways provided a more efficient freight service, he declared. Mr. Macrory called for a clear statement of the policy behind the Distribution of Industry Acts, apart from the general need to redress the balance between the Midlands and the south. He also complained that planning authorities carried their control down to a degree of detail which was quite unnecessary and vexatious to the industrial developer.

Federation of British Industries Overseas Scholarships Scheme

Dr. W. Abbott, C.M.G., O.B.E., formerly H.M. Staff Inspector of Engineering at the Ministry of Education, has been appointed Director of Studies in connection with the F.B.I. Overseas Scholarships Scheme. Mr. W. V. Jenkins, who has been responsible for the operation of the scheme since its inception, remains as manager.

Practical Experience of Shell Moulding*

By C. Potter

The biggest difficulty facing the Author when contemplating shell moulding was the lack of records as to practical experience with the process. To assist others who may be in this position, the following Paper was prepared, detailing subsequent experience.

Early Experiments

The early start made by the Author in shell moulding was quite primitive but the accuracy and surface finish of the casting looked promising enough to warrant further attention. The great disadvantage was the hot and cumbersome pattern-plate. This had to be handled far too much and its manipulation included such operations as turning it over twice and ejecting the cured shell from the plate. At 200 deg. C. this is objectionable, for in addition to the operator picking up a few scars, the plate was out of the oven far too long and had to be heated to temperature again before further investment. From experience it was learnt that if the hot plate could be handled quickly without fatigue at dump box and ejector stations, re-heating of the plate would be unnecessary; mould making would have good continuity and a good production rate could be achieved. The equipment eventually designed is mainly a means of handling the plate easily and efficiently.

The rate of mould production on this equipment, as on any other, is governed mainly by curing time. There have been curing times quoted of 45 secs., but it seems better to give an extension of this to at least a minute, and with this time 60 half shells, or 30 complete moulds, can be produced in an hour by one operation without undue fatigue.

Further Development

The Author's firm is now constructing a slightly larger machine which is intended to produce a top and bottom shell simultaneously in each oven.† Theoretically, this should give 60 complete shells to the hour, although in actual fact it is not expected to achieve this figure as the fatigue factor will be higher.

Elaborating on the fatigue factor, attention is drawn to the following comparison:—A hand moulder working on an 18 by 12-in. plate pattern, using a box of the same size 4 in. deep, could be expected to produce 60 complete moulds in an 8-hr. day. In achieving this, he would be handling 3 tons 4 cwts. 1 q. 4 lb. A machine moulder, working on a jolt/turn-over machine, using a plate and box of the same size and making a top and bottom simultaneously on the machine, could be expected to produce 200 moulds in an 8-hr. day. During this time he would be physically lifting 10 tons 14 cwts. 1 q. 4 lb. An operator, working a shell-moulding machine similar to that described, working on an 18 by 12-in. patternplate, could be expected to produce 240 complete moulds which, at a weight of 10 lb. per mould (likely to be on the heavy side), is only 1 ton 1 cwt. 1 q. 20 lb., so that he is in fact physically lifting one-tenth of the weight handled by the machine moulder.

Costs

The question of cost is one which will figure largely in the minds of those interested. The Author believes that the cost of castings is very largely a domestic problem being governed by capital charges and on-cost over which, in many cases, the practising foundryman has no control. Personal remarks will therefore confine the subject of costing to basic facts. The cost of the main material, *i.e.*, the resin/sand, should be constant, although the price of sand and carriage will vary as to the locality. However, as the resin itself represents approximately 90 per cent. of the price of the mixture, fluctuation in the cost of sand is not such a disturbing factor as it would first appear.

The cost of labour, if reference is made to the previous example, assuming that a rate of 3s. per hr. would be paid in each case, then a mould produced by the hand plate moulder would cost 4.8d. per box, the machine moulder 1.44d. per box and the shell moulder 1.2d. per box. Generally speaking, with resin at 2s. 8d. per lb. and sand at 30s. per ton, one ton of the mixture costs £14 5s. 0d. It is estimated that, at these figures, a mould of 6 lb. costs in direct labour and materials approximately 1s. Against this have to be offset the decreased sand handling charges, decreased fettling charges, the absence of moulding boxes and their maintenance and also the running and maintenance costs of a mechanized plant, together with—what is the biggest consideration of all—the savings which can be made in the machine-shop.

Typical Examples

Examples of the saving which can be made in the machining are as follow:—On a spray of operating bars (Fig. 1) where the mould costs 1s. to produce, the saving in the machine-shop was 1¼ hrs., so that the saving achieved in direct machine-shop labour only was 5s. In a second example—a spray of brass links (also shown in Fig. 1)—the mould cost approximately 6d., while the direct machine-shop labour saved was 1½ hrs.,

* Extract from a Paper read before the West Riding of Yorkshire branch of the Institute of British Foundrymen, Mr. C. S. Johnson presiding.

† This equipment was described in the JOURNAL, December 10, 1953

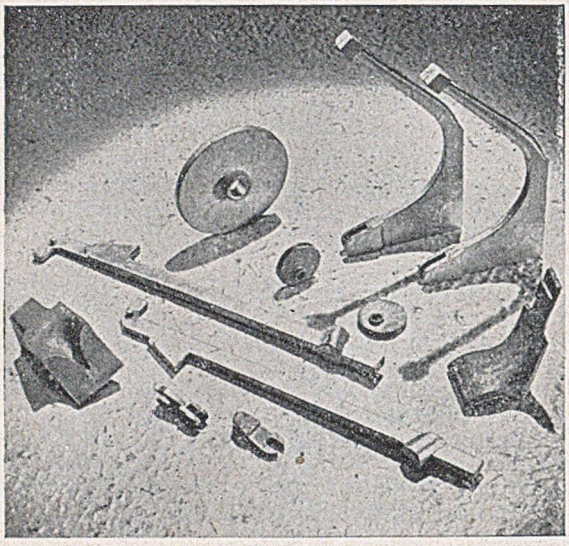


FIG. 1.—*Group of Single Castings produced by Shell Moulding; in each case the Patternplate incorporated a Spray of Items.*

or 4s. 6d. It is substantiated, therefore, that when considering the question of cost for shell moulding, that apart from economies which can be effected in the foundry, a much greater saving can be made in the machine-shops.

Snags

Resin Mixture.—Intimate mixing of resin and sand is essential; with resin content as low as 5 per cent. poor mixing can be serious. Weak friable shells, poor casting finish and run-outs are a few of the troubles that may follow.

Peel Back.—Peel back from the dump-box edge was the worst problem encountered when the equipment was first worked and it seriously affected both output and the tempers of the operators. One or two grades of resin were better than others in this respect but none was immune from the trouble. In the quest for a solution of the problem the Author began to consider water-cooling of dump-box edge, a loose frame round the pattern, or a silicone rubber seal, but it was eventually cured by the fitting of a $\frac{1}{4}$-in. square steel strip around the patternplate edge. As a result, resins of different viscosity can be used without any trouble whatsoever.

Curing Times.—Attempting to cure the half shells at very fast rates can lead to shells appearing cured, when in fact they are really under-cured in the centre and the resultant shell is plastic on ejection. The Author has seen shells laid face downwards on a flat machined plate in this hot condition and the joint face has settled down to the plate. What happens to the unsupported parts of the mould one hesitates to think, or what would happen if the mould were cast unsupported, because the metal on entry would produce a slightly plastic state in the shell again and a distorted or badly "flashed" casting would result.

Ejector Pins.—The problem of ejector pins are widely discussed; some operators appear to favour the use of as many as possible, others take the opposite view. Illustrations have been published of a device for removal of the shell without any pins. For this, a loose, dove-tailed frame round the pattern edge holds the shell while the patternplate is being withdrawn. Personal experience is that it is desirable to have plenty of pins so arranged that they advance simultaneously. Whatever care be taken in curing, a shell is inclined to be very slightly plastic on leaving the oven and if it could be left to cool down for a few minutes before ejection, much flatter shells could be obtained with the employment of fewer ejection pins. Unfortunately, perfect curing conditions are difficult to obtain, for the plate must not be out of the oven longer than is essential or continuity is broken down. So, to extend the versatility of shell moulding, plenty of pins, particularly at vital points, is an excellent rule.

Gas Supply.—To ensure regular curing times and steady oven temperatures, some form of gas governor control is desirable and a visible oven-temperature indicator would be an advantage.

Pattern Materials.—The pattern materials used have included aluminium, brass, cast iron, steel, and all these have proved satisfactory. Iron and steel, however, do seem to be preferable, both taking on a very good finish after a few days working. Aluminium and brass, apart from being soft and thus very susceptible to damage, go dull in use, although the casting finish does not seem to deteriorate. Ejection, however, also appears to be easier from ferrous patterns.

Clamping of Shells.—Undoubtedly, the holding of the shells together during casting is still the biggest problem of shell moulding. Vertical pouring seems to be widely favoured, especially abroad, and all the early shells appear to have been cast in this way. The Author, like most people, cast his shells in this fashionable manner at first and gave himself plenty of difficulties. The holding of the shell is a much bigger problem when casting vertically —higher resin contents and thicker shells must be employed if unsupported moulds, as well, are the rule. The Author is now concentrating as far as possible on horizontally-cast moulds with the result that speed of closure, freedom from flash on joint lines, and surface finish have been improved. There are, however, many castings that can be improved by casting in a vertical plane, so no hard and fast rule can be laid down, each job to be taken on its own merits.

Possibilities

Shell moulding is only in its infancy in this country. The price of the resin/sand mixture is high, but when plotted against the advantages to be gained from the process, shell moulding certainly appears to have very great possibilities. These advantages are:—Improved surface finish; a dimensional accuracy that is more easily maintained than with ordinary moulds (leading to the elimination of machining on all but the closest limits); ease of casting thin sections; lowered surface chilling, due to

the entire absence of moisture and the reduction of blowing owing to the high permeability of the shell. The control of green-sand moulding with the attendant requirements of critical water-content, bond strength and permeability, will be non-existent with shell-moulding sands. The initial cost and maintenance of moulding boxes can be ruled out. A much smaller floor area; a high proportion of unskilled labour; less sand handling; lower plant maintenance; reduced fettling charges and the entire elimination of scrap castings due to offset joint lines, can be visualized, as set against the normal mechanized foundry process.

Conclusions

In conclusion, it is germane to ask " what of the future? ", but the past and the present should be examined. It is known that by June, 1944, the process was in production at several German foundries. In one foundry it was being used for the production of cores for hand grenades where the production figure of 6,000 components per day was achieved. It is also known that since the issue of what is now known as the F.I.A.T. report No. 1168, which was published on May 30, 1947, the Americans have given considerable thought to and spent a considerable amount of money on the development of shell moulding to such an extent that it is now reported that the Ford Motor Company pour 150 tons of metal per day into shell moulds. In the future, therefore, it may be seen that foundry technique as known to-day may be almost entirely surplanted by the shell-moulding process—coupled with a complete change of ideas on machining techniques. Instead of castings being produced with $\frac{1}{8}$ in. metal left for machining off by lathes and milling machines, etc., castings will be produced with a minimum machining allowance of 0.005 to 0.01 in. which will be rapidly removed on grinding machines. It is suggested that to-day no foundryman who hopes to keep abreast of contemporary practice can afford to ignore shell moulding. Somewhere in every foundry and engineering concern there will be castings which can be produced more economically by this twentieth century method.

Universities Must Have Engineers

The astonishing rate of productivity in the United States has long been viewed enviously from this side of the Atlantic. To emulate it would brighten our economic prospects immeasurably, but, in the opinion of Lord Simon of Wythenshawe, there is no chance of this until the " major single weakness " in the industry of this country—the shortage of well-trained engineers—is remedied.

Manchester University at least has this aim in view, and Lord Simon, who is chairman of its council, has given details of plans for expanding the engineering departments. At present there were 60 post-graduate students, compared with only six to eight before the war; it was hoped to double the pre-war number of about 150 engineering graduates within the next few years, and to appoint two more professors—one of municipal engineering and one of chemical engineering and to develop " a really strong chemical engineering department."

