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A Progress Report

Because of the enlightened publicity undertaken by some of the newer industries, there is a tendency in the minds of the general public to think that the older materials will become rapidly obsolete. Too much credence is given to the notion that because a material or process is new it must necessarily be better. A few years before the war, a London suburb was astounded when its local authority converted the street lighting system from electricity to gas. Yet better conditions prevailed, partly due to the fact that the periodic change of mantles was invariably accompanied by a thorough cleaning of the glasswork. Street lighting by gas is not necessarily inferior to electric illumination because it happens to be an older system. The gas industry has not stood still; indeed, it ranks amongst the progressive. Much the same conditions appertain to the cast-iron industry. Throughout its long history, newer materials have, here and there, replaced iron castings in limited fields, but compensation has invariably been found by catering for other sections of an ever-developing manufacturing world.

The struggle to meet the more stringent requirements of modern engineering, resulted in the accumulation of data of such character that the world's foundry metallurgists were no longer satisfied by the mere retention of inherited estates, but sought to invade fields hitherto deemed to be quite outside the sphere of cast iron. These men had in the production of their 18 tons per sq. in. all pearlitic cast iron done much more than give to the engineers a superior metal; they had, by the institution of technical control, replaced rule-of-thumb working by a management based on factual data. The establishment of this general background about 1930 provided the essential conditions for ordered progress into new fields, and when war conditions created shortages in strategic materials, iron castings exhibiting quite new and extraordinary properties were ready to step into the breach. Mr. G. L. Richter, a metallurgist on the staff of the Farrel-Birmingham Company, has listed some of these in an article published in "Metal Progress."

Amongst the new applications he cites are:—*Quenching dies* used for rigidly holding aircraft propeller blades to prevent distortion during quenching. Cast accurately to size and shape, they replace steel. *Stoker screw castings* from 10 to 15 ft. long, for handling abrasive materials such as coke. They are said to be more satisfactory than nickel-chromium steel. *Recuperator tubes* for an oil-fired rotary furnace. They replace malleable iron and increase life by 500 per cent. *Hydrogen cylinder heads,* to withstand a pressure of 2,000 lbs. per sq. in. *Sulphur distillation retorts,* formerly made of high nickel-chromium steel and used for the production of carbon bisulphide. They are subjected to working temperature of 690 deg. C. *Spindles for lathes and grinders,* weighing over 9 cwts., formerly made of steel. *Mobile gun wheel* centres, formerly of steel. *Wheel tyres for mobile cranes,* formerly made of steel. *Crankshafts for Diesel engines and compressors,* with the main bearings lightened by cores. They are cast with cored-out oil passages for the lubrication system. They replace steel. *Ship's propellers,* 5 to 18 ft. dia., for use in both fresh and sea water, are replacing manganese bronze. *Tool shanks* and cast milling cutter bodies, for use with brazed-on carbide tips. They permit the use of higher speeds and give better finishes, due to the lowered vibration. *Shell nosing dies* are now largely made from high strength cast iron. In certain shops they have given superior service to hot die steels of the order of three to one. Such diverse applications have entailed in their production of a wealth of costly research, and engineers must not expect to purchase such castings at the price of sash weights.

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BOOK REVIEWS

Recommendations for Machining Light Alloy Castings. By "Birmal." Published by Birmingham Aluminium Castings (1903) Company, Limited, Smethwick, 40, Birmingham. (Price 1s.)

A real service to the light alloy foundry industry has been given by the issue of this 26-page booklet, because it clearly points out the differences in technique when machining aluminium and magnesium castings as compared with iron and steel. Much information has been reduced to tabular form. This has been done by assigning to most of the well-known alloys a code letter and then detailing in a second table the recommended speeds and feeds for each code letter. Naturally, these tables must be used in conjunction with the text, for there are obviously adjustments to be made for operations other than turning. The information given for the machining of magnesium castings should go far towards eliminating the fire hazard.

"Code of Recommended Practices for Industrial Housekeeping and Sanitation." Published by the American Foundrymen's Association, 222, W. Adams Street, Chicago, 6, Illinois, U.S.A. Price $1.50.

When the matter contained in this book appeared serially in the "American Foundryman," the Editor of this JOURNAL commented favourably on the commonsense approach which the American foundry industry had made to what is an admittedly difficult problem. The major interest for the British reader is that American industry does voluntarily much of what the British counterpart is forced to do through the requirements of the Factory Acts.

In some cases the Recommendations are better than the "Law of the Land." Whereas here drying facilities for wet clothes should be provided, the Americans require the provision of lockers. The reviewer believes that the imposing of the factory legislation in America will vary from State to State. V. C. F.

"Metallography of Some Aluminium Alloys." By M. D. Smith, B.A. Published by the British Non-Ferrous Metals Research Association, Euston Street, London, N.W.1. Price 2s.

The illustrations, photomicrographs of cast light alloys, are excellent. There are 28 all told and cover a wide range of the alloys extensively used in light alloy foundry practice. These are supplemented by a series of cooling curves and tables giving the location of the arrest points. The brochure will be of real use to the laboratories undertaking this class of work.

The production of American steel castings in February aggregated 144,070 tons, which is higher than either January or February of last year. The order-books, however, are not so well filled as a year ago, but are an improvement on January.

A SUCCESSFUL FUEL ECONOMY DRIVE

At a recent meeting of the Non-Ferrous Co-ordinating Fuel Efficiency Committee, the representatives of the Association of Bronze and Brass Founders, Mr. G. T. Hyslop and Mr. G. L. Harbach, in their progress report, were able to show considerable fuel saving on the part of member firms during 1943 compared with 1942. The report dealing with 1942 gave a summary of the fuel used in relation to tonnage melted and output, together with details of melting units employed, types of non-ferrous alloys cast and moulding methods—green sand, dry sand, chill cast, etc.—for each member, recorded under a code number. The data supplied enabled each member firm to compare their results with those of other members on similar outputs, melting units or classes of work.

The recent report compared the results of 1942 with those of 1943, using the same methods of grouping and of calculating the fuel used per ton output of castings. The following summarises the figures obtained from two main groups of firms who supplied data for both 1942 and 1943.

No. of Firms.	Class of Work.	Tons fuel per ton output. 1942.	Tons fuel per ton output. 1943.	Fuel Saved.
27	Billets and ingots..	0.301	0.295	2 per cent. or 410 tons.
51	Bronze and brass castings.	0.906	0.862	4.4 per cent. or 2,440 tons.

NEW CATALOGUE

Ferro-Alloy Briquettes. An eight-page pamphlet received from F. & M. Supplies, Limited, of 21-23, Coldharbour, London, E.14, is primarily addressed to ironfounders and describes the use of silicon, manganese and chromium briquettes. The reviewer was particularly interested in the sensible claims made for the use of chromium briquettes and his mind went back to the late Dr. Moldenke's researches. This American metallurgist chose chromium to emphasise the difficulty of separating charges in the cupola, and it now seems he could hardly have selected a less convincing example. The pamphlet clearly establishes a case for the use of briquettes in cupola practice and rightly discourages their employment in electric and arc furnace practice. Now that trade literature has been placed on a higher plane than ever before, it is right that attention should be drawn to the omission of the magnification figures in the two photomicrographs used.

"The Foundry" gives the following "wrinkle" for identifying which shift has made a core. One shift uses a sand which has had a distinctive coloured dye incorporated in it.

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

Women have proved more proficient in this type of work than men

By M. J. GREGORY, Peoria, Ill., U.S.A.
(American Foundrymen's Association Exchange Paper.)

INTRODUCTION

The Company with which the Author is associated in normal times makes track-type tractors, road machinery, Diesel engines and Diesel-electric sets, and its products are distributed and used all over the world. Since the beginning of the present war "Caterpillar" has been one of the largest suppliers of similar and other material to the armed forces of the United Nations. One of its most important war products is the tractor portion of the completed machine commonly referred to as the "Bulldozer." These machines are helping to construct airports and bases, to build and repair military roads, and to perform many other functions which make the construction operations of the Allied armies the miracles that they are.

Foundry Designed to Use Women

In its peacetime operations, the Caterpillar Tractor Company operated foundries to produce the many castings required in the construction of its products. Its foundries enjoyed a reputation for producing high-quality castings under carefully controlled conditions. It was natural, therefore, that as the tremendous need for air-cooled aluminium cylinder heads in the war effort grew, it should have been requested to add an aluminium foundry to its facilities to help to answer the call for increased production of air-cooled cylinder head castings. Man-power was the important problem. Therefore, it was decided to use a large number of women in the new operation, and the aluminium foundry was so designed and established. The success of the project is shown by the fact that 90 per cent. female labour is used in that foundry.