Trade with Chile

Chile took 23 per cent. of her imports from the United Kingdom in 1934. In 1938, the percentage had dwindled to 10, and since the war it has never exceeded 12. According to the Export Services Branch of the Board of Trade, the United Kingdom has an uphill task in endeavouring to regain the position she formerly held. There are, however, prospects for trade with Chile in capital goods.

Chile is rapidly expanding her industrial potential and imports for this purpose are likely to have priority in the allocation of foreign exchange. She needs machinery and agricultural equipment with which to develop her resources, as well as vehicles for the improvement of transport.

Opportunities are likely to occur within the fairly near future for the supply of rolling stock, signalling equipment, etc., for the State Railways; it is considered that mining machinery and equipment should offer a profitable field in view of Chile's extensive mining industry, and there are periodic demands for port equipment and ships. In all these lines there is a certain predisposition in favour of United Kingdom goods, other factors such as price, payment terms, and delivery being equal. The competition of United States and European manufacturers is, however, keen.

Copper accounts for over 50 per cent. of Chile's foreign exchange earnings at present, and since Chile now has the opportunity to sell copper once more in the London market, this could do a lot to increase the level of trade between the two countries. Chile is a country of considerable resources, many of them largely undeveloped, and although present conditions do not appear encouraging to United Kingdom exporters, the market is worth cultivating for its permanent value. An easing in Chile's economic difficulties will quickly be followed by an increase in imports, and the present restrictions are adding to the backlog of demand.

Management " Lazy-minded "

The disturbing thought that the increased rate of productivity in this country was still lagging behind that in the United States concerned trade unionists and industrialists who attended a one-day conference of the Motion Study Society of Great Britain in Newcastle-upon-Tyne. One delegate, Mr. R. W. Mann, chairman of Victor Products (Wallsend), Limited, accused managements of lazy-mindedness, which, he asserted, was the stumbling block to increased productivity in the Tyneside area. He quoted the case of his own works where in the past year a work study team had produced another £32,000 worth of saleable goods. There was not one delegate present, he declared, who could not return to his factory and from his own experience introduce new methods which would increase production.

Putting the employees' point of view, Mr. F. Burr, district secretary of the Transport and General Workers' Union, said that men would not adopt a scheme they could not understand; many feared to adopt new ideas in case they worked themselves out of their jobs. Works-expert schemes should be explained to workers in language they could understand; they must be concise, clear, and profitable to employees.

THE EDINBURGH engineering firm of Bruce Peebles & Company, Limited, will close on the evening of December 31 for the New Year holiday. The works will reopen on January 6. No goods will be received or despatched during the holiday.

International Foundry Congress

Extracts from the Paris Papers

Influence of the Chemical Composition of Silicate Inclusions on the Properties of Grey Irons

By Dr. Andre Roos

The analysis of inclusions in cast iron presents the same difficulties as with steel, with the added difficulty of the problem of the determination of graphite. If a study be made of plain cast iron having a constant content of combined carbon and graphite, the determination of carbides, sulphides and phosphides seems of less importance than that of oxidized inclusions (silicates and oxides) especially if the study of the action of the traditional deoxidants for cast iron (calcium silicide) be envisaged.

The method described is based on the electrolytic separation of silicates and oxides involving the destruction of carbides, phosphides and sulphides, through the action of nascent bromine produced by electrolysis in a strongly brominized surrounding. This method does not allow of the determination of SiO_2, for the silica released by electrolysis, is found mixed with some iron silicon, the following analysis gives a wrong figure of high SiO_2. To determine the SiO_2 pre-existent in the iron, the method brought to perfection by I.R.S.I.D. has been used, that is, the dissolving of cast-iron borings in a solution of copper acetate.

In consequence, the whole of the analysis cited led to the complete determination of silicates. In particular it has been possible to check that the total of the determinations of the silicon oxidized to SiO_2 and of the non-oxidized silicon, agrees (within analytical error) with the total silicon content of the iron, as determined by the traditional method.

The particular case of grey iron, deoxidized by calcium silicide, has been investigated and the following results found:—(1) Inclusions decrease as the calcium content increases; (2) the modular of elasticity E depends on the phosphorus content, as corrected by the equation:—

$$P^1 = P - \frac{5\,Fe_2O_3 + FeO}{10}$$

where Fe_2O_3 and FeO are respectively the ferric and ferrous oxide in the cast iron. This formula assumes the true silicon content to be constant (total Si-Si of SiO_2). Actually, it has been shown that the modulus of elasticity of deoxidized irons is a linear function of p^1 for a constant value of carbon, silicon and manganese.

The irons used in the experiments had the following average composition:—

TC = 2.60; total Si = 0.80; free si = 0.68; and Mn = 0.60.

In conclusion, the method of analysis outlined shows the possibility of following the deoxidation of grey irons and to demonstrate how starting off with a certain percentage of P and P^1, the action of calcium silicate becomes such that the percentages of oxides decrease to a marked degree. The modulus of elasticity being the mechanical property most sensitive to graphite content, its variation is thus determined for a constant value for the combined-carbon.

Contribution to the Study of Feeding Heads—Use of Exothermic Materials

*By M. P. Nicolas**

One of the essential factors governing the soundness of a casting is the need for feeding all sections in a proper way. The maximum guarantee is offered in this field by correct risering and so mastering the law of cooling of the casting in order to allow the feeding head to operate in such a way that it will take care of the last section to freeze.

The principal rules to be followed to attain this object are the following:—

(1) The capacity of the feeding head must be such as to take care of the shrinkage of the metal of the casting during solidification. Its volume can usefully be fixed at twice the value of this shrinkage.

(2) The modulus of the cooling of the feeding head, which is the ratio of its volume to its surface, should be greater than the modulus of the casting or more precisely of the part upon which it has to act. Generally speaking, the modulus of any section of the casting should be greater than that of another section which it serves to feed.

(3) Should it so happen, later, that there is not sufficient calorific mass in every part of the casting to take care of this condition, then resort may be had to either exothermic materials or by abstracting calories, by using shells so that the volume of this part of the casting be modified so as to attain the desired value of its modulus.

In the case of a homogeneous casting, the solution of the problem of the law of cooling can often be had through the use of expedients:—

The modulus of one part of a casting is increased if the casting is run on this part by means of a free feeding head.

The modulus of one part of a casting is, on the other hand, decreased if resort is had to high conductivity sand for the making of the surface of the corresponding mould.

Too low a modulus value of a feeding head or of a part of a casting which it feeds, can be compensated for by adopting a feeding head of which the motive element is a core made with an exothermic material.

* The Author is head of the "mould" section of the Centre Technique.

Influence of Copper on Cast Irons Containing Magnesium

*By R. M. Lamb B.Sc.**

Copper of higher content than two per cent. has an unfavourable influence on the structure of spheroidal graphite in irons containing magnesium made from pure Swedish iron. The same effect is noted when using smaller quantities with magnesium containing iron made from commercial irons of normal purity.

Magnesium, in quantities necessary to yield spheroidal graphite, lowers the solubility of the copper in the iron and the noxious effect on the form of the graphite starts to manifest itself in the appearance of a copper-rich phase in the microstructure. The addition of about 0.2 per cent. of Mischmetal, following upon the normal addition of the magnesium alloy and prior to inoculation, neutralizes the bad effect of the copper on the form of the graphite, but does not restore the solubility of the copper.

The copper stabilizes the pearlite in the microstructure sufficiently to convert the largely ferritic structure of the matrix into ore containing but a low percentage of ferrite. The effect is not influenced by the small additions of Mischmetal. The presence of copper likewise increases the resistance of the pearlite to heat treatment beneath the critical point.

Copper-base alloys are less efficient than those of nickel for the introduction of magnesium into the iron.

Gases in Phosphor-Bronze

By A. T. Pal†

Experimental casts of phosphor-bronze have shown that when carried out under a thick covering of charcoal, no loss of tin nor formation of vapour was noted; any addition of phosphor copper as a deoxidant became quite superfluous. All the same, metallographic, hydraulic and mechanical testing established that the absorption of hydrogen, which could come about when melting under charcoal, was without detrimental effect.

During the course of other experiments made by melting without a charcoal cover the absorbed oxygen was eliminated and tin losses prevented by suitable additions of phosphate copper, but a fresh addition of this alloy was used to adjust the final phosphorous content. The quantity of oxygen absorbed, as determined by the total loss of phosphorous depends on three factors; melting time; surface of the exposed bath and atmospheric conditions.

The results obtained have shown that the presence of charcoal, when melting phosphor-bronze, improves the production of sound castings, since melting with a cover yields defective castings.

* The Author is on the staff of the Research and Development Department of the Mond Nickel Company, Limited.

† Annapurna Metal Works, Calcutta.

Productivity in Medium-size Foundries

*By J. Leonard**

The Author, having visited 24 American foundries, has applied the information he obtained to European conditions, especially with regard to detail. To obtain a proper perspective of the North American foundry industry, the following table is included:

No. of foundries.	Per cent.	No. of people employed.
2,550	42.5	25 and fewer
1,170	19.6	25 to 50
1,000	15.7	50 to 100
850	14.2	100 to 150
475	7.9	250 and more

Referring to the American production of machine-tool castings, where mechanized a foundry has a productivity of the order of 52 to 53 man-hours per ton of good castings, whilst partially mechanized shops show a figure of 70 to 80. In Belgian and other European foundries a figure of 100 hours is usual, so that the effort required for improvement is not too fanciful.

When answering the question, "Why change to mechanization?" the Author points to well-known reasons—scarcity of skilled men, improved appearance, market demand, and so forth—but issues a word of warning that if mechanization is overdone, upkeep and depreciation of equipment will neutralize the gain from its installation. Later he expresses the opinion that mechanization should be done bit by bit. Productivity, it is asserted, should be based on the production of sound saleable castings. Figures of 3 to 4 per cent. wasters are not to be deemed utopian and in the American machine-tool industry are about 5 per cent.

Several examples are given of poor foundry layouts, together with suggestions for their improvement. Finally, a number of examples selected from American practice, and applicable to European conditions, are described and illustrated.

* The Author is a consultant.

Iron and Steel in Australia

Under the heading "Extractive Metallurgy in Australia (Ferrous Metallurgy)," the Australian Institute of Mining and Metallurgy has published a number of the papers prepared for the fifth Empire Mining and Metallurgical Congress, held this year in Melbourne. These contributions, which deal with various aspects of the Australian iron and steel industry, are as follow:—"Metallurgical Coke-making Practice," by R. L. Carr; "Blast-furnace Practice in Australasia," by C. Newman; "Steelmaking Practice—Mass Production Steels," by R. L. Knight; "Steelmaking Practice—Special Steels," by E. Guy Smith; "Iron and Steel Foundry Practice," by G. Brown; "Steel Rolling Mill Practice in Australia," by M. R. Pitt; "Heavy Forging Practice," by F. A. Hamilton; "Ferro-Alloy Practice," by R. T. Hooper; "Charcoal Industry at Wundowie, Western Australia," by A. C. Harris; "Refractories for the Ferrous Metallurgical Industry in Australia," by D. M. Humbly. The address of the Institute is 399, Little Collins Street, Melbourne, Australia.

Feeding of Steel Castings at Greater-than-atmospheric Pressures*

Author's Replies to Discussion

Replying to the questions posed when their Paper on the above subject was presented at the annual conference of the Institute of British Foundrymen, MR. CHARLES W. BRIGGS and MR. H. F. TAYLOR wrote that they wished to thank the members contributing. Their interest in the studies was very much appreciated. They also thanked Mr. J. F. B. Jackson for his excellent summary presentation of the Paper, and were greatly impressed with the understanding manner in which he replied to the questions on their behalf. It was very evident that he had spent considerable time in a detailed review of the Paper. The Authors, in their reply to the discussion, therefore, could only re-emphasize Mr. Jackson's observations and remarks.