It is not strange to picture women in foundry work, as modern power-operated equipment can be used to eliminate heavy foundry work. Women have proved more proficient in aluminium cylinder head foundry work than men. Their natural skill in doing intricate and precise work makes them ideal workers for producing air-cooled cylinder heads. All women employed by this Company have a desire to help in the war effort, and those employed in the aluminium foundry have the satisfaction of knowing that they are working on the front line of production. The story as to technique and methods employed, together with a roll of several hundred feet of sound moving picture film and a number of slides, which describe the entire operation in making aluminium cylinder heads, has been made.

Development of Practices and Design

The technique and methods used in producing aircraft engine castings have grown with the industry, and are very exacting. Yet, the progress has not necessarily been all that could be asked for. This can be explained readily by the speed with which the industry was required to get into production. Known techniques were simply multiplied as the demand for castings and engines grew into tremendous quantities.

In the air-cooled engine, possibly the most difficult casting required was the large cylinder head that is used on some of the larger engines. The general design of these air-cooled cylinder heads, through the process of evolution, was a relatively plain casting with cooling fins spaced wide apart and of relatively shallow depth. As increased horsepower was demanded, gradually the design of the cylinder head changed. The number of fins became greater until now there are five fins to an inch. Where the fins were relatively shallow in earlier designs, it is not unusual now to find them 4-in. deep in some instances. The fins, of course, provide cooling surface for the engine.

Evolution of the New Foundry

The Caterpillar Tractor Company was called upon to go into the air-cooled engine business through the work that it did in converting a petrol engine, manufactured by the Wright Aeronautical Corporation, into a Diesel engine. The cylinder head in both engines was practically the same, with the exception that the Diesel head did not have sparking plug recesses at both sides of the head. Clearances for the injection nozzle for the Diesel were allowed for in the location on the push rod side.

Later, the firm were called upon to make heads for the aviation industry. Since their manufacturing personnel had acted somewhat in an advisory capacity in a voluntary way, they were in a position to learn gradually from the manufacturers the many problems within the technique of producing cylinder heads. Thus, when they were called upon to produce these heads, they had developed and established a new technique which is thoroughly explained in this Paper. New machines were designed, different sands were

* Paper read at the Forty-First Annual Meeting of the Institute of British Foundrymen. The Author is Factory Manager, Foundry Division, Caterpillar Tractor Co.

Aluminium Air-Cooled Cylinder Heads

used, and at the same time the general procedure was of a basic principle. At this time the Author wishes to acknowledge his appreciation for assistance that he has received from such organisations as the Buick Motor Car Company, the Aluminum Corporation of America, Studebaker Corporation, the War Production Board, the Wright Aeronautical Corporation and others, who have done a great deal of fine pioneering work.

Laying out, procuring materials, and getting a plant into operation in the very midst of the difficulty of obtaining materials, called for some very exacting and fine co-ordination on the part of all involved. To alleviate the difficulties, photographs of the entire foundry layout were taken and photostatic copies were placed in the hands of everyone concerned, from Government officials in Washington to expeditors in the field. With this pictorial information, it was a simple matter for the personnel working on priorities to visualise the importance of one piece of equipment in relation to another.

FIG. 1.—THE TYPE OF ROUNDED GRAIN SAND USED.

Variations of New Procedure

When one visualises the very narrow section of sand within the cooling fins of the cylinder head when the fins are spaced five per inch, one can readily see the problem of obtaining a core that will not wash away when the metal enters the mould. Where it has been common practice in making cylinder heads of this type to use from 700 to 800 wires in each half of the core, by the method used in the author's foundry it is possible to reduce the number to some 70 wires. Also, where the conventional procedure of pouring was from the bottom requiring from 5 to 6 secs. to pour, in the new method, the mould is poured directly from the top, requiring less than 2 secs.

To do this, it was necessary to develop a different type of sand from that which was used conventionally. The general practice in making air-cooled cylinder heads required the use of two types of silica sand of a different grain shape. The general practice in making the fin body cores has been to use a combination of round and angular grain silica sand. The round grain is shown in Fig. 1 and the angular grain in Fig. 2. However, in the present method, 95 per cent. of the sand was of the round grain, and 5 per cent. was a fine moulding sand containing 10 per cent. clay. The resulting sand mixture contains 0.5 per cent. clay.

FIG. 2.—THE TYPE OF ANGULAR GRAIN USED.

Gating Considerations

It is a common knowledge that, in the pouring of metals such as aluminium and magnesium, the absence of turbulence is a great factor in producing a better metal within the casting. It is good practice, wherever it is possible and necessary, to introduce aluminium into the mould cavity from the bottom and allow it to flow up through the mould without any disturbance. Top pouring of castings many times has its disadvantages, for when aluminium enters the mould in a splashing manner, oxides and folds are likely to result. However, there are many ways in solving these problems by the process of elimination. By carefully consulting Fig. 3, which shows the layout of the entire air-cooled cylinder-head operation, it is possible better to visualise the facilities employed in the following description.

Sand Handling

The sand is received at Position 1, Fig. 3, removed from box cars by an automatic power shovel and delivered to a concrete feeder hopper. Sand is fed from the feeder hopper by a 24-in. flat belt conveyor to a 10-in. by 6-in. belt bucket elevator, which discharges on to an 18-in. flat distributing belt equipped with plough to drop the sand into any one of eight concrete storage bins under the crane way. Sand is worked from these concrete storage bins to the feeder hoppers, using an electrically operated clam shell on the overhead crane. This is shown as Position 2 in Fig. 3. The four feeder hoppers are made of reinforced concrete. Each holds approximately 25 tons of sand.

Dry Sands before Storing

Silica sand enters the plant in box cars and is thoroughly dry when received. However, the other two sands, one fine moulding sand and the other a crude silica, are wet, the amount of water present being determined by weather conditions. For this reason, these two sands are dried before storing. A rotary, 4-ft. dia. dryer was installed. It is approximately 18 ft. long and is equipped with a 225 cub. ft. capacity feed hopper supported above the shell. Sand is fed directly from this hopper to the rotary dryer and runs through the shell to the discharge end near the furnace. Four gas burners fire into the brick-lined furnace preceding the dryer.

Sand Mixing

Position 3, Fig. 3, shows where the sand mixing takes place. Sand for mixing is fed from hoppers by special leakproof apron conveyors to a 24-in. troughing belt conveyor, which in turn discharges it into a 3-ft. by 5-ft. gyratory screen with a 10- to 12-mesh deck. All foreign matter is removed by this screen. The screened sand runs into a 10-in. by 6-in. belt bucket elevator, which discharges the various sands either to the 15 cub. ft. capacity batch hopper over the large sand muller, or to small storage hoppers over the small muller.

Two sand mullers are used, one having a capacity of 3 cub. ft. and the other a capacity of 15 cub. ft. The floor of the unit is elevated to a height of 5 ft., with the mullers set at floor level for convenience of the operator. Above the larger unit is a 15 cub. ft.

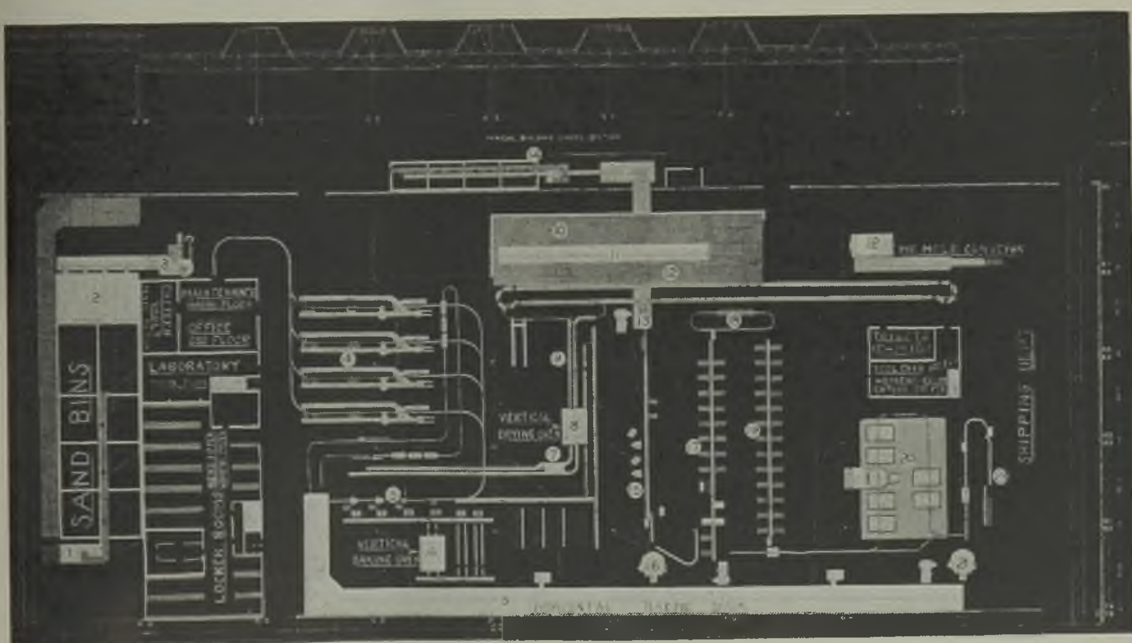

Fig. 3.—Layout of the Caterpillar Light Alloy Foundry.