In reply to Mr. A. R. Parkes it could be said that in certain instances pressures only a fraction of atmospheric pressure were sufficient for adequate feeding, whereas in the case mentioned by Mr. Jackson, full atmospheric pressure was necessary. It was shown that in certain of the experiments it was possible to obtain improved conditions of soundness by the use of pressures not too much above atmospheric pressure. It was certain that in the final stages of solidification of a section, such as a plate for instance, it would be advantageous, by the use of pressure, to assist the movement of the liquid steel through the tortuous channels between the dendrites. However, from a practical standpoint, it would be most difficult to ascertain just when such pressure should be applied. The rate of the final solidification wave was fast and the timing would have to be most exact in order to accomplish the desired results. The closer to the end-point, the greater the pressure. Therefore, it was not a difference of 13 to 18 lb. per sq. in. but differences of from 3 to 75 lb. per sq. in. that were to be considered.

Mr. E. Longden had commented on the relation between pressure and density. The Authors' comment on this point was that the time and the rate of application of pressure was important. In most cases, either because application was too early or too late, the application of pressure accomplished nothing. In fact, pressure application was detrimental in most cases.

The Authors had no experience with cast iron, but they desired to point out that the chilling of risers by application of water, etc., went out of practice in the steel foundry years ago.† Every effort was now made to keep risers open to atmospheric pressure for maximum riser efficiency.

Pressure for Investigating Solidification

Mr. J. G. Bailes' remarks were indeed appreciated. The Authors' approach in this study was to ascertain the practical application of greater-than-atmospheric pressures to production steel castings, and this, of course, meant minimum equipment for each mould and easily applied, effective procedures. In reply to Mr. Bailes' question concerning the use of pressure to determine the extent of solidification, it might be said that nitrogen and argon gas, under pressure, have been used to blend castings, but that such techniques usually show the advancing front of beginning solidification and not final solidification times. In heavy sections it is possible to move the liquid plus solid steel ahead of the advancing solid skin and show, by etching methods, after the casting has cooled, the proportion of the liquid plus solid material as compared to the solid skin and entirely liquid interior at the time of pressure application.

Mr. Daybell's comments were of considerable interest. If his company had issued the single paragraph remarks he has made a few years sooner, there would have been no need for the studies presented by the Authors.

* Paper printed in the JOURNAL, October 1 and 8, and Discussion, November 19, 1953.

† Here it is believed that it was not the chilling of the risers which was referred to by the speaker, but the generation of steam pressure in a closed space for producing feed pressure.—EDITOR.

Dorman, Long's Further Development

The third and fourth 360-ton tilting furnaces at the Lackenby open-hearth steelworks at Dorman, Long & Company, Limited, were brought into production last week. A second 600-ton active mixer has also been brought into commission, and this will be followed in the new year by a fifth steel furnace.

Starting of operations at Lackenby was accompanied by the closing down in two stages of the melting shop at the company's oldest works, the Britannia steelworks. Two steel furnaces ceased production in September and the remaining two furnaces went out of commission towards the end of October. Meanwhile, Lackenby melting shop has been largely manned by employees transferred from the works.

Steelmaking began at Britannia in 1887, and over 10,750,000 tons of steel have been produced there in the past 66 years. Rolling of structural sections will continue until the projected mill installations on the Lackenby site come into production, probably in something more than three years' time.

Honorary Degrees Conferred

When the new chemistry building of the University of Sheffield is opened by Lord Scarbrough, Lord Lieutenant of the West Riding of Yorkshire, on February 5, a degree congregation will be held. The honorary degree of Doctor of Laws will then be conferred upon Mr. T. A. McKenna, chairman and managing director of the Staveley Coal & Iron Company, Limited. He joined Staveley Coal & Iron in 1924 as London manager, and in 1939 became commercial manager. In 1944 he was appointed to the board, and two years later became deputy managing director. Mr. McKenna is chairman and managing director of Staveley Iron & Chemical Company, Limited, and is chairman of Birmingham Chemical Company, Limited, and other companies.

Other recipients of honorary degrees will be Sir Cyril Hinshelwood, F.R.S., Professor of Chemistry at Oxford, and Prof. C. K. Ingold, F.R.S., Professor of Chemistry, University College, London, and will both receive that of Doctor of Science.

Metal Corebox Construction

By F. H. Wakeham

Where repetition work is required, coreboxes are often made in light metal such as aluminium. Metal coreboxes are, of course, more expensive to produce, but their life is infinitely greater than their wooden counterparts, particularly when the coremaker appreciates that a metal corebox will produce a better core if trouble is taken to preserve the original shape. This can be achieved in many ways, such as ramming carefully, and the use of a wooden or rubber mallet for rapping the frame of the box to release the core, if rapping is necessary at all. Careful storage will also preserve the high finish of the faces in contact with the core sand.

Advantages

The advantages to be obtained by the use of a metal corebox are:—(1) The shape of the core is maintained indefinitely; (2) owing to the better surface finish, a more clearly-defined core is possible, and (3) a metal corebox will produce many thousands of cores if treated with respect.

When making a metal corebox, a layout has to be prepared to allow for double contraction, *e.g.*, with an aluminium corebox for cast iron, aluminium contraction would be allowed for the corebox plus the normal pattern contraction for cast iron, the metal of the final casting. The corebox, when finished and assembled, should be as light as possible without sacrificing strength.

Typical Example

A typical example of such a corebox is shown in Fig. 1, the overall measurements of the frame being approximately 21 by 13 in. The corebox is built up of component parts, primarily for easy release of the core, and, secondly, so that each part carries the minimum weight. It will be noted that the frame of the corebox is tapered, this being to facilitate rapid removal of the interior from the frame after the whole box has been turned over; consequently the components of the frame can be screwed together permanently. Because the completed corebox has to be as light as possible, the baseplate, frame and interior portions are all either themselves cored out or carved out at the back to within from $\frac{1}{8}$ to $\frac{1}{4}$ in. of the profile.

Detail Constructions

The baseplate (Fig. 2) appears solid at first glance, but actually its underside is shaped as shown in Fig. 3, thus making it light and at the same time comparatively strong. The frame, also, is lightened by shaping from behind the working face, as shown in Figs. 4 and 5, as also are the interior portions shown in Figs. 6 and 7. The cover of the corebox completes the job, and this is shown in Figs. 8 and 9. Fig. 8 shows the face presented to the coremaker during ramming and reveals how the back is carved out for lightness, whilst Fig. 9 illustrates the top face of the core.

Machining

If the components forming the corebox have to be further lightened, this may be accomplished by drilling holes in the faces which are not in contact with sand. A pattern-milling machine is very useful in removing stock behind the profile of each part, since an appropriate tool executes the work swiftly and confers the necessary taper. All pieces which have to be matched, such as the interior, the inside of the frame (and, in general, all faces where another part is in contact), should carry an extra allowance of $\frac{1}{8}$ in. or more on its master pattern, so that such faces may be machined true during the assembly of the pieces.

Patternmaking machinery necessary for the fitting and finishing of such a corebox are a metal milling machine, fine-wire buffing machine, and a portable grinding machine, with an assortment of variously-shaped heads and wheels. Although such machinery is a considerable help in the making of metal coreboxes, much has to be done by hand, such as the filing and scraping of fillets and finishing with fine emery cloth. The faces of the interior are invariably left invarnished.

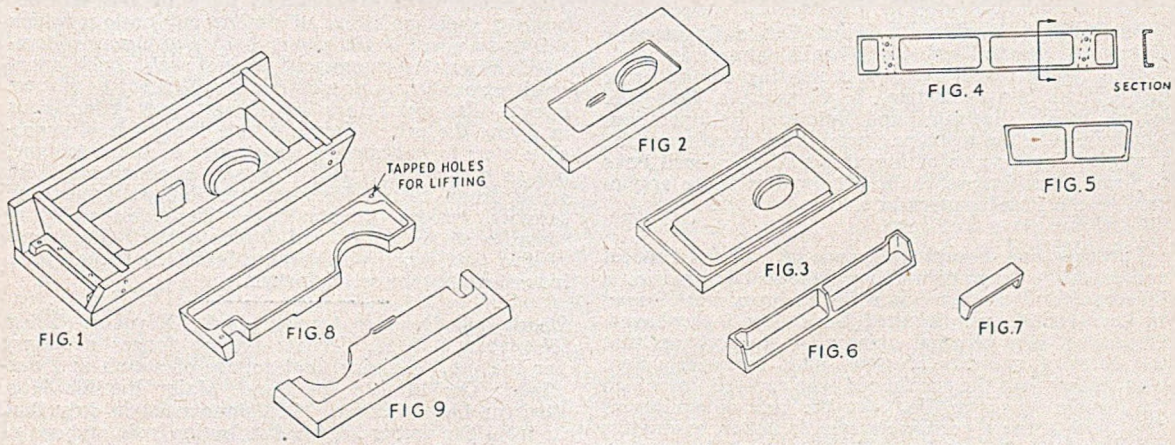


FIG. 1.—*Completed Metal Corebox; Figs. 2 to 8 Component Parts and Fig. 9 Top Face of the Finished Core, the making of which is described.*

THE UNITED STEEL COMPANIES, LIMITED, announces that it expects to pay a final dividend in respect of the year ended October 3, 1953, shortly before the end of the fiscal year on April 5, 1954.

DELIVERIES of structural steel in the United States in October totalled 289,755 tons, and were the highest for any month since the October, 1929, total of 323,785 tons.

Foundry Technique a Century Ago

by T. R. Harris

During the Crimean war, various foundries throughout the country were called upon to produce castings of a different nature from those usually undertaken. Recently, the writer perused a number of letters written by one of the executives of a firm of engineers and iron-founders, who at that time was acting in the capacity of London representative. These letters dealt with the production of cast-iron mortars and the relevant passages appertaining to current foundry practice have been abstracted, as it is thought a glimpse of the methods adopted a century ago may be of interest to modern foundrymen.

Writing in July, 1855, the representative passes on information gathered concerning this new type of work the firm had been asked to produce. "From what I have heard," he writes, "some do cast them solid and this has been pretty general, but some are now being cast with a core. I should think the core the best with a head, say a foot. I would make the moulding box so that the mouth of the mortar be about level with the top, or say 1 in. above, so that the mould can be nicely dressed up after the box is put together, and this can be done before it is dried, then there will be no joint visible. These things are cast very smooth, as you have no doubt seen, much goes in appearance; if honeycombed, they would not receive them. A little box for the head and fixing (hanging) the core can be put on separately. I would not have more sand around the mould than is convenient for packing and let the sand be well cleaned and mixed. . . . The iron must be strong and, from what I learn, the No. 2 Ystaly pig, with a little good scrap, will just do, but, of course, tenacity is the point."

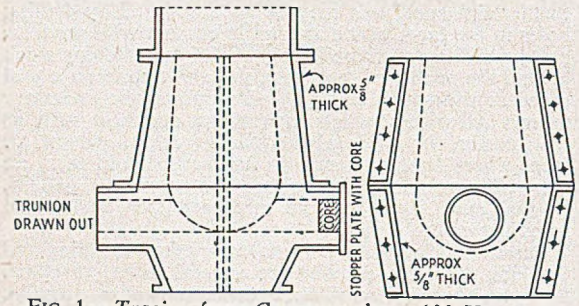


FIG. 1.—*Tracing from Correspondence 100 Years Old, showing the Method of Producing Cast-iron Mortars.*

Sand Details

Some days later, a further letter refers to this job. "Be sure," it was stated, "to make boxes for the mortars and use fine sand for moulding; half of the Vicarage and some London mixed would do." In the letter was also a sketch of the box equipment, a tracing of which is reproduced in Fig. 1. The writer continues: "Dry sand is better, quicker and cheaper than loam, as many boxes as you may have as many boxes you may cast per day. The trunions (pattern) are long enough to nail through the box so as to draw out; the length for casting is regulated by a plate with core inside, as sketched, and packed up."

The next day, another communication on the same subject was despatched to the foundry: "A couple of moulding boxes must be had; you may then cast two each day. The routine is to cast about 12 o'clock; in an hour or two take off the boxes, leave the sand in afterwards, mould so as to be dry by morning. . . . You may cast the mortars as well under the large green-sand foundry crane as anywhere, and as for the moulds you can carry them in your arms. Might be done without a crane, as they would roll—nothing more simple as far as the casting. . . . Get the large foundry in order. I expect shortly to have plenty of work for them in shape of engines and pumps. . . ."