(1) Sand Unloading. (2) Sand Bins. (3) Sand-Mixing Unit. (4) Core Making. (5) Sm Core Making. (6) Core Baking. (7) Clean and Spray. (8) Core Drying. (9) Core Assembly. (10) Aluminium Storage. (11) Melting. (12) Pouring. (13) Shakeout. (14) Refuse Sand. (15) Rough Cleaning. (16) Sand Blast. (17) Preliminary Clean. (18) Pickling. (19) Finish Cleaning. (20) Heat-Treatment. (21) Finish Sand Blast. (22) Remelt Furnaces. (23) Packing.

Aluminium Air-Cooled Cylinder Heads

batch hopper and between the two mullers is a series of small hoppers for silica sand. A scale car runs under these sand hoppers for accurate weighing of the sand for facing mixtures.

On one complete side of the sand-mixing unit is a large panel with electrical timers for each feed hopper to ensure the correct amount of sand in each mixture. Also, on this panel are the switches for all equipment that appertains to sand mixing. Sand mixtures are all proportioned at the operating platform, either by timers controlling amounts of sand through the previously described system to the mixing unit, or by weighing, independently, amounts from the small overhead hoppers into the travelling weigh lorry for the small sand muller. Oil and water dials are located on the electrical timing panel to give the operator knowledge of the amounts she is adding to each mixture (see operation at right in Fig. 4).

In the mixing of sands, the procedure is constantly watched and the control of the properties is accurately maintained. Therefore, by having no moisture in the sand at the beginning, a very accurate moisture content can be maintained.

Sand Preparation and Properties

Facing Sand.—Facing sand must have green properties to withstand handling and dry properties to withstand the rush of molten metal. Dry permeability must be sufficient to liberate gases which generate in the mould, yet low enough to ensure a clean casting which will require a minimum amount of cleaning. The following shows the green and dry properties of the facing sand we use:

Green Properties

Compressive strength, psi	0.35
Permeability	39
Moisture, per cent.	Nil

Dry Properties (baked at 450 deg. F.—230 deg. C. for 6½ hrs.)

Tensile strength, psi	180—195
Permeability	40—44

Sands Used.—The facing sand now used was adopted after many experiments had been performed. This sand mixture contains a fine washed and dried silica sand, of the following screen analysis:

Screen Analysis of Silica Sand.

Remaining on	Per cent.
40	0.2
50	3.5
70	25.0
100	41.9
140	17.2
200	9.6
270	2.0
Pan	0.5
Total	99.9
A.F.A. grain fineness	79
A.F.A. grain class	No. 4

Mixed with the silica sand is a fine moulding sand, which has a clay content of approximately 10 per cent. This clay content is sufficient to fill most of the voids between the silica grains and to give the sand the necessary green bond. The fine moulding sand also contains a compound grain with interlocking qualities that makes it possible to use considerably fewer nails than ordinarily required. The resultant mixture of these two sands reduces the clay content in the mixture to 0.5 per cent., which is something very desirable. The use of sand higher in clay content will present complication in pouring castings of this mixture—however, only within the thin fin sections.

The screen analysis of the moulding sand is as follows:

Screen Analysis of Moulding Sand.

Remaining on	Per cent.
20	0.3
30	0.2
40	0.6
50	1.0
70	2.6
100	4.6
140	8.8
200	39.7
270	14.0
Pan	16.4
Total	88.2
Clay	11.4
A.F.A. grain fineness	166
A.F.A. grain class	No. 2
A.F.A. clay class	No. E

Mixing Procedure.—Following is the procedure used for mixing. The time cycle, 1 min. and 30 secs., is important. This cycle provides maximum strength and smoothness in our sand mixtures. The scale car is stopped under a hopper and 268 lbs. of sand (95 per cent. of the mixture) is weighed into the small batch hopper by the scale car. The small muller is then started and the sand is dumped into the running unit. Then 5 per cent. dry moulding sand, 3 ozs. of ammonium nitrate, 9 ozs. of Dow No. 12 inhibitor, and 4¼ pts. of core oil are added to the sand in the mixing unit. The mixture is mulled for exactly 1 min. from the completion of adding the core oil. After this time, 5 per cent. flyash is added and the mulling continued for an additional 30 secs. At a completion of a time cycle of 1 min. 30 secs., the sand is dumped into an awaiting tramrail bucket for distribution.

Functions of Additions.—Ammonium nitrate is used to accelerate drying of cores. Dow No. 12 is an inhibitor. It is a chemical which, in a solid state at a given temperature, will change to an inert gas. The function of this inhibitor is to cleanse the metal of oxides. It is mixed in sand to obtain homogeneity in cleaning the metal. In this instance, this inhibitor can be used in the facing sand because it is a dry mixture. It is questionable as to whether that inhibitor will work if the sand mixture contains 5 to 6 per cent. moisture instead of the less than 0.5 per cent. used in the present mixture. Mixing the inhibitor in the facing sand eliminates a great deal of the spraying after the core has been baked. However, a slight amount of spraying is necessary in localised places. The inhibitor also is sprayed on the mould, which acts in the same manner for the fins adjacent to the heavy sections of the cylinder head of the combustion dome.

Flyash is a by-product of coal, being the residue of chimney soot obtained chiefly from power plants. It

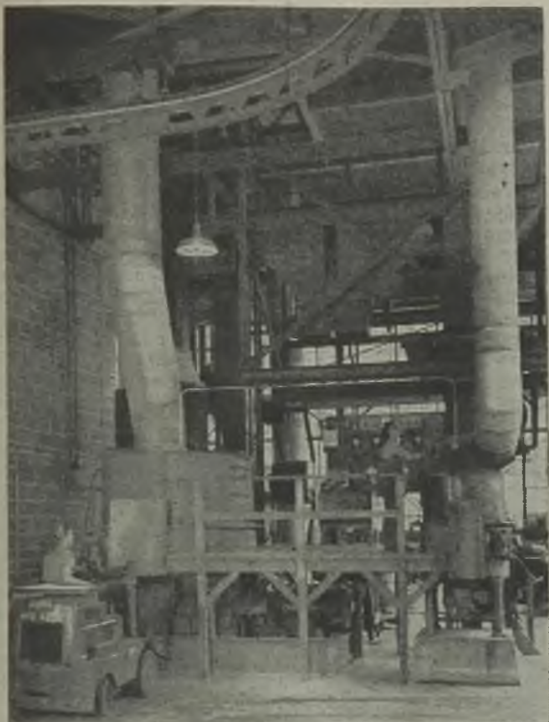

Fig. 4.—The Sand-Preparing Plant.

has a velvety texture, and its function is to assist the sand in drawing from the pattern.

Efficient Operation.—While one mixture of sand is mixing the required time, which is checked very carefully by the operator, sufficient time is given to weigh another 268 lbs. of sand in the scale car and get the remaining ingredients measured for the next mixture. When the first mixture is dumped into the tramrail bucket a second mixture is ready to enter, thus extracting the greatest efficiency possible from the muller.

Backing Sand.—Backing sand is a mixture of crude silica sand, cereal binder, and core oil. The green and dry properties in the backing sand used are as follow:—

Green Properties.

Compressive strength, psi	1.10
Permeability	190
Moisture, per cent.	2.0
Dry Properties (baked at 450 deg.—230 deg. C. for 6½ hrs.)	
Tensile strength, psi	85—95
Permeability	225—250

The screen analysis of the crude silica sand used is as follows:—

Screen Analysis of Crude Silica Sand.

Remaining on	Per cent.
12	0.3
20	0.2
30	4.0
40	25.0
50	32.8
70	22.2
100	12.4
140	2.1
200	0.5
270	0.1
Pan	—
Total	99.6
A.F.A. grain fineness	45
A.F.A. grain class	No. 6

The same proficiency exists in mixing the backing sand in the large sand mixer, as is evident in the operation of the smaller unit. The sand, coming from the elevator, enters the batch hopper located over the muller, and is dumped into the running unit. The operator then starts an electrical timer on the panel and 1,280 lbs. of crude silica sand again enters the batch hopper ready to follow the preceding 1,280 lbs. While the batch hopper is filling, the operator adds 6 galls. of cereal binder and 2 lbs. of ammonium nitrate to the muller, followed by sufficient water for the desired moisture content and 7 qts. of oil. From the completion of adding oil, the mixture is mulled for 1 min. 30 secs. and then dumped into the waiting tramrail bucket.

The next batch of sand then is dumped into the muller and the above procedure repeated. The tramrail buckets of sand then are picked up by the overhead tramrail, which distributes the different types of sand to their designated hoppers or blowers.

(*To be continued.*)

According to "The Foundry," a new permanent magnet alloy has made its appearance. It contains 12 per cent. cobalt and 17 per cent. molybdenum, the balance being iron. After suitable heat-treatment it is readily machinable. It has a high coercive force of 245, a residual induction of 10,300, and a maximum energy value of 1,100,000.

A NEW DILATOMETER FOR HIGH TEMPERATURE TESTING

The progress made in high temperature testing of foundry moulding and ceramic materials has been outstanding both in testing technique and in the necessary equipment. The Harry W. Dietert Company, of 9330, Roselawn Avenue, Detroit, Michigan, are carrying on extensive research in this field, and they have available an improved dilatometer, as shown in Fig. 1. This dilatometer is equipped with a furnace that will operate between the temperature ranges of 260 to 1,650 deg. C.

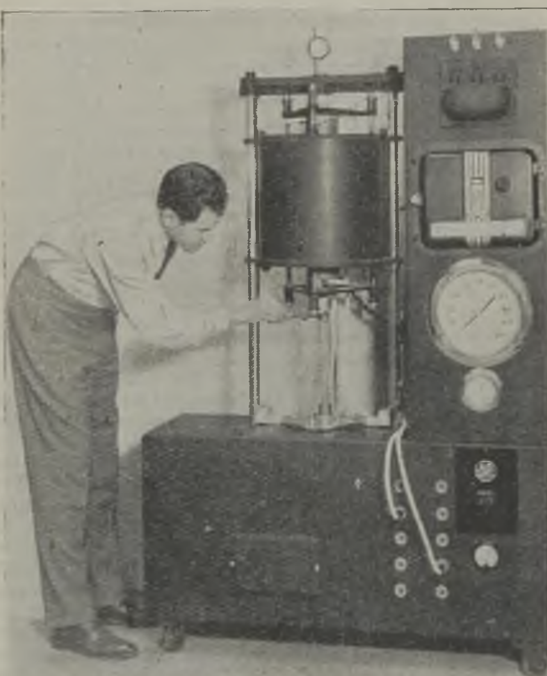

FIG. 1.—THE NEW DIETERT DILATOMETER.

The test specimen size most commonly used is $1\frac{1}{8}$ in. diameter and 2 in. in length. To determine the hot strength of the specimen at elevated temperatures, the specimen is loaded in the furnace by means of a motor-driven, hydraulic operated plunger which may be used to load the specimen in compression. The compression strength is recorded on a large test gauge.

The expansion or contraction of the specimen is readily obtained either for thermal shock or for gradual temperature rise. Both free and confined expansion or contraction tests are permissible. The dilatometer unit also lends itself to spalling tests for either shock

(Continued at foot of next column.)

SILICON-IRON ALLOYS

The improvements in acid-resisting silicon-iron alloys were discussed in a Paper presented to the Chemical Engineering Group of the Institution of Chemical Engineers by Dr. J. E. Hurst. In a summary the author states that from a metallurgical point of view the important considerations in determining soundness in commercial castings in silicon-iron are the gas content, particularly the content of hydrogen, the carbon content, and the casting temperature. With a hydrogen content not in excess of 2 mls. per 100 grms., a carbon content closely approximating the eutectic value for the particular composition, and a casting temperature between 1,200 to 1,280 deg. C. (disappearing filament pyrometer) conditions of maximum soundness and freedom from hot tears are obtained. For simple general corrosion resistance a silicon content of not less than 14.25 per cent. is desirable.

The possibility of the existence of internal stresses in silicon-iron casting has been demonstrated and also the effect of heat treatment in minimising the magnitude of, and possibly removing, such stresses. The existence of the unstable carbide phase and the brittle "eta" phase has been encountered and the influence of heat treatment and the careful control of the silicon content in removing risks of internal stresses from these causes has been recognised. The recognition of the presence of internal stresses and their removal or reduction by heat treatment goes a long way towards the avoidance of the risk of cracking in these castings.

The degree of control over the soundness and tendency to crack rendered possible by the findings of these investigations has resulted in improved reliability in acid-resisting silicon-iron castings. It would be reasonable to expect that an improvement in soundness and reduction in magnitude of internal stresses would be accompanied by an improvement in strength properties. The published data relating to strength properties are hardly sufficient to enable a quantitative comparison to be made, but it is thought that an average transverse rupture modulus of 18 tons per sq. in. does represent an improvement in ultimate breaking strength.

(Continued from previous column.)

or gradual temperature immersion. Accessories are available to measure the hot permeability of materials at elevated temperatures. The gas pressure created by materials at elevated temperature is also measured with this unit. For studying troublesome foundry problems, test methods and accessories are available for determining metal penetration, veining, and grooving. With this same equipment, one may measure the facing or protective value of various foundry or glazing materials. All of the controls of the dilatometer are mounted on a panel of the unit which makes the entire unit self-contained and easy to operate.

INSTITUTE OF BRITISH FOUNDRYMEN

PRESIDENTIAL ADDRESS

The future of the foundry industry is bound up with the future of the technical man

On his induction in the chair as President of the Institute of British Foundrymen, at the annual conference of June 10, Mr. J. W. Gardom delivered his presidential address on the subject of "The Technical Man."

Mr Sharpe and Gentlemen,—

I have always considered it wise and desirable when embarking upon any project to set a high target figure and, when planning your own future or the future of others, to aim at the almost unattainable. From my earliest days and up to the present time I have been inclined to build castles in the air, but I cannot remember ever visualising the possibility of standing here as your President. However, such is the case, and addressing you in this City and in this particular building is a somewhat strange coincidence, as these are associated with the happiest times and the most outstanding event of my life. The coincidence—which Manchester has so far failed to realise—is that some 50 years ago I was born here. After leaving school I became laboratory assistant to the late Sir Harold Carpenter, who was then Professor in the Metallurgical Department of Manchester University. During those very happy times I had the good fortune to meet Dr. C. A. Edwards and Dr. J. H. Andrews and be associated with their work. At that time, with the delightful prerogative of the Manchester man, I used to think how fortunate Prof. Carpenter was to have me working for him, but as time has passed I have more and more realised how much I owe to that early training and to Prof. Carpenter for his kindness and guidance.

After three years, as the Department of Metallurgy grew, I was given my first chance of labour control, and a boy straight from school became my assistant. This boy is to-day the immediate Past-President of the Lancashire Branch—Mr. E. J. L. Howard. I cannot help thinking, and I am sure Howard will join me in this, that the most helpful and lasting technical education is obtained by being associated in however small a part with some experienced and enthusiastic worker, and should your teacher in later years be able to refer to your own work, no higher reward could be desired. When, therefore, Sir Harold Carpenter in this very building as President, addressing the Manchester meeting of the Iron and Steel Institute in 1935, referred to the satisfactory work I had done for him, you will appreciate that was, until to-day, the outstanding event to which I have referred.

I feel that in electing me as your President you wish also to honour the Technical Committee of which, since its inception, I have had the privilege to be a member, first as Convener of a Sub-Committee, and then for the past 12 years as Convener. I would like to take this opportunity of thanking members of the Technical Committee for the great help and support they have given me during this time, and following these years of association with such men it will be no surprise to the majority of my listeners that my subject to-day should be "The Technical Man."