In October it was reported: "Am just returned from Woolwich. The mortars to appearance are improved much."

New Catalogues

Band Filing Machine. Fisher Deane Engineering Company, Limited, of 39, Victoria Street, London, S.W.1, having taken over the marketing of the Ernst Grob band filing machine, have issued a four-page leaflet, which illustrates and describes its operation, which is:—On the machine, metal is removed from the workpiece by a series of files mounted on special links to form a continuous chain. It appears to be applicable to the metal patternshop.

Furnaces and Foundry Equipment. A very useful and extensive range of melting plant and accessories is illustrated and captioned in a folded broadsheet, issued by Lees, Hall & Sons, Limited, Lewes Road, Newhaven, Sussex. It is a personal opinion of the reviewer that this form of publicity is more suited for widely used plant rather than the specialized type covered, for which the demand is spasmodic. For the type of equipment dealt with a more permanent type is better, as months may elapse before a firm actually enters the market. Of its type, however, the folder is well produced. It is available to readers on writing to Newhaven.

Engineers' Tools and Supplies.—If this be a rather comprehensive heading, it is no less all-embracing than a 1,267-page catalogue received from Buck and Hickman Limited, of 2, Whitechapel Road, London, E.1. The receipt of this ponderous tome by the reviewer brought back memories of similar publications which still find a place in the buyers' library of business literature. The greatest commercial asset of such a book is that until replaced by a new edition it will never be thrown away. The publishers have been very courageous in giving the price of each article listed. It is impossible even to indicate the wide range of this catalogue, but so far as the foundry industry is concerned there are a dozen entries for moulders' and patternmakers' supplies, besides the numerous other tools and consumable stores daily used by founders. Recipients of this catalogue, which is profusely illustrated, can, indeed, count themselves fortunate.

Starch and Dextrine Control Order Revoked.—From December 6, 1953, licences are no longer necessary for the use, obtaining, and supply of starch and dextrine. The Minister of Food, Major the Rt. Hon. Gwilym Lloyd-George, M.P., announced in July that, as from September 27, the distribution, sale and use of starch and dextrine would be free of existing controls. To ensure a smooth transition from control to freedom, however, it was decided to retain the licensing arrangements until a later date. There are now adequate supplies to meet the current and prospective needs of users, and the Minister has therefore revoked the relevant control Order.

The Domestic-appliance Industry and Fuel Usage in Great Britain*

By Harold Hartley, C.B.E., D.Sc., Hon.M.Inst.Gas E., F.Inst.F.

Statistics

The domestic fuel usage in 1952, expressed as potential heat value, was roughly as follows:—

	million therms
Coal burnt directly	10,500
Coke	850
Gas	1,350
Electricity	550
Oil and bottled gas	200

According to the latest issue of the "Blue Book"† the domestic expenditure on fuel in 1952 amounted to £438 millions, made up as to: coal £187 millions, electricity £103 millions, gas £103 millions, other £45 millions.

Eight-two per cent. of households have a supply of electricity, whilst 78 per cent. have a supply of town gas, and two-thirds have supplies of both gas and electricity. Only 7 per cent. of households depend on solid-fuel apparatus alone—a significant fact.

The retail sales in 1952 of all types of domestic appliances for cooking, heating and hot-water supply are estimated to have yielded about £65 millions, and the manufacture and wholesale distribution to have resulted in the direct employment of some 45,000 to 50,000 people.

Accurate data are not available, but the total numbers of appliances in normal use are possibly of the following order:—

	millions		
	Gas	*Electricity*	*Solid Fuel*
Cookers	10½	2½	2½
Space-heaters	4½	12	12½
Water-heaters	2¼	2¼	1¼

In the above there are included some 300,000 domestic cooking appliances used with bottled gas, which is supplied in all to about 400,000 users.

Space Heating

There is little public appreciation of the advantages of using convected heat. Central heating has found little application in the home, although it is commonplace in countries with severer climates. Portal houses were provided with closeable solid-fuel fires with an easily controlled rate of burning, giving the advantage of reduced ventilation and the benefit of convected heat. These fires are more efficient than either the old or the modern type of grate, and their reception by the occupants raised hopes that they would sound the knell of the built-in open fire.

Little has been done to make known the advantages of using self-contained appliances giving radiant and convected heat, and progress has been hampered by the national housing policy. A big effort will be needed to break down public inertia and to make people realize that the ideal heating system is really one of which the room occupants are almost unaware. It is not one that has to be the focal point of the family circle and may limit the utility of the living space provided.

Heat Absorption by Chimneys.—It is common knowledge that a substantial amount of heat is transmitted to the chimney by the flue gases passing away from an appliance. Little has been done, however, to estimate the temperature gradients and to take advantage of the fact. The rate of absorption of heat by the chimney is of interest and suggests possibilities for improvement of appliances and of the methods of use.

By making the fireplace a recess with a well-designed source of heat standing freely in the middle, a substantial improvement in efficiency is attainable without constructional complications. Merely by standing an ordinary gas fire in such a recess the heat output would be increased by 20 per cent. or more in the form of convected heat. The provision of fireplace recesses would do much to enable better use to be made of solid fuel and gas for space-heating, and also encourage the early manufacture of self-contained apparatus in which bituminous coal could be burned smokelessly.

Free-standing Fires.—In 1939, A. F. Dufton described a simple form of solid-fuel fire, referred to as an adaptation of the Cheminée de Nancy, which he had made to improve the heating of a living room. The fire, which was placed in a typical recess, emitted both radiant and convected heat. With it he found the coal consumption could be reduced from 3 to 2 lb. and hour. Sealing may offer practical difficulties and, if this is faulty, the appliance will not be effective. The proposal should be given a large-scale trial and every effort should be used to make it a success. The Ridley Committee has endorsed the suggestion.

Radiant and Convected Heat.—Although much data have been published of the emission of heat from various types of apparatus, the value of the information is not always recognized. There is a failure to distinguish adequately between the effects of radiant and convected heat, and to analyse in detail the results attained with appliances providing the heat in one form or the other.

The efficacy of an appliance should be a measure of the ability to maintain with it the desired comfort conditions in the occupied parts of a room, and particularly up to, say, 4 to 5 ft. from the floor.

* Abstract from the "Melchett Lecture" for 1953, presented to the Institute of Fuel. The Author is chairman of Radiation, Limited, and national president of the Institute of Vitreous Enamellers.

† National Income and Expenditure 1946-52, published August, 1953 (H.M. Stationery Office).

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Dufton by his work probably came closer to a true evaluation of room heating efficiency than have some later workers. His method, which takes into account both the temperature distribution within the room and the effect of the rate of air change, has much to commend it.

Insulation and Ventilation.—There is a growing appreciation of the importance of better structural insulation of houses and of the need to prevent excessive ventilation in order to maintain comfortable conditions. The gains possible are well established, but there has been a delay in the application of the information which is, from the technologist's point of view, common knowledge. This delay may be attributable to preoccupation with the initial cost of building, and to indifference to the factors affecting fuel usage.

The adoption of improved insulation appears to be more extensive in the northern half of England and in Scotland, but the proportion of new houses insulated to the Egerton standard is inadequate. It is understood that in the north about one-half of the houses now being built have ceiling insulation up to the Egerton standard. Somewhat over one-third have an improved outer-wall insulation, although not up to the Egerton standard, but practically all reach the Egerton standard of insulation at the ground level by the use of a solid floor.

Building costs have been reduced in some cases by the use of light-weight concrete blocks, which help to offset the cost of ceiling insulation. By insulating a house to the Egerton standard, a reduction of 25 per cent. in heat losses from the structure can be effected, compared with those occurring in pre-war standard houses (11 in. cavity-brick outer walls, wood and joist ground floor, and tiled and felted roof).

Quite important economies can be obtained by reducing the effect of chimney pull, as is done in the most advanced form of convector gas fire with chimney break attachment, and by reducing the amount of ventilation such as follows from the use of flue restrictors with solid-fuel-burning appliances. When an adjustable restrictor is provided in the flue outlet, it is suggested that an "hygienic" test should be applied before approval of appliances, lest fatalities occur due to carbon monoxide poisoning when smokeless fuels are used. Such a test has been applied to the gas fire ever since W. R. Twigg made his recommendations some 40 yrs. ago.

It can be stated definitely that most of the technical problems associated with the burning of bituminous coal in the home, virtually without smoke production and at high overall efficiencies (70-80 per cent.), have been solved. Coal-burning domestic appliances with which such results are achieved have been marketed for some years. Up to the present, the application has been made for the provision of whole-house heating and hot water. The principles used in the fire-pot construction can be applied to other domestic apparatus, which, however, may only be manufactured if a worth-while market becomes available.

Cooking

It is estimated that some 72 per cent. of the cooking load is carried at present by the gas industry; that some 17 per cent. of the load is dealt with by the electrical industry, and that approximately 15 per cent. of households use a solid-fuel appliance for cooking.

The competition for the load between the two younger industries has stimulated improvement in cooker design. Work on the solid-fuel cooker is now going on apace, but extension of the use of solid fuel for cooking is hindered by the absence of a suitable flue in many of the houses now being built. Solid fuel can be used most effectively in appliances designed to provide a combination of warmth, cooking facilities and hot water, and it would be better from the national standpoint to erect houses which make it easy for such equipment to be installed.

There has been some raising of the thermal efficiency of gas and electric cookers during the last decade or so, but this has not been notable, and it would seem that no great improvement will be effected so long as traditional methods and utensils are used in the kitchen. The incidence of the cost of cooking on the weekly budget is small, and most attention is now paid to factors in the design which affect the efficacy and ease of operation of the appliances. More emphasis is now laid on minimizing the work of the housewife in cleaning and maintaining the equipment and on simplifying the cooking procedure. The thermostat for the gas oven was first introduced in this country about 30 yrs. ago and it is now an essential.

Care it taken to see that the external surfaces are kept cool, and that the working parts shall be maintained at as low a temperature as possible, to minimize charring following spillages during cooking.

The designing of the electric cooker has followed much the same lines as that of the gas cooker, which from the earliest stages of its evolution has been adapted to suit traditional cooking operations. Both types satisfy standards which form the technical, production and utilization standpoints are high, and from whatever point of view the appliances are examined, they will be found to compare favourably at least with any other types of domestic apparatus.

Water Heating

There is a wide range of water-heating appliances available to the public. With the exception of the gas operated instantaneous heater, all other systems depend on storage. The use of any system involves heat losses, which may be significant.

The efficiency of transfer of heat is greatest with the electric immersion heater and least with the solid-fuel "boiler". In all cases problems arise due to the nature of the water itself; scaling with hard waters, and corrosion with peaty waters. By treating the water supply with hexametaphosphate,

scaling troubles can be avoided, and there is now a considerable experience which enables soft waters to be dealt with satisfactorily.

A special preoccupation of the gas industry has been the cost of maintenance, resulting in part from the corrosive effect of condensate which is subsequently evaporated *in situ*. With the gas circulator this can be overcome by the use of chromium-nickel-molybdenum steel for the combustion chamber. Gum trouble is avoided by the use of suitable filters in the gas stream. The maintenance problems have seen solved with the circulator and the sink storage heater.

Thermostatic control makes gas and electric storage water heaters virtually automatic in operation. With solid-fuel "boilers" such control minimizes the danger of accidental extinction of the fire and reduces the work to that of refuelling and ash removal.

Design and Manufacture of Appliance

In the organization with which I am associated the work of the central laboratory affects the whole of the Group. It has, for example, a responsibility to devise or collate new ideas which can be applied in the designing and manufacture of better apparatus. It is the spearhead of the Group's design policy, and new designs are based on investigations, carried out in the laboratory. On the staff are physicists, chemists, metallurgists, biochemists, engineers and other technologists.

The work of the technical section is divided into three classes:—

(1) *Background Research.*—This work is done to obtain a better understanding of gaseous and solid-fuel combustion, of heat generation and transfer problems, and of the effects produced with apparatus intended for space-heating, for cooking and for water-heating.

(2) *Applied Research.*—This work is done with parts of apparatus or complete appliances. New concepts are applied in working models prepared for examination by other specialists. It is at this stage that the mechanics of the appliance design are considered so that production shall be as simple as may seem possible. It is at this stage also that the apparatus is examined in the light of B.S. Specifications or other standards which it is desired to attain.

(3) *Process Research.*—This work is concerned with improving our knowledge of the technique of works processes and of the uses of new materials.

Whilst the design policy is the responsibility of the Board of the company, it is carried out by teams of specialists able to look after the needs of the development, production and sales sides of the organization.

In the foundry, there is no longer complete dependence on the moulder and his skill, as mechanized plants are used to provide the bulk of the output of castings, although this is a decreasing quantity. The working of the cupola and the preparation of the sand are both under technical control. Effort is directed to the manufacture of a uniform product, intelligently designed for the use to which it is to be put.

The tool rooms and press shops are equipped with up-to-date plant operated under the control of experts. The enamelling departments are mechanized. The enamel is applied with automatic sprayers to moving lines of goods *en route* to the driers and the furnaces. The box muffles have been replaced with continuous furnaces. The preparation and the use of the slurries is controlled by technicians, as is the working of the plant itself.

Frit Manufacture

Enamel frits are manufactured in a factory designed to eliminate the danger of silicosis. This factory is equipped with all the necessary accessories for the handling of raw materials, weighing, mixing and fusing the batches, and checking and spraying the product.

Before nationalization of the gas industry, a large number of variants of products were needed to satisfy the whims of customers. To-day most of these have been eliminated; such as now remain are of secondary importance from the production standpoint. The introduction of mass production and specialization has been of considerable benefit to the gas-using public. Manufacturers are able to provide for those who must buy in the low-price market, cookers with a finish and standard of performance higher than were available for the high-price market 15 yrs. ago. The significance of this change is perhaps not fully appreciated by the electrical industry, and may not have come within the range of thinking of the coal industry.

A "utility" convector solid-fuel grate, of the type referred to earlier, may cost about £8 if the demand is small. On the other hand, if a single manufacturing unit were to make, say, half-a-million of these fires at the rate of 5,000 or more a week, the design could be adapted for mass production and the price would be reduced by at least one-third.

Domestic Outlay for Heat Service

The heat services available in many homes are quite inadequate, and yet the operating costs are not serious even for "industrial" families. According to the latest "Blue Book," in 1952 the national expenditure on beer amounted to £563 millions, on tobacco to £821 millions, and on fuel and light to £438 millions. This latter outlay is equivalent to an average annual household bill of approximately £30—about equal to the cost of ten cigarettes a day for each household.

The annual capital expenditure on new appliances is also relatively small and averages about £4 10s. per household—in the alternative "currency" less than ten cigarettes a week.

The mass of the public can and will spend more money for the purchase and use of better heat service equipment provided it can be obtained and used as tenants' fixtures. It needs only straightford selling to bring this about. A £20 cooker can be obtained for an outlay varying from 1s. 3d. to 2s. 3d. a week, according to the period of hire-purchase. A

The Domestic-appliance Industry and Fuel Usage in Great Britain

" utility " solid-fuel fire, such as has been mentioned earlier, should be obtainable for only a few pence a week.

Of the £438 millions spent annually on " fuel " as much as £260 millions' worth may be wasted. Even after making allowance for avoidable waste by users, which may be serious, there is an ample margin for an important national saving of fuel. If matters are dealt with realistically, standards of comfort can be raised in such a way that fuel will be saved without an undue call on the domestic income or on the national resources.

The coal industry should not leave the responsibility for the design, manufacture, marketing and use of domestic coal appliances so much to the appliance manufacturers and the merchants, but in its own interests should assist to a greater extent. No fuel is of use to the householder without satisfactory appliances. It should be a primary concern of the provider of fuel to help to make it possible that only satisfactory equipment will be manufactured, and, as a *sine qua non*, to co-operate with the manufacturers and the merchants to ensure that a market, which is adequate, shall be offered only good equipment.

Increases of Capital

WILLIAM DOXFORD & SONS, LIMITED, Sunderland, increased by £1,250,000, in £1 ordinary shares, beyond the registered capital of £1,000,000.

VALBANIA, LIMITED, brass and general founders, etc., of London, S.W.8, increased by £6,000, in £1 shares, beyond the registered capital of £6,000.

POWER-GAS CORPORATION, LIMITED, Stockton-on-Tees, increased by £750,000, in 10s. ordinary shares, beyond the registered capital of £750,000.

F. MALKIN & COMPANY, LIMITED, ironfounders, etc., of Stoke-on-Trent, increased by £7,000, in £1 ordinary shares, beyond the registered capital of £3,000.

HENRY HARGREAVES & SONS, LIMITED, ventilating engineers, etc., of Bury, increased by £43,000, in £1 ordinary shares, beyond the registered capital of £7,000.

CRAWFORD & COMPANY (TOTTENHAM), LIMITED, ironfounders, engineers, etc., of Witney (Oxon), increased by £98,000, in £1 ordinary shares, beyond the registered capital of £2,000.

FARMER & CHAPMAN, LIMITED, engineers, etc., of Bilston (Staffs), increased by £20,000, in 5,000 ordinary and 15,000 cumulative preference shares of £1, beyond the registered capital of £15,000.

ELECTRIC FURNACE COMPANY, LIMITED, London, S.W.1, increased by £100,000, in 22,143 7 per cent. cumulative preference, 56,500 ordinary, and 21,357 unclassified shares of £1, beyond the registered capital of £200,000.

JOHN HARPER (MEEHANITE), LIMITED, manufacturers of castings in meehanite metal, iron, brass, and other metals, etc., of Willenhall (Staffs), increased by £20,000, in 1s. ordinary shares, beyond the registered capital of £30,000.

PYRENE COMPANY, LIMITED, fire-extinguisher manufacturers, of Brentford (Middx), increased by £725,000, in 600,000 5½ per cent. cumulative preference shares of £1 and 500,000 ordinary shares of 5s. each, beyond the registered capital of £575,000.

UNITED STEEL COMPANIES, LIMITED, Sheffield, increased by £14,000,000, in 4,000,000 5½ per cent. redeemable cumulative preference, 3,806,000 ordinary, and 6,194,000 unclassified shares, all of £1 each, beyond the registered capital of £16,000,000.

THOMAS SUMMERSON & SONS, LIMITED, manufacturers of railway equipment, etc., of Darlington, increased by £274,900, in £1 ordinary shares, beyond the registered capital of £100, and £25,000, in £1 ordinary shares, beyond the registered capital of £275,000. Summerson Holdings, Limited, was allotted 97 shares on March 31, 1953, and a further 274,900 shares on August 7, 1953.

Grinder Ventilation

Marketing arrangements for the external dust-control system for pedestal and other grinders, developed by the British Cast Iron Research Association, have been taken over exclusively by Air Control Installations Limited, Ruislip, Middlesex. The name " Dusgard " has been coined to cover the equipment so produced. Readers will remember that the details of design and efficacy of this method of dust exhausting have already been given in the JOURNAL.* The production model is shown in Fig. 1.

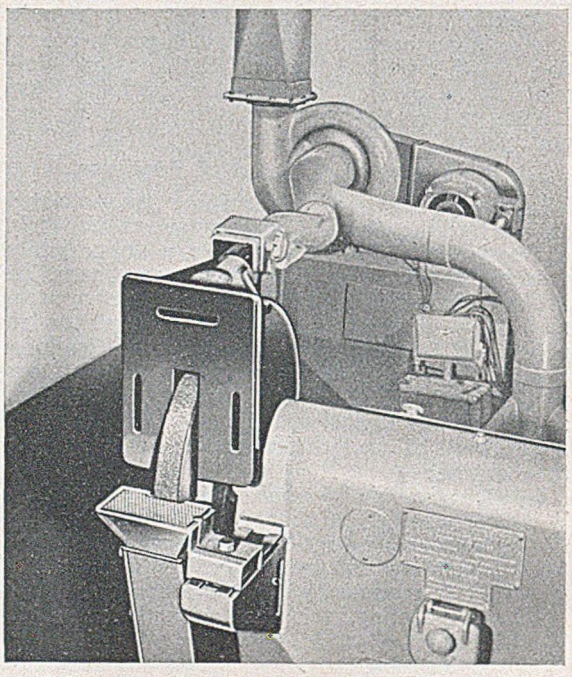

FIG. 1.—*Appearance of the " Dusgard " Equipment as designed for Production Models of Stand Grinders.*

* " External Dust Control for a Pedestal Grinder," JOURNAL, December 4 and 11, 1952 (discussion December 18, 1952), and " Application of External Dust Control to a Standard 24-in. Pedestal Grinder," October 15, 1953 (discussion November 26, 1953, and December 3, 1953).

American Course on Corrosion

Plans for the 1954 annual short course in corrosion to be held by the National Association of Corrosion Engineers are well under way, according to Dr. M. F. Adams, N.A.C.E. programme chairman and associate chemist, Division of Industrial Research, Washington State College. The five-day course is to be held on the campus of Washington State College at Pullman from February 1 to 5, 1954, and will present a brief but intensive review of the fundamental aspects of corrosion followed by panel discussions and lectures on the applications of corrosion control in industry. The Division of Industrial Services of the Washington State Institute of Technology is sponsoring the course. The programme includes five general topics—fundamentals, practical aspect, corrosion mitigation, materials of construction, and environment.

Personal

MR. WILLIAM WEST, who is outside contracts head foreman of Wailes Dove Bitumastic Company, Limited, Hebburn-on-Tyne, is retiring at the end of this year after 45 years with the company.

MR. J. WALRAVE, of Industrial Products Department, Philips Electrical, Limited, Century House, Shaftesbury Avenue, London, W.C.2, recently completed his 25th year of service with the company.

MR. R. J. ASHLEY, managing director of Skyways, Limited, from 1946 to 1952, has joined Armstrong Siddeley Motors, Limited, of Coventry, as general manager of the Car Division.

MR. H. J. G. GOYNS, president of the South African branch of the Institute of British Foundrymen, has been elected vice-president of the Institution of Production Engineers (South African Branch).

MR. GEORGE WESTWATER, chief draughtsman of Pott, Cassels & Williamson (Engineers & Founders), Limited, Motherwell, is to retire at the end of the month. He will continue to be available as a consultant.

MR. JOSIAH ECCLES, who has been chairman of the Merseyside and North Wales Electricity Board since 1948, has been appointed a deputy chairman of the British Electricity Authority in succession to Sir John Hacking.

MR. WALTER JONES retired on his 70th birthday from the metal-window department of James Gibbons, Limited, Wolverhampton, after half a century with the firm. He was senior departmental foreman with the firm, and had been a foreman since he was 26.

MR. J. WALKER, foreman of the brickworks, has retired, after 54 years' service, from Carron Company, Falkirk. Employees of the firm presented him with a wallet of notes. He started work with the firm as an office boy but for the past 24 years had occupied the position from which he retired.

THE EXPORT CREDITS GUARANTEE DEPARTMENT (the Government Department providing insurance against the major risks of exporting) announces the appointment of Mr. Philip Jones as Press and publicity officer, a new post. Mr. Jones was for several years deputy chief Press officer to the Board of Trade.

MR. W. B. WALLIS, the president of the Lectromelt Furnace Corporation, has been elected president of the [American] Foundry Equipment Manufacturers' Association, and MR. D. E. DAVIDSON, Link Belt Company, is to be the vice-president. Mr. Arthur J. Tuscany Junr. succeeds his late father as secretary-treasurer.

MR. EDWARD ARKLE, who is commercial superintendent of the North-Eastern Region of British Railways, is to leave that position to become commercial superintendent of the London Midland Region at Euston from January 1. He will handle £128,000,000 worth of railway business annually, and control a staff of 38,000. He is 53.