Bridging the Gap

It is usual when describing the individual of a group to generalise, or alternatively, and as stated above, I prefer this, to consider the ideal, but first let us examine the conditions which created the necessity for a technical man. The first man to work metal must, of necessity, have been a practical man, and his skill through the ages was passed on, mainly by example, to his helpers, with constant improvement until the first casting was produced. So was born our present-day artisan. I prefer the word artisan to craftsman when applied to our industry, because it stands for one employed in an industrial art, whereas craft is capable of being given more than one definition, although applied to our requirements; it means "a highly skilled manual worker." Then, as now, our artisan had not only to be skilled in manipulation, but also to have a basic understanding of the materials with which he works. Let us denote this worker with a capital "A."

"A"

As skill and knowledge improved it was natural that more thought must be given to the processes of production and improvement of the product. More and more time was given to studying "Why," so a new type was created which pondered, reflected, reasoned and drew inferences, and so was born the academic man. Let us denote him by a capital "A" and small "m."

"A" "Am"

As this practice of thinking increased, the distance between the two classes of workers grew wider and wider until an almost impenetrable wall was between them. Let us demonstrate it so.

A I Am

The rate of progress was now delayed until the wall had been scaled, but as both had started from one beginning, it was natural that pioneers would be found to carry the problems from left to right, A. T. Am. and the solutions right to left A. T. Am., and so was born the Technical man. He can be considered the catalyst about which all change takes place. So we have the Technical Man—T,

A T Am

and from this arrangement we can visualise the technical man's requirements and the training necessary to obtain these.

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First it can be seen that to enter this sphere the academic man can come down from the University and the practical man can come up from the foundry floor, providing each has the capacity to appreciate and understand the other's work. For this is truly the field of the technical man, to understand the problems, to appreciate the research results and to apply and demonstrate them for the betterment of all. The wide knowledge and experience of both the practical and theoretical make him realise that we have only scratched the surface of knowledge and accomplishment, and so he is a humble man, unassuming and not sufficiently self-assertive.

The technical man is always ready to discuss and explain to all, irrespective of class, the "how" and "why" of his work, work requiring careful observation and logical examination so that all facts can be verified and all experiments reproduced. "Near enough" can never satisfy; his integrity is beyond doubt and so he is inherently an honest man. No requirements of labour or capital can sway his findings. Naturally, then, he has gained the confidence not only of his colleagues, but also of the direct producers. He has the tendency sometimes to forget the value of results and obtains too much enjoyment from the process by which results are attained, and it is this quality of enjoying work for itself which has, unfortunately, resulted in a lack of appreciation of his work by the business man. He is not well understood, mainly because of his detachment. As he is inclined always to be talking of his work, his pleasures are usually taken with other technical men where he is always on the look out for some hint to overcome his present problem.

He has developed to a very high degree that greatest of all assets, the power to look and see, or what is called vision. Vision—the faculty of forming images and pictures of conditions, of always seeing familiar things in a fresh and new light and seeing things as they really are. Thus is developed the power not only to recall images out of past experience, but also of creating and producing in more or less detail mental images of things not previously experienced, but merely suggested or hinted at. Having avoided, by close connection with productive requirements, that great sin—procrastination—he is ready to act, to act boldly, to make his dreams come true, refusing to be discouraged by theoretical impossibilities and, when all material factors are against success, to be invincible and insist upon success.

The technical man is not right all the time, but he is right so much of the time that we would do well to consider using him in a wider sphere in our post-war world. Unfortunately, this authority is subjected to the ills common to man, but, apart from replacements, more and more and even better technical men are required to keep pace with our future requirements, for science moves with incredible speed to-day.

A Diploma for the True Technician

Much time has been given by this Institute to considering education and training and methods of bringing youth into the industry, but I think something more is needed. Almost every boy entering the foundry for the first time is thrilled with interest and, if no comparisons with other sections were pressed upon him, I am sure that interest and desire to work there would remain. Further, of those who have remained either on the floor or in the laboratory, I have still to meet one who can truthfully say he is not interested in the work and does not get every satisfaction from his employment. Many young men are sufficiently keen to wish to increase their knowledge by attendance at evening classes, and excellent courses of part-time instruction are available at various centres throughout the country. Classes are now arranged for workers in many industries, and these usually lead to an examination and the granting of a certificate or diploma. Qualifications of this type are useful to employers in assessing the ability of a man, as quite apart from indicating a certain standard of knowledge, they also imply a keenness and a desire to learn and, in the case of a youth working long hours in a foundry, perhaps a dogged determination to succeed.

Up to the present there is in this country no standard course of part-time study which can be followed by a man interested in the technical aspect of founding, and no recognised examination which can be taken as a proof of ability and knowledge. An external degree or the entrance examination of one of the chemical or engineering institutions is often chosen and, while I feel that all the knowledge gained in following one of these courses of study is useful, the qualification gained can be no real guide to a man's technical ability to produce castings.

I would like, therefore, to see established a Technical Diploma which would show that the holder had not only knowledge of foundry subjects, but also that he had satisfactorily filled a works position for two or three years. Thus the graduate would be required to fulfil the examiners' requirements in practical application, while the practical man would have to demonstrate his knowledge of the theory. The usual criticism of our present educational system is that it confers privilege on social status or wealth. Whether or not that is true, any system which is based solely on graded scholastic examinations must confer a privilege on early precocity or immature intellect. The new system under the proposed Education Bill may, therefore, be found more harmful than the old system. The diploma I suggest would allow men who develop their full powers after leaving school or after works' experience to obtain recognised qualifications of their ability. An oral and practical examination would be necessary, and this work could, I am sure, be undertaken by the newly constituted Technical Council.

You are no doubt aware of the new constitution of the Technical Committee; mainly, that it is under the guidance of the Technical Council and that sub-committees will now be set up to report on specific problems. It is hoped by this means to widen the scope of the subjects considered, and also to increase the number of members taking part in this work. I know that the reports, and particularly the special reports of the sub-committees, have been well received and are valued. but such reports do not by any means cover the wealth of knowledge that is shown at sub-committee meetings. If you could have been present, as has been my good fortune, to listen to the discussions which take place between these highly skilled and knowledgeable technical men, you would feel that something should be done to take advantage of the information so freely and fully given.

Sustaining Student Interest

As one method of furthering this, I have asked your Council to consider the creation of a Technical Student Grade. members of which would be eligible to sit on Technical Sub-Committees. These positions would be open to those youths in the foundry industry who it is considered would benefit most by being present and listening to the discussions. I do not suggest that they should take part in any of the work carried out, but it may be that they should be required to write a brief report of each meeting in order that their interest in the subject could be followed. Such studentships would be granted to suitable young men, and only after careful selection, for the period of one Committee's report. Application or recommendation could be through the Branch Councils and the final selection could well be left to the Technical Council.

It is my wish that the expenses incurred in attendance at such meetings should not be borne by the individual or his employers, and I have therefore asked the Council to accept a sum of money to be used for this experiment. I hope, if it is successful, that further contributions will be forthcoming to put such an arrangement on a permanent basis, but if one youth ever feels that my suggestion has helped him to succeed, I shall feel I have repaid a little my debt to the late Sir Harold Carpenter. A Memorial Fund would be a tribute to such an eminent metallurgist. I am particularly anxious that the student shall have sufficient funds at his disposal so that he may take part not only in actual meetings, but also in the attendant discussions which take place over meals, as there is much to be learned in this way from many points of view. I feel that it is here that the foundryman often lags behind his other engineering contemporaries, and in this respect I have even noticed a distinction between the casters of one metal and another.

The advantages of this arrangement will not be entirely one sided. Older members will have the opportunity of meeting new young men who, while naturally not thinking all time should be spent at work, will show a keen interest in everyday problems. This will not only keep the older men alive to youth's requirements. but, I hope, will demonstrate to some that by keeping in a somewhat confined space of scientific achievement they are not furthering the interest

THE NEW PRESIDENT

MR. JOHN W. GARDOM received his early technical training at the Manchester College of Technology and in the Department of Metallurgy of Manchester University as assistant to the late Sir Harold Carpenter. He left Manchester to become assistant chemist in the metallurgical laboratories of the Midland Railway Company, Derby. During the world war he served in the Royal Artillery, but was recalled in 1917 to take up a technical position at the Royal Aircraft Establishment, Farnborough, and with the Electro Metallurgical Department of the Ministry of Munitions.

After the war Mr. Gardom was connected with the Skefko Ball Bearing Company, Limited, Luton, at first as assistant metallurgist and later as chief metallurgist. In 1922 he joined the staff of Bagshawe & Company, Limited, Dunstable, as metallurgist, where he became works manager before leaving in 1933 to establish his own business as a consulting engineer, specialising in foundry installations.

Mr. Gardom is best known to members for his work on the Technical Committee of the Institute. He has served on this since its inception, and for the past 12 years has been its convener. In 1929 he was President of the London Branch, and in 1933 he was awarded the Oliver Stubbs' Gold Medal. Mr. Gardom has been responsible for the design and equipment of a number of foundries, both for specialised production and for general foundry castings, in steel, malleable, non-ferrous and iron.

of our industry as much as they otherwise might. Further, I have always found that we are particularly keen not to demonstrate to the younger generation our short-comings whilst we do not seem to mind our own colleagues knowing of our failings.

Post-war Problems

Turning now to the future of our industry, while it is inevitable that we will have competition for some of our past markets, I am sure there will always be a very wide field available for "Castings," especially if we remain alive to the knowledge gained during the present emergency, and concentrate on production and quality.

Surely, as foundrymen, it should be our first responsibility to see that any casting is made in the most suitable metal. It would be a great step forward if

I.B.F. Presidential Address

an authority could be set up to decide which metal is most suitable for any particular application. I fully appreciate the difficulties involved and that many cases of overlapping of available materials must arise. If, however, the aim of each section could be to supply castings to meet service requirements rather than to secure orders at all costs, the whole industry would ultimately benefit. The authority I visualise could also be called in to inspect cases of unsatisfactory service and to report on incorrect applications and lack of quality. It could also with advantage give assistance in the early discussions on new designs, acting as the liaison between designer, engineer and the producer, so ensuring the best possible results from processes and materials.

The aim should be to obtain the highest quality casting for all applications in all cases. This is the technical man's sphere and an increased demand for castings would be the reward for his integrity. Allied to this quality casting must be high unit production, and when high production and quality are associated in any trade, its future against all comers is assured. It does seem strange that the output per foundry capacity should show a decided fall between wars. I have not gone deeply into this matter, but a brief examination points to control by the Civil Servant during high production periods as the determining factor, or is it that for these short periods technical control has come before business requirements? We have had a magnificent opportunity during the recent years of learning what is possible on a productive basis, and these lessons must be applied to all future manufacture—in particular, idle time of men, machines and money must be cut to the irreducible minimum. By operating close to capacity we can be assured that employment will be kept at a high level.

During the past 50 years there has been greater change in methods, plant and space requirements in the castings industry than in any other engineering production, and it appears to me somewhat of a tragedy that some modern plants have been forced into old buildings—buildings that were quite suitable when capacity requirements per ton of castings produced were 10 or 20 times higher than under modern methods. Such, however, is the case, and it is no doubt due to the uneconomic return discernible on building expenditure, whereas new plant and equipment returns can be accurately calculated. National assistance for the purchase of new buildings rather than for plant would have been of greater value to foundry future production, employment and labour welfare. The post-war industrialist must be completely self-supporting, not dependent on Government assistance. I would therefore like to see building costs, which are at present a serious drag on progress, reduced by the application of up-to-date methods of production in the building industry, and a more helpful method of rating applied to the basic heavy industries. Possibly a "cast" building is one answer to the first part of the problem and a unit based on "turnover per cubic foot of building capacity" the answer to the second part.

I feel very strongly that the future of our industry is bound up with the future of the technical man. The essentials for future prosperity are *confidence, decision and reward.* First we must have confidence, not only in ourselves, but in our associates, for confidence is an essential to production. Nothing impedes progress so much as lack of confidence in a planned project. Nothing can be more disheartening than that often-heard expression, "I will believe it when I see it," and no one can say how many well-planned schemes have failed because the planner was not tough enough to stick to his guns in the face of disbelief. When the technical man has overcome the lack of self-assertiveness which I have already mentioned, I feel he will be well suited to carry out such projects requiring, as they do, both vision and experience.

Constant Practice

It may be asked, "Can the technician also undertake management?" Good managers, like good castings, are made, although I will concede that inherent properties are an advantage in each case. The first essentials in training for management are to accept responsibility and to profit from experience. It is only by constant practice that one can be successful, but understanding of others, particularly in what seem unessential and small matters, and a constant remembrance of how you liked to be treated when on the bench, will help towards success. Confidence of men in their leaders and in the management is not by any means the least requirement for a prosperous future.

Decision does not, of course, mean alteration without due thought, but when, after careful study, a line of action has been agreed to, one man should be given the responsibility of carrying out the project.

It is readily agreed that it is most important that a manager shall be able to take a quick decision. We often hear it said that production cannot stop while a fault is looked into, yet so often, when a decision has to be taken on the installation of new plant or the rearrangement of a productive unit, weeks and months go by of wondering which is the best way. No doubt this is because the executive are on strange ground, but I know that losses owing to avoidable delays in putting plant into work are far higher than is ever realised, and in many cases profits lost in this way would have paid for the new plant over and over again.

When a chosen leader is able to give and agree to a decision without having to turn to his colleagues for further discussion, we shall have moved further along the road to prosperity.

Finally, there must be reward. Here we must be realists; all work done, all actions, all ideas must be appreciably rewarded. Effort that is allowed to pass unrecognised may not be repeated. It is unfortunate that so many consider the £ sterling the symbol of personal progress—money is not the only reward.

Encouraging Youth

Perhaps I have been wrong in using the rather old-fashioned word "reward," and it would have been better to speak of incentive, but, whatever the name, I do hope I have your support in furthering two suggestions I have put before you, *viz.*, the Technical Student and the Technical Diploma, for by such incentives we will not only encourage young men to see and appreciate more the advantages of our industry, but I consider it of paramount importance that the youth who has for any reason missed the opportunity of obtaining suitable qualifications must not be lost or discouraged. It is such men who have been mainly instrumental in bringing the foundry industry from its somewhat unenviable position to the present scientifically controlled industrial art and the Institute to a position of prominence and promise.

I have spoken of the technical man being satisfied in working for the enjoyment of his job, and this is often quite sufficient reward, for his wants are a secondary consideration to his work. He is, therefore, easily satisfied, but the world at large judges far too much by outward appearance, and so the technical man, who has the ability to cure most of our troubles, should recognise the fact that some time must be spent away from his work and a little self-advertising would probably result in more power, power which he of all men could put to such good use.

You will see that all the necessary requirements for obtaining the prosperous future we desire are part of the technical man's make-up, and so to the technical man I say, "Here is a job of work to do. Go to it and you will do good to all who come within your sphere; your reward will be that you have lived a full and satisfactory life."

VOTE OF THANKS

MR. P. H. WILSON, proposing the thanks of the Institute to Mr. Gardom for his excellent and interesting address, said he had outlined very clearly the position of the foundry industry with particular reference to technical control and its effect on the industry, which he agreed would be even more important in the post-war days when, in view of the need for increased trade overseas as well as at home, it would be necessary to produce a high-quality product at the very lowest possible cost.

One must agree with Mr. Gardom that that aspect of the industry was intimately connected with the future status of foundry technicians, and that better facilities for study and training should be available for suitable types of young men. He did not see any major difficulties in the way of a course of practical and theoretical training in foundry practice and subjects allied to it being organised under the auspices of the Institute. The course would culminate in a periodic examination which would entitle successful entrants to a diploma that would be recognised throughout the industry. The possession of such a diploma, whilst admittedly not affording full measure of the capabilities of the holder, would nevertheless provide some tangible evidence that he had attained a recognised standard as a foundryman and would establish a definite status to qualified men and a consequent higher standard of efficiency among foundry technicians.

In addition to the training and status of foundry technicians, Mr. Wilson stressed the importance of including the foundry foreman type of man in any future training scheme. He emphasised that for the great majority of foundry employees the foreman was their sole link with the managements, and the policy of a company was, in its final stages, largely administered by the foreman. Quite recently, in the works which he had the honour to control, he had started a system of foremen's conferences, whereby they learned a little more of the company's policy; they appreciated that they were taken more into the confidence of the management, so that they were in a better position in handling labour.