MR. NORMAN POLLARD, aged 64, has completed 50 years' service as an iron moulder in the foundry of P. and C. Garnett, Limited, textile-machine makers, Wharfe works, Cleckheaton, where he was given a pedestal pipe stand and ash tray from his workmates, the presentation being made by Mr. L. Brearley, a director and works manager, who himself completed 50 years' service in 1951. At a private ceremony next week the firm is to present Mr. Pollard with a gold watch.

Obituary

MR. J. P. EVESON, founder of the firm Eveson Brothers (1928), Limited, died on December 12, at the age of 85.

MR. ADOLF VINER, who recently resigned after 20 years as chairman and joint managing director of Viner's, Limited, cutlery manufacturers, of Sheffield, has died at the age of 70.

MR. DAVID HUTTON, who was appointed engine-works manager of the Wallsend Slipway & Engineering Company, Limited, in 1937 and retired in 1946, has died at the age of 80. He joined the company in 1901.

MR. ARTHUR BAILEY, who was recently elected a director of the Furness Shipbuilding Company, Limited, Haverton Hill-on-Tees, died early this month at the age of 47. He served his apprenticeship with the company and rose to the position of yard manager.

The death has occurred of MR. HOWARD SKIDMORE, a well-known industrialist in the Midlands. He had been ill for several years. Joint managing director of Barton & Sons, Limited, Netherton, Dudley (Worcs), Mr. Skidmore was a director of Barton Conduits, Limited, Clydesdale Stamping Company, Limited, Harrison Bros. (England), Limited, Premier Aluminium Casting Company, Limited, and of other companies in the Barton group among his many industrial connections. He served for many years as a member of the governing Council of the National Association of Drop Forgers and Stampers.

MR. ROBERT STEWART WHIPPLE died on December 13 at the age of 82. In 1900 he became private assistant to Mr. (later Sir) Horace Darwin, the founder of the Cambridge Instrument Company, Limited, being appointed manager and secretary at the end of that year. In 1909 he was made a joint managing director, a post which he held until his retirement in 1935; from 1939 to 1949 he was chairman. He was twice president of the Scientific Instrument Manufacturers' Association, treasurer of the Physical Society for 10 years, and vice-president for another three. Mr. Whipple was Faraday Lecturer to the Institution of Electrical Engineers in 1936-37, and for 21 years he served on the Board of the Institute of Physics.

SIR ARTHUR BENEDICT WINDER has died at the age of 78. He was educated at Giggleswick School and at Sheffield University, where he was awarded the Mappin medal and Premium for Honours in Metallurgy and Associateship. He entered the steelworks of Thos. Firth & Sons, Limited, now Thos. Firth & John Brown, Limited, and in 1906 became manager of the steel-making departments of Jones & Colver, Limited. In 1918 he was appointed to a similar position at Thos. Firth & Sons, and three years later became works manager and director of Industrial Steels, Limited, in 1932. He was then appointed general manager of the English Steel Corporation, and in 1934 became a director. Sir Arthur retired in 1944, a year after he was knighted. At that time he was also general manager of Darlington Forge, Limited, and Industrial Steels, Limited. His directorships then included those of the Brearley Ingot Company, Limited, Firth-Vickers Stainless Steels, Limited, High Speed Alloys, Limited, and Vickers-Armstrongs, Limited. He had been vice-president of Sheffield Chamber of Commerce, a Searcher of the Cutlers' Company, chairman of the Alloy Steels Association, a Fellow of the Royal Society of Arts, and a member of the Council of the British Iron and Steel Federation.

News in Brief

THE NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY (U.S.A.) have recently opened a "technical centre," which occupies 5.7 acres with 36,050 sq. ft. of floor area.

THE UNITED STEEL COMPANIES, LIMITED, announce that they expect to pay a final dividend in respect of the year ended October 3, 1953, shortly before the end of the fiscal year on April 5, 1954.

THE BRITISH THOMSON-HOUSTON COMPANY, LIMITED, announce that they have acquired new premises for their Middlesbrough office, located at Prudential Chambers, 27, Albert Road, Middlesbrough.

RESPONSIBILITY for distributing the products manufactured and previously marketed by Tinsley (Industrial Instruments), Limited, has been taken over by Evershed & Vignoles, Limited, Chiswick, London, W.4.

THE RANGE of fluorescent lighting fittings with one-piece pressed-steel or "Perspex" reflectors, marketed by the General Electric Company, Limited, now covers 4 ft. and 3 ft. fittings in addition to the original 5 ft. model.

THE ADELAIDE ENGINEERING COMPANY have developed and placed on the market a combination of latex and aluminium together with a carrying agent, which is claimed to give protection against rust to all materials used in industrial constructions.

MR. SIDNEY GUY, managing director of Guy Motors, Limited, announced at the company's annual meeting that next year the Royal Commission will hear a claim by the company concerning the pre-war development of a process of welding of bullet-proof armour-plate.

BELL'S ASBESTOS AND ENGINEERING, LIMITED—Shareholders approved resolutions providing for a scrip issue of two new ordinary shares for each ordinary share held. It was also agreed to change the name of the company to Bell's Asbestos and Engineering (Holdings), Limited.

THE MINISTER OF MATERIALS, Lord Woolton, has announced the restoration of private trading in sulphur and pyrites from January 1. The arrangements made, he said, would enable the removal of the remaining controls on sulphur, pyrites, and sulphuric acid at the end of this year.

THE SHEEPBRIDGE GROUP are now starting the production of intricate castings in a number of non-ferrous alloys, such as high-tensile brass, nickel, and aluminium bronze, either statically cast in sand or centrifugally cast. Mr. Z. Stokowiec has been appointed foundry manager of the new shops.

THE SECOND ANNUAL DINNER of the "600" Group of Companies Veterans Club (minimum service 25 years) was held last week at the Strand Corner House. Of the 332 people eligible no fewer than 240 were present. Mr. Cyril Cohen, the chairman of the Group, was present as a founder member.

WEST BROMWICH HEALTH EXECUTIVE COUNCIL has decided to appeal to the Midland Regional Hospital Board to place a full-scale mobile X-ray unit at the disposal of foundries in the town—on the lines of the equipment provided some years ago by the British Steel Founders' Association for their members.

THE SECOND OF THE 1953/54 series of technical reunions organized by the British Compressed Air Society was held at the Alliance Hall, Palmer Street, London, S.W.1, on November 26, when Mr. A. S. D. Barrett, technical director of W. Edwards & Company (London), Limited, presented a paper on "High Vacua".

WHEN HE ADDRESSED members of the Cambridge Region of the Institute of the Motor Industry at their last meeting, Mr. H. L. Parish, of F. Perkins, Limited, Peterborough, said his company was confident that they could take a petrol unit out of most chassis, and put a Diesel in place without alteration and the range included all models.

THE BRITISH ELECTRICITY AUTHORITY are considering building a large power station at Kincardine-on-Forth. The station will use water from the Forth and coal from Glenochil Mine. Mr. M. E. Taylor, Fife planning officer, mentioned the project at Thornton on Friday during a public meeting held to explain the development plan for Central and West Fife.

A LARGE COMPANY assembled to inspect the M. 34501, the first main-line railway passenger coach to be built at the works of Charles Roberts & Company, Limited, Railway Wagon Works, Horbury Junction, near Wakefield. This coach is the first of an order for 44, and a special feature of it is the theft-proof parcel and luggage compartment fitted into the guard's van.

SHIPBUILDING IN FRANCE this year has reached a new high level since the end of the war: by the end of this month 48 vessels, of 218,970 tons gross, will have been launched, and 31, of 193,150 tons gross, delivered, while 45 vessels, of 227,740 tons gross, are under construction according to figures issued by the *Chambre Syndicale des Constructeurs de Navires de Machines Marines.*

TWO NEW GAS PRODUCERS have been installed at the River Don Works of the English Steel Corporation, Limited. They are capable of producing 25,000,000 cub. ft. of gas a week for re-heating and heat-treatment furnaces. The first of their type to be used in this country, the producers make a cleaner type of gas from less coal. Use of the new gas affords a greater degree of furnace control.

IN SWEDEN a film for the training of machine moulders has been produced which shows in detail the best working methods when moulding on various types of machines. The film, which has been described in *Gjuteriet*, by Mr. P. Fagerström, has been used in a training course for machine moulders. This course gave good results in the re-education of working-men and the training of skilled moulders.

DURING OCTOBER the number of people employed in the manufacturing industries rose by 53,000, which included 16,000 more in engineering and metal goods and 2,000 in metal manufacture, according to statistics issued by the Ministry of Labour. The total number of unemployed at November 16 rose to 322,700, an increase since October 12 of 13,600, although it was well below the figure of 406,400 at November 10, 1952.

NEW ALL-TIME RECORDS in steel and pig-iron production in South Wales and Monmouthshire were set up in November. The output of steel ingots and castings reached a weekly average of 84,130 tons, representing an annual rate of 4,374,700 tons. This compares with the previous highest output of 82,450 tons last January. Production of pig-iron was at a weekly average of 36,630 tons: the previous highest was 34,450 tons in May.

THE GLASGOW FIRM of George MacLellan & Company, Limited, have formed a subsidiary company with a capital of £20,000 under the title of Flexible Ducting, Limited, to produce a new type of ducting for ventilation in mines, in firefighting, and carrying away fumes or dust in general engineering. The trade name is

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News in Brief

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"Spiratube," and it is now in production under licence from the Flexible Tubing Corporation of Guildford, Connecticut.

IN THE MIDLANDS the one-day strike of engineering workers has resulted in a reshuffling of trade union membership. The A.E.U. in its 66 branches in the Birmingham area enrolled during the week following the strike, between 500 and 750 new members compared with the usual weekly figure of about 50. An official of the Transport and General Workers' Union said that his union had received "an abnormal number of applications for membership" since the strike.

SIR THOMAS HUTTON, director and secretary of the British Productivity Council, attended a meeting on December 16 of the Wolverhampton and District Productivity Committee which invited local industrialists to hear details of a proposed circuit scheme for the exchange of production information. At the meeting, Mr. B. E. L. Morton, of Mather & Platt Limited, Manchester, who has had experience of operating a circuit scheme in the north west, explained the idea.

THE NEW London office of the Colt Associated Companies in British Columbia House, Regent Street, was formally opened by Mr. W. A. McAdam, C.M.G., Agent General for British Columbia, on Thursday, December 10. The offices have been designed by Story & Company, Limited, and good use has been made of contemporary furniture and colour schemes to create a pleasing and spacious effect. The head office of the Colt companies will, of course, remain at Surbiton, Surrey.

NEARLY 100 CANDIDATES from all parts of the country took the first examination for the post-graduate award in management accountancy of the Institute of Cost and Works Accountants recently. This Fellowship in management accountancy was first announced by the Institute a year ago. The examinations leading to associateship of the Institute were also held last week in respect of 2,500 candidates at home centres and 750 candidates oversea, principally in South Africa and India.

"A CRITICAL EXAMINATION of Procedures used in Britain and the United States to Determine Creep Stresses for the Design of Power Plant for Long Life at High Temperatures," by Dr. R. W. Bailey, at the Institution of Mechanical Engineers in London on December 4, examined the more commonly used procedures and focused attention upon the factors present which would operate to introduce uncertainty and error as between the probable behaviour in the long-time of actual service, and as yielded by a test procedure.

MIDLAND SILICONES, LIMITED, 19, Upper Brook Street, London, W.1, have now issued a publication entitled "Silicones in Motor Windings." This leaflet has been prepared for the motor user and deals, in a general way, with the advantages gained by the introduction of silicone insulation. The risks of insulation breakdown in electrical equipment subjected to arduous service may be practically eliminated in many cases by the use of silicone materials, and a description is given of their application in the repair of equipment.

INDUSTRY should adopt more effective means of collecting fumes and dust and turning them into some other form that could be disposed of more easily instead of taking them out of the shop and putting them on the roof. This was suggested at a discussion on smoke abatement arranged by the Birmingham and District Branch of the Institution of Heating and Ventilating Engineers in Birmingham on December 9. Members of the Midland section of the Institute of Fuel and members of the National Smoke Abatement Society had been invited to the meeting which was addressed by Mr. G. W. Farquharson, West Midland branch secretary of the latter society.