MR. H. J. YOUNG, seconding, said that throughout the address there was real punch, and there was no doubt whatever that Mr. Gardom was the right man in the right place at the right time. There was no doubt that Mr. Gardom had the ability and the characteristics of a President, including a vein of humour and that divine spark which enabled a man to see two sides of a question. The Institute was to be congratulated on his election, and he could be assured that the members would do all they could to make his presidency a success and a pleasure.

(The vote of thanks was carried with enthusiasm, and Mr. Gardom briefly responded.)

ALUMINIUM PAINT

The use of aluminium paint on hot surfaces to reduce radiation losses has been suggested in cases where lagging is impracticable. Figures given by the Paint Research Station show that rather more than one-half of the heat loss from a dark surface at 350 deg. F. is due to radiation. Painting the surface with a non-metallic paint whatever the colour makes almost no difference to this loss, but painting with the right grade of aluminium paint reduces the radiation loss to one-half so that the total loss will be only three-quarters of what it is for an untreated surface.

The metallic content of aluminium paint is in short supply, but the appropriate Department has agreed to release small quantities of these materials in the interests of fuel economy. The Fuel Officer will tell you how to proceed when paint is urgently needed for fuel conservation.

Owing to its scarcity, aluminium paint should only be used as a last resource, *e.g.*, where for any reason the application of lagging or some form of shield is impracticable. Such cases are boiling pans of irregular shape, vessels which, if lagged, would require continual removal of insulation for inspection or other purposes, and piping partly embedded in walls. As a typical example, the Plastics Industry F.E.C. are recommending firms to paint the edges of press platens with aluminium paint. With the present shortage, however, it cannot be justified for the external surface of lagging.

INSTITUTE ELECTS NEW MEMBERS

At a meeting of the Council, held at the Midland Hotel, Manchester, on June 9, the following were elected to the various grades of membership.

As Subscribing Firm Members

D. Flanagan, Limited, Irvine Brass Works, Irvine, Ayrshire (representative, R. Copleton); Gearings, Limited, P.O. Box 1597, Cape Town, marine and general engineers (representative, H. C. Gearing); J. Sagar & Company, Limited, Canal Works, Halifax, Yorks, woodworking machinery and machine-tool makers (representative, A. Ingham); The Star Foundry, Corner Foundry and Westminster Road, Salt River, South Africa (representative, H. M. Harris).

As Members

H. T. Angus, Ph.D., M.Sc., chief chemist and metallurgist, Parkinson Stove Company, Limited, Stechford, Birmingham; L. R. Batchelor, rolling stock engineer, Cape Town Tramways; J. F. Bossenger, patternmaker, Gearings, Limited, Cape Town; R. H. Braid, foreman moulder, Gearings, Limited, Cape Town; J. G. Davies, works manager, Glanmor Foundry Company, Limited, Llanelly; J. Hale, works manager, R. W. Coan, Limited, London; W. J. Hopkins, assistant foundry manager, Midland Motor Cycle Company, Limited, Birmingham; H. Hughes, assistant superintendent, Union Steel Corporation, Vereeniging; N. A. McLeod, foreman patternmaker, Rand Founders, Johannesburg; R. M. Storkey, foreman moulder, Globe Engineering Works, Wynberg, South Africa; D. Walker, foreman moulder, A. Reyrolle & Company, Limited, Hebburn, Co. Durham; J. F. Dowell, foundry foreman, Sheepbridge Stokes Centrifugal Castings Company, Limited, Chesterfield; N. J. Dunbeck, B.Sc., Vice-President, Eastern Clay Products, Ohio, U.S.A.; H. O. Howson, metallurgist, Millspaugh, Limited, Sheffield; J. Neil, chargehand moulder, D. Brown (Huddersfield), Limited, Penistone; J. A. Scott, foundry manager, Sheepbridge Stokes Centrifugal Castings Company, Limited, Chesterfield.

As Associate Members

L. H. Akerman, foundry foreman, Langley Alloys, Limited, Bucks; L. Ashall, patternmaker, Hudson & & Hopkins, Sea Point, Cape Town; J. Beal, foreman, African Malleable Foundries, Limited, Beksburg South, South Africa; W. M. Boulton, foundry metallurgist, Bristol Aeroplane Company, Limited; H. J. Bullock, foundry engineer, Lake & Elliot, Limited, Braintree; N. H. Butler, foundry manager, Glanmor Foundry Company, Limited, Llanelly; K. H. Coombs, metallurgist, Crane, Limited, Ipswich; J. C. Danvers, moulder, Cape Town; S. Davis, chargehand patternmaker, Simplex Electric Company, Limited, Oldbury; W. Evans, journeyman, Rudge Littley, Limited, West Bromwich; W. Geutjes, patternmaker, Gearings, Limited, Cape Town; G. A. Goad, founder, H.M. Dockyard, Cape Town; H. W. Hancock, foundry manager, R. Boby, Limited, Bury St. Edmunds; J. R. Hayward, foundry foreman, B.A.C. Engines, Limited, Bristol; C. J. Hopkins, manager, Phœnix Foundry, Cape Town; C. F. Huiskens, patternmaker chargehand, Globe Engineering Works, Cape Town; T. John, works engineer, Glanmor Foundry Company, Limited, Llanelly; D. O. Lewis, metallurgist, Glanmor Foundry Company, Limited, Llanelly; C. N. Membrey, founder, H.M. Dockyard, Cape Town; P. McLoughlin, engineer, Globe Engineering Works, Cape Town; W. J. Percy, moulder, Globe Engineering Works, Cape Town; D. Robertson, foundry foreman, Cochranes (Middlesbro'), Limited; C. N. Rollin, metallurgical chemist, North Eastern Marine Engineering Company, Limited, Wallsend; F. D. Roper, general floor moulder, Beans Industries, Limited, Tipton; E. L. S. Sylvester, patternmaker, H.M. Dockyard, Cape Town; R. A. J. Symons, foreman moulder, C.V.A. Jigs, Moulds & Tools, Limited, Hove; W. H. Tomlinson, foundry manager, Auto-Klean Strainers, Limited, London; J. Doig, assistant foreman moulder, H. Balfour, Limited, Leven; W. Lister, foundry manager, B. Moore's Foundry, Bingley; D. Stewart, assistant manager, Grange Foundry Company, Limited, Glasgow; J. McP. Niven, chargehand moulder, High Duty Alloys, Limited, Slough; S. Wade, patternmaker, Gearings, Limited, Cape Town; S. A. Wilson, works estimator, Globe Engineering Works, Cape Town; J. Ladhams,* steel moulder, Head, Wrightson & Company, Limited, Thornaby-on-Tees; W. H. Hughes,* moulder, Brown, Lenox & Company, Limited, Pontypridd.

As Associates (Student)

R. Davies, apprentice steel moulder, Brown, Lenox Company, Limited, Pontypridd; M. A. Edwards, apprentice coremaker, Brown, Lenox & Company, Limited; T. T. Leyshon, foundry apprentice; M. W. Northall, apprentice steel coremaker, Brown, Lenox & Company, Limited; T. G. Palmer, apprentice steel moulder, Brown, Lenox & Company, Limited.

According to the Bureau of Mines, the United States production of primary aluminium last year amounted to 821,588 tons, an increase of nearly 77 per cent. over the 1942 figures. The production of secondary aluminium was estimated at 232,142 tons, 31 per cent. above the figure for the previous year.

Mr. William G. Reichert has been awarded the Joseph S. Seaman Gold Medal; Mr. Alfred W. Gregg, the J. H. Whiting Gold Medal, the two major awards of the American Foundrymen's Association. Honorary life memberships of the Association have been granted to Mr. John Hill and Mr. Herman E. Alex. Mr. Reichert, a consulting metallurgist, was the author of the first Exchange Paper between London and New York; Mr. Gregg is the chief engineer of the Whiting Corporation. Mr. Hill, who has visited this country several times, is the president of the Hill & Griffiths Company—a leading American foundry supply concern. Mr. Alex is foundry manager of the Rock Island Arsenal.

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* Transferred from student grade.

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"KAZOAK"—Alloys of common metal. NATIONAL ALLOYS LIMITED, Tadley Court, Tadley, Basingstoke.

"LAKO"—Gas and water fittings. BLAKEY'S BOOT PROTECTORS, LIMITED, Modder Place, Armley, Leeds, 12.

"PHILOY"—Electric welding apparatus. PHILIPS LAMPS, LIMITED, Century House, Shaftesbury Avenue, London, W.C.2.

"CERAMETAL"—Machine parts and tools. BOUND BROOK BEARINGS (G.B.), LIMITED, Birch Road, Witton, Birmingham, 6.

"RADIAN"—Electrode for electric arc welding. QUASI-ARC COMPANY, LIMITED, Grosvenor House, Park Lane, London, W.1.

"CULTYLE"—Metal tiles, etc. WALLIS & COMPANY (LONG EATON), LIMITED, Nottingham Road, Long Eaton, Nottingham.

"VORTIC"—Electrodes for electric arc welding. QUASI-ARC COMPANY, LIMITED, Grosvenor House, Park Lane, London, W.1.

"ALCHO-RE"—Fluxes for soldering and brazing. FRY'S METAL FOUNDRIES, LIMITED, Christchurch Road, Merton Abbey, London, S.W.19.

"CARLEC"—Building and construction materials, etc., of common metal. CARLISLE ELECTRICAL MANUFACTURING COMPANY, LIMITED, Salters Lane, Eccles, Lancs.

"WITTONSIL"—Mixtures of siliceous clay and ganister for use in lining furnace cupolas. LIVINGSTON REFRACTORIES, LIMITED, 62, New Broad Street, London, E.C.2.

"SKY-LINE"—Boxes of sheet iron for electric batteries, building fittings, and other goods made of metal. PLATERS & STAMPERS, LIMITED, Colne Road, Burnley, Lancs.

"KLONOK"—Metal frames and fittings and rolled and cast metal building materials. NORMAN STUART BELLMAN, Terminal House, Grosvenor Gardens, London, S.W.1.

"VANBRO"—Unwrought and partly wrought common metals and their alloys. WILLIAM MCPHAIL & SONS, LIMITED, Violet Grove Foundry, 37-41, Grovepark Street, Glasgow, N.W.

"ERM"—Ingots, wire sheets, and strip, etc., of zinc, copper, or aluminium, or of alloys of these metals with other non-ferrous metals. ENFIELD ROLLING MILLS, LIMITED, Millmarsh Lane, Brimsdown, Enfield, Middlesex.

"MANCOLOY"—Alloys of manganese, copper, and nickel, in wire, strip, or other form for use in the manufacture of electrical apparatus. MALLORY METALLURGICAL PRODUCTS, LIMITED, 78, Hatton Garden, London, E.C.1.

"PLIMAG," "PLICHRO," "PLIMACHRO," and "PLIRUNDUM"—Refractory material in plastic or powdered form for use in lining furnaces. JOINTLESS FIREBRICK COMPANY, LIMITED, Westmorland Road, The Hyde, London, N.W.9.

"FOUR CIRCLES" (device)—Ingots, wire sheets, and strip, etc., of zinc, copper, or aluminium, or of alloys of these metals with other non-ferrous metals. ENFIELD ROLLING MILLS, LIMITED, Millmarsh Lane, Brimsdown, Enfield, Middlesex.

"AIRMEC" (and diamond device)—Building parts and fittings made of common metal or of common metal alloys; power-driven pumps, transmission gearing, and internal combustion engines. AIRCRAFT MECHANICAL PRODUCTIONS, LIMITED, Lane End Road, Sands, High Wycombe, Bucks.

IRONFOUNDRY FUEL NEWS—VIII

Members of the fourteen Regional Panels of the Ironfounding Industry Fuel Committee have now paid visits to about 400 ironfoundries, and to an appreciable proportion of these firms fuel-saving recommendations have been made. An analysis of all the recommendations shows that, as far as cupola melting is concerned, the advice most frequently given is that the iron and coke charges should be weighed or measured more accurately. Indeed the number of foundries where both iron and coke are weighed is surprisingly low. The following two extracts from inspectors' reports are illustrative of a position which too frequently exists:

"The coke charges were nominally of 196 lbs. I had a typical charge weighed and found the actual weight to be 231 lbs.!" "The overall coke consumption was stated to be 2 cwts. per ton of iron melted, but an actual weighing on the charging platform showed that the charge coke alone amounted to $1\frac{1}{2}$ cwts. for 10-cwt. iron charge. Mr. ——— admitted surprise when the true position was disclosed, and he undertook immediately to reduce his charge coke to a normal figure."

THE FOUNDRY TRADE JOURNAL for February 3, 1944, reports the case of an ironfoundry at which a saving in cupola coke of about 20 per cent. was made on installing a weighing machine.

If you wish to purchase a weighing machine the secretary of your Regional Panel will be able to help you to obtain the necessary licence. In the meantime, why not improvise a pair of scales with a standard iron charge on one pan? This can be used for weighing the iron, while the coke may be weighed on a similar pair or measured accurately in skips, baskets or boxes, not charged by the forkful.

If you do not know the address of the secretary of your Regional Panel, please communicate with the Fuel Officer, Ironfounding Industry Fuel Committee, Alvechurch, Birmingham.

ALUMINIUM DEVELOPMENT ASSOCIATION

The Aluminium Development Association has been formed, registered as a company limited by guarantee without share capital. The objects are to promote the use of aluminium, and to provide facilities for research work and the discussion of problems other than those of wages and prices. The executive council includes Sir W. Murray Morrison, Mr. Geoffrey Cunliffe and Mr. G. Boex (directors, British Aluminium Company, Limited), and Mr. W. T. Emery (secretary, British Aluminium Company).

PERSONAL

Mr. E. W. Starkey, a director of Charles H. Pugh, Limited, engineers and founders, has been awarded the M.B.E.

Lt.-Com. J. G. Adamson, who has been awarded the M.B.E., is production manager of J. & E. Hall, Limited, engineers.

Mr. S. A. Jackson has been appointed general manager and Mr. S. R. Howes general works manager of Samuel Fox & Company, Limited.

Capt. C. F. Ward Jones, Mr. Gerald Steel, and Mr. A. J. Peech have been appointed assistant managing directors of the United Steel Companies, Limited.

The Marquess of Linlithgow, former Viceroy of India, and Dr. A. Fleck have been appointed directors of Imperial Chemical Industries, Limited. Dr. Fleck is chairman of the Billingham division of I.C.I.

Dr. W. J. Rees, technical adviser to the Foundry Bonding Materials Control, has been awarded the O.B.E. He has been head of the Refractories Department of Sheffield University since its inception in 1917.

Mr. A. T. Marshall, secretary of Harland & Wolff, Limited, and Mr. S. M. Turnbull, managing director of the Greenock Dockyard Company, Limited, have joined the board of the Iron Trades Employers' Insurance Association.

Capt. H. FitzHerbert Wright has resigned the chairmanship of, and his seat on, the board of the Butterley Company, Limited, owing to ill-health. Capt. Wright has been a member of the board for nearly 42 years, having been appointed in October, 1902. He was elected chairman in October, 1938. The present managing director, Mr. E. Fitzwalter Wright, has been appointed chairman and managing director.

Mr. H. Riggall, a director of Ruston & Hornsby, Limited, has been appointed assistant managing director of the company. Mr. Riggall joined the associated company of Ransome, Sims & Jefferies, Limited, in 1920, and went to Ruston & Hornsby in 1921. He is vice-president of the British Engineers' Association, a member of the Grand Council of the F.B.I., and a member of the Executive Council of the Association of British Chambers of Commerce.

Mr. Walter Haynes, director and secretary of Ruston & Hornsby, Limited, Lincoln, is retiring from his executive secretarial duties on June 30, having filled the position of secretary for the past forty years and completed 52 years' service. He will continue to occupy his seat on the board. Mr. Geoffrey Pawlyn, chief accountant to Ruston & Hornsby, Limited, has been made a director of the company, and appointed secretary as from July 1, in succession to Mr. Haynes.

Mr. George H. Buchanan has joined Craven Bros. (Manchester), Limited, as engineer representative in Scotland. Mr. Buchanan served his apprenticeship in the shops and drawing office of Loudon Bros., Limited, with whom he was associated for over thirty years, occupying, in turn, the positions of chief draughtsman, works manager and works director. In 1937, he joined Urquhart Lindsay & Robertson Orchar, Limited, as general manager at their Dundee works, and later became a director of the company.

NEWS IN BRIEF

The London office of Davy & United Engineering Company, Limited, and its subsidiary companies, Duncan Stewart & Company, Limited, and Davy & United Roll Foundry, Limited, has been transferred to larger premises at 5, Victoria Street, Westminster