THE MINISTER OF LABOUR AND NATIONAL SERVICE, Sir Walter Monckton, has presented to Parliament the report by the delegates of the United Kingdom Government to the 36th session of the International Labour Conference, held in Geneva from June 4 to 25, 1953. The Report (Cmd. 9023, H.M.S.O., 1s. 6d.) *inter alia* discloses that two recommendations were adopted by the conference—one concerning the minimum age of admission to work underground in coal mines and the other concerning the protection of the health of workers in places of employment. A first discussion took place on "holidays with pay" and the conference decided to place the question on the agenda of the next session with a view to a final decision on a recommendation.

Plea for Taxation Reduction

A plea for a further reduction in taxation to encourage the growth of enterprise in business and industry is urged by the Association of British Chambers of Commerce in its annual letter to the Chancellor of the Exchequer on the forthcoming Budget. The association feels that the effect of the stimulating Budget of 1953 has justified the risk that was taken. Production has increased, the national income has not receded, and the yield of taxes has not been significantly reduced as yet. It is a matter of speculation whether too much has not been spent on personal consumption, but it is too early yet to form an opinion.

The association considers that business is ready for a repetition of the kind of stimulus which was given in the Budget for 1953, always provided that the funds can be found. In the sensitive condition of business the growing confidence which a lightened load of taxes would give would be of very considerable help to those who are working for industrial recovery, it declares.

Putting forward suggestions as to where the funds are likely to be found to enable relief of taxation, the association says that it may be expected that the continued increase in the national income in real terms will ensure that the yield of taxes will be maintained despite the delayed loss in revenue due to the relief given in 1953. The capital expenditure of earlier years should be bearing fruit, and the experience of the past year has indicated that a reduction in taxation stimulates business activity.

Lectures on production of vitreous-enamelled ware. -The full-time course in Vitreous Enamelling for the training of managers and technicians at the North Staffordshire Technical College, Stoke-on-Trent, has now reached its third year. At this stage it is usual for us to invite specialists from the industry to give a series of finishing lectures and, as a special gesture, this special series has been thrown open to the industry in general, and we are very pleased to do this. The fee for the course (which is suitable for senior men only) of twelve lectures will be two guineas; they will be held on Tuesdays from 5.15 to 6.30 p.m., commencing on January 5 and finishing on March 23, 1954. Full particulars are available from Dr. H. W. Wells, principal of the College.

Raw Material Markets

Iron and Steel

Although the foundry industry as a whole is not producing at anywhere near capacity levels, production of castings shows an improvement on that obtained at the beginning and during the greater part of the year, when in addition to a recession in home business, import restrictions abroad created difficulties in securing orders. Most foundries were affected, but none more so than the light-castings makers, whose volume of work sank to very low proportions, resulting in redundancy of labour or a shortened working week. These conditions governed the light and many of the jobbing foundries until the last month or two, during which time improvement in both home and export business brought additional work, the improvement being more pronounced in some areas than in others. To ensure capacity production, a much larger volume of orders is required by the light foundries, as well as by the textile foundries, but the improved trend is welcome and augurs well for the future.

Busy home trades, including the steelworks and collieries as well as machine-tool makers and, lately, the agricultural-implement manufacturers, are keeping many of the engineering and speciality foundries fairly busy. Although difficulties in the export market reduced the order-books at those foundries which cater for the motor, tractor, and allied trades, their position has continued to improve and fairly good outputs of castings are being obtained.

Output of pig-iron is maintained at a high level and there will be no letting up over the Christmas holiday. Although the demand for high-phosphorus iron is on a much better scale, the furnaces are able to satisfy requirements without much difficulty. The call for low-phosphorus iron tends to exceed the supply and the demand for the medium-phosphorus grades also is keen. All available supplies of hematite are taken up.

The rising scale of production of finished steel products is steadily overtaking the demand. There has been a marked softening of the export markets of late and steelmakers are now able to promise deliveries of a wide range of products to home consumers over much shorter periods than was the case a few months ago. There are, however, some notable exceptions. The demand for plates still exceeds the supply, and the regulations of deliveries by the special committee will be continued for an indefinite period. Commitments of the sheet mills also extend far into the New Year; rail mills are also working on long-term contracts, and the demand for tinplate is also recovering. Business in small steel bars and sections is slack and the re-rollers can secure all the semi-finished steel they need.

Non-ferrous Metals

The approach of Christmas and the year end have not been without their effect on business generally, while the threat of a railway strike was an unsettling factor. Nevertheless, on the whole consumption has kept up well and the latest figures available make quite good reading. The details for October, published by the British Bureau of Non-ferrous Metal Statistics, show that, with the exception of tin, consumption during the month showed an improvement on September. The figures for stocks at the month end showed changes in both directions. United Kingdom usage of copper, virgin and scrap, during October amounted to 43,742 tons, compared with 39,449 tons in September. The split of the October figure was 32,615 tons of primary and 11,127 tons of scrap calculated on a copper content basis. Stocks of virgin copper on hand at October 31 were 36,824 tons, an increase of about 5,000 tons on a month earlier. In zinc, usage of all grades is shown as 26,865 tons, against 26,465 tons in September, and here it may be mentioned that zinc consumption for the first 10 months of this year is practically the same as in 1952. Stocks of zinc at October 31 were 24,731 tons, against 27,981 tons at the end of September. Stocks of lead, however, increased from 22,886 tons to 29,279 tons, while consumption, virgin and secondary, at 28,014 tons, was about 600 tons better than in September. Tin consumption was 1,680 tons, compared with 1,820 tons in September.

Trading in non-ferrous metals last week was overshadowed by fears of a rail strike, and on Monday all the metals lost ground at midday, some recovery, however, being seen in the afternoon. Copper declined to £228 10s. for cash and £218 10s. for three months, base prices being the lowest seen for about three months. The setback in copper, which certainly was not without its effect on the other metals, was probably precipitated not only by the strike news in this country, but also by the announcement that Chile is on the eve of making sales from current production. It would appear that deliveries from the very ample stocks of Chilean copper lying in the United States will commence at once, if they have not done so already, subject, of course, to business being arranged. Anaconda is reported to have bids in hand on the basis of 30 cents per lb. It is thought that every effort will be made in the course of these selling operations to avoid damaging the world price structure.

Official metal prices were as follow:—

COPPER, Standard—*Cash:* December 16, £228 10s. to £229; December 17, £228 to £229; December 18, £230 to £231; December 21, £230 10s. to £231 10s.

Three Months: December 16, £218 to £218 10s.; December 17, £218 10s. to £219; December 18, £219 5s. to £220; December 21, £219 15s. to £220.

TIN, Standard—*Cash:* December 16, £650 to £660; December 17, £655 to £657 10s.; December 18, £650 to £652 10s.; December 21, £647 10s. to £650.

Three Months: December 16, £625 to £630; December 17, £635 to £637 10s.; December 18, £631 to £632 10s.; December 21, £626 to £627 10s.

ZINC—*December:* December 16, £74 to £74 10s.; December 17, £74 15s. to £75; December 18, £74 15s. to £75; December 21, £74 15s. to £75 5s.

March: December 16, £73 15s. to £73 17s. 6d.; December 17, £74 10s. to £74 12s. 6d.; December 18, £74 to £74 10s.; December 21, £74 to £74 5s.

LEAD—*December:* December 16, £89 15s. to £90; December 17, £90 5s. to £90 10s.; December 18, £90 to £90 10s.; December 21, £89 17s. 6d. to £90.

March: December 16, £88 to £88 2s. 6d.; December 17, £88 5s. to £88 15s.; December 18, £88 5s. to £88 10s.; December 21, £88 to £88 5s.

OCTOBER PRODUCTION of crude steel in the United States was higher than in September this year, but 3½ per cent. lower than in October, 1952. The figures are 9,459,000 tons in October, against 8,883,428 tons in September and 9,808,084 tons in October, 1952. In the first 10 months of the year production rose by nearly 21,000,000 tons over the same period last year to 94,969,000 tons, which period included a long strike.

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

(*Delivered unless otherwise stated*)

December 21, 1953

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £13 18s. 0d.; Birmingham, £13 11s. 3d.

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

Scotch Iron.—No. 3 foundry, £16 11s. 0d., d/d Grangemouth.

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

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

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. Coast and N.-W. Coast of England, £16 12s. 0d.; Scotland (Scotch iron), £16 18s. 6d.; Sheffield, £17 13s. 0d.; Birmingham, £17 19s. 6d.; Wales (Welsh iron), £16 18s. 6d.

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

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*).

Ferro-silicon (6-ton lots).—40/55 per cent., £53 10s. 0d., basis 45 per cent. Si, scale 21s. 6d. per unit; 70/84 per cent., £82 10s. 0d., basis 75 per cent. Si, scale 23s. per unit.

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

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

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

Ferro-tungsten.—80/85 per cent., 13s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 16s. 6d. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent. C, £85 4s. 0d., basis 60 per cent. Cr, scale 28s. 3d. per unit; 6/8 per cent. C, £80 17s. 0d., basis 60 per cent. Cr, scale 26s. 9d. per unit; max. 2 per cent. C, 2s. 0½d. per lb. Cr; max. 1 per cent. C, 2s. 1d. per lb. Cr; max. 0.15 per cent. C, 2s. 2d. per lb. Cr; max. 0.10 per cent. C, 2s. 2¼d. per lb. Cr; max. 0.06 per cent. C, 2s. 2½d. per lb. Cr.

Cobalt.—98/99 per cent., 20s. 0d. per lb.

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

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

Ferro-columbium.—60/75 per cent., Nb + Ta, 52s. 6d. to 70s. 0d. per lb., Nb + Ta.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £25 12s. 6d.: tested, 0.08 to 0.25 per cent. C (100-ton lots), £26 2s. 6d.; hard (0.42 to 0.60 per cent. C), £28 0s. 0d.; silico-manganese, £33 16s. 0d.; free-cutting, £28 16s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £32 12s. 0d.; case-hardening, £33 0s. 0d.; silico-manganese, £34 17s. 6d.

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

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £30 6s. 6d.; boiler plates (N.-E. Coast), £31 14s. 0d.; floor plates (N.-E. Coast), £31 15s. 6d.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £28 9s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £32 4s. 6d.; flats, 5 in. wide and under, £32 4s. 6d.; hoop and strip, £32 19s. 6d.; black sheets, 17/20 g., £41 6s. 0d.; galvanized corrugated sheets, 24 g., £49 19s. 6d.

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

NON-FERROUS METALS

Copper.—Cash, £230 10s. 0d. to £231 10s. 0d.; three months, £219 15s. 0d. to £220 0s. 0d.; settlement, £231 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 27¼d. per lb.; wire, 261s. 6d per cwt. basis; 20 s.w.g., 290s. 6d. per cwt.

Tin.—Cash, £647 10s. 0d. to £650 0s. 0d.: three months, £626 0s. 0d. to £627 10s. 0d.; settlement, £650 0s. 0d.

Zinc.—December, £74 15s. 0d. to £75 5s. 0d.; March, £74 0s. 0d. to £74 5s. 0d.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £103 10s. 0d.; rolled zinc (boiler plates), all English destinations, £101 5s. 0d.; zinc oxide (Red Seal), d/d buyers premises, £90 0s. 0d.

Lead (Refined Pig).—December, £89 17s. 6d. to £90 0s. 0d.; March, £88 0s. 0d. to £88 5s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 22¼d. per lb.; rods, drawn, 32⅞d.; sheets to 10 w.g., 249s. 3d. per cwt.; wire, 29¾d.; rolled metal, 236s. 0d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £165 to £170; B6 (85/15), £205 to £210; BS249, £186 to £190.

Brass (High Tensile).—BS 1400, HTB1 (30 tons), £196 to £205; HTB2 (38 tons), £205 to £210; HTB3 (48 tons), £214 to £220.

Gunmetal.—RCH, 3/4 per cent tin, £190 to £195; BS 1400, LG2 (85/5/5/5), £196 to £200; LG3 (86/7/5/2), £204 to £208; G1 (88/10/2/½), £260 to £263; (88/10/2/1), £251 to £255.

Phosphor Bronze.—BS 1400, PB1 (AID released), £277 to £285 per ton.

Phosphor Bronze Strip etc.—Strip, 347s. per cwt.; sheets to 10 w.g., 368s. 9d. per cwt.; wire, 43¾d. per lb.; rods, 38½d.; tubes, 36¾d.; chill cast bars: solids 41d., cored 42d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × .056, 3s. 0¼d. per lb.; round wire, 10g., in. coils (10 per cent.), 3s. 5¼d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 4¼d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 10½d. per lb. Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex warehouse, £61 15s. 0d. Nickel, £483 0s. 0d. Aluminium, ingots, £150 0s. 0d.; aluminium bronze (BS 1400), AB1, £253 to £260, AB2, £266 to £270. Solder, brazing, BS 1845, 2s. lb.; granulated, 2s. 3d. lb.

Board Changes

ARMSTRONG SIDDELEY MOTORS, LIMITED—Rear Admiral George Campbell has joined the staff.

JOHN BROWN & COMPANY, LIMITED—Lord Bilsland and Mr. J. W. Beck, formerly secretary, have been appointed directors.

JOHN HALL & SON (OLDHAM), LIMITED (engineers and ironfounders)—Mr. Herbert Stone, M.I.B.F., has been appointed a director.

CASTINGS, LIMITED, WALSALL, MALLEABLE IRONFOUNDERS.—Mr. W. H. Cockerill, A.M.I.MECH.E., A.M.I.PROD.E., has been appointed a director.

WEYBURN ENGINEERING COMPANY, LIMITED—Mr. L. D. Watson has been appointed deputy managing director, and Mr. J. W. Scruby has been appointed financial director.

CHARLES WINN & COMPANY, LIMITED—Mr. R. W. Blackie has relinquished his position as chairman, and is succeeded by Mr. N. K. Mousley, vice-chairman and managing director.

MR. H. E. SLAUGHTER has been appointed a director of Parker, Winder & Achurch, Limited, Birmingham. He was London branch manager prior to becoming departmental manager at head office nine years ago.

SHAP GRANITE COMPANY, LIMITED—Mr. H. B. Fleming, managing director of the company, which belongs to the Thos. W. Ward, Limited, group, will relinquish his appointment on January 1, and his place will be taken by Mr. J. W. Millray, director and secretary. Mr. Fleming will continue to serve in an advisory capacity as a special director.

Contracts Open

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

BIRKENHEAD, January 4—Supply of iron castings for the 12 months ending March 31, 1955, for the Borough Council. The Borough Engineer and Surveyor, 3, Conway Street, Birkenhead.

BOOTLE (LANCS), January 9—Supply of manhole covers, gully grates, mails, rivets, and screws, for the 12 months commencing April 1, 1954, for the Borough Council. The Borough Surveyor, Town Hall, Bootle.

EALING, January 18—Supply of iron castings, and lamp and ventilating columns, for the Borough Council. The Borough Engineer and Surveyor, Town Hall, Ealing, London, W.5.

ELLAND (YORKS), January 9—Supply of cast-iron gully grates and frames, and manhole frames and covers, for the Urban District Council. Mr. F. R. Birkhead, engineer and surveyor, Council Offices, Elland.

ILFORD, January 4—Supply of iron castings, iron, nails, screws, etc., for the 12 months ending March 31, 1955, for the Borough Council. Mr. L. E. J. Reynolds, borough engineer and surveyor, Town Hall, Ilford. (Fee, 1s.)

NEWPORT (MON), January 2—Cast-iron gully gratings and frames, for Monmouthshire County Council. The Clerk of the Council, County Hall, Newport.

RUISLIP (MIDDX), January 23—Supply of castings for the year commencing April 1, 1954, for the Urban District Council. The Borough Engineer and Surveyor, Council Offices, Northwood (Middx).

IN THE LAST SEVEN YEARS, 455 employees of Samuel Fox & Company, Limited, steelmakers, of Stocksbridge, near Sheffield, have qualified for long-service awards. This figure was reached recently when 169 men and three women each received a plaque and gift in recognition of 40 years' service.

CLASSIFIED ADVERTISEMENTS

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

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

SITUATIONS WANTED

ENGINEERS' PATTERNMAKER (35), sound technical, practical, and foundry experience, organising ability, wishes to contact Proprietor or Manager requiring conscientious Assistant.—Box EP130, FOUNDRY TRADE JOURNAL.

ENERGETIC young Man, 7 years' experience in Foundry progress and production control, seeks position, with opportunity for advancement.—Box EY102, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE—Qualified Metallurgist and Foundryman (34), desires position with progressive company requiring hardworking and active representative, resident Sheffield.—Box T.R. 131, FOUNDRY TRADE JOURNAL.

FOUNDRY WORKS MANAGER (M.I.B.F.), age 45, sound practical experience modern methods of high production in Blackheart, Malleable, Grey Iron, Chilled, Roll and Non-Ferrous Castings.—Box F.W. 132, FOUNDRY TRADE JOURNAL.

METALLURGIST, A.I.M. Full Tech. C. and G., metallurgy, foundry practice. Age 27. Experience: steel, arc and open hearth iron; cupola, P.F., arc, grey, high duty, S.G. rolls; chilled, grey. Sand control. Initiative, responsibility, development and research.—Box MA125, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive or a woman aged* 18-59 *inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order,* 1952.

INSPECTOR wanted for Mechanised Foundry. Staff appointment.—Write, stating age, experience, and salary required.—Box IW113, FOUNDRY TRADE JOURNAL.

REQUIRED immediately, FOUNDRY FOREMAN, for Machine Tool Loose Pattern Foundry. Castings up to 7 tons. Essential good organiser, disciplinarian, sound practical man production, and progressively minded. North Midlands.—Box RI134, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMEN. — Vacancies exist at the English Electric Co., Ltd., Rugby, for men, aged 30-40 years, with experience in dry and green sand moulding for castings up to 30 tons in weight. Modern foundry, good conditions. Previous supervisory experience desirable.—Apply in writing to PERSONNEL DEPARTMENT.

SITUATIONS VACANT—*contd.*

STEEL FOUNDRY FOREMAN required Sheffield. Accustomed to high quality product. Age about 35 years. Progressive future for suitable applicant.—Write, giving age and qualifications, to Box SF128, FOUNDRY TRADE JOURNAL.

LABORATORY ASSISTANT required by Metallurgical Department attached to large non-ferrous alloy foundries in the London area. A man with foundry experience will be preferred.—Write, giving full particulars, to Box LA108, FOUNDRY TRADE JOURNAL.

FOUNDRY RATEFIXERS.—Vacancies exist at the English Electric Co., Ltd., Rugby, for men with ratefixing experience in iron foundries producing castings up to 30 tons in weight. Good conditions in a modern foundry.—Apply in writing to the PERSONNEL DEPARTMENT.

REPRESENTATIVE required by old-established Midland Ironfounders to sell high grade Grey Iron and Special Duty Alloy Castings.—Write in confidence. Box MA124, FOUNDRY TRADE JOURNAL.

VITREOUS ENAMELLER.—Required for South Africa, capable chargehand for continuous plant. Excellent prospects. —Write, stating age and experience, Box V120, FOUNDRY TRADE JOURNAL.

WANTED.—CHARGEHAND for Grey Iron Foundry handling General Engineering Work.—Write, giving experience and age, and state if married or single.—CARTER WILKINSON, LTD., Kingsfield, Hooley Lane, Redhill, Surrey.

MELTING SHOP SUPERINTENDENT for Factory, West of London. Salary: £700-£800 per annum, depending on qualifications and experience.—Write, giving full details of career, Box MS122, FOUNDRY TRADE JOURNAL.

FOUNDRY SUPERINTENDENT, with all-round production experience, used to operating mechanised moulding unit. Fully conversant with both grey iron and alloy iron automotive castings of all descriptions. Must have a thorough knowledge of core-making as well as light and heavy moulding, also cupola practice. Present daily melt 60 tons. First-class conditions, offering permanent position, superannuated. Foundry situate North Midlands.—Box 3916, FOUNDRY TRADE JOURNAL.

WORKS MANAGER.—West of Scotland Pipefounders and Engineers require Works Manager to supervise two Factories employing 350 total personnel. Applicant must be a Qualified Engineer, 35 years of age or over, with Management experience and thorough knowledge of Greensand Flanged Pipework manufacture. Salary: £1,500 per annum, with foreman and staff benefit. Help with housing if necessary. Applications, which will be treated in confidence, should state age, education, training and experience.—Box WM127, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

METAL STORES CONTROL.—Man required by Merseyside Non-ferrous Founders to develop and take charge of comprehensive control system. Costing background preferred, with some foundry and metallurgical experience. Salary: £550-£650, according to qualifications. Good pension scheme.—Apply, giving full details, to Box 3891, FOUNDRY TRADE JOURNAL.

ENGINEER required as head of Production Control office. Foundry, drawing office and production control experience essential; A.M.I.Prod.E. or equivalent; age 30 to 40. Must possess initiative, drive and organising ability. Excellent prospects. Superannuation scheme. First-class canteen and welfare facilities.—State age, education, qualifications, experience, and salary required, to Box ER114, FOUNDRY TRADE JOURNAL.

A RAPIDLY expanding IRON FOUNDRY (Malleable and Grey Iron) requires REPRESENTATION in all parts of England and Wales. Generous remuneration and exceptional prospects for capable men with knowledge of Foundry Trade. Applications, which will be treated in strictest confidence, should give details of age and experience.—Write Box 3148, FROST-SMITH ADVG., 64, Finsbury Pavement, London, E.C.2.

BAMFORDS LTD., Agricultural Engineers, Uttoxeter, require Metallurgical Chemist for Foundry producing repetition high duty and light grey iron castings. Applicants should have a sound knowledge of metallurgical analysis and experience in cupola control, sand testing, etc. State age, experience, and present salary.

HIGHLY qualified ENGINEER required, to take charge of organisation responsible for design and sales of foundry plant and associated equipment. Post advertised constitutes key position in internationally known group of engineering companies. Applicants are asked to supply details of experience, qualifications, age, etc.—Box 3908, FOUNDRY TRADE JOURNAL.

PROPERTY

ADVERTISER wishes purchase Established Foundry Supplies or Equipment Business. Willing consider continuance present management. Medium or large business required.—Write Box AW137, FOUNDRY TRADE JOURNAL.

FOR SALE—SOUTH WALES NON-FERROUS FOUNDRY. WELL CONSTRUCTED, COVERING LARGE AREA. NEAR MAIN LINE. GROUND AVAILABLE FOR EXTENSIONS. ENQUIRIES INVITED—BOX FS129, FOUNDRY TRADE JOURNAL.

MACHINERY WANTED

ONE 3-5 cwt. drum type Ladle. Preferably ungeared.
One 10 cwt. Roper type Rack Hoist.
Box WO135, Foundry Trade Journal.

WANTED.—BMM. RD.5 Jolt Squeeze Turnover. Cap. 1,100 or 1,300 lbs., pattern draw 12 in., table 48 in. by 30 in.—Macmillan Foundries, Ltd., 130, St. Albans Road, Watford. Tel.: Watford 6241.

MACHINERY FOR SALE

ONE Air Pumps TS20 Compressor. 120 c.f.m. at 80 p.s.i. Complete with bed, vee belt drive, 30 h.p. Lancashire Dynamo Motor, 440 volts, 3-phase, a.c. Ellison starter.
Box FS136, Foundry Trade Journal.

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Station Road, Blackheath, Staffs.

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275 pairs of assorted Moulding Boxes.
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CAPACITY available for good Grey Iron Castings for ½ lb. to 2 ton.—WAGSTAFF & Co., Trading Estate, Slough. Tel. 24858.

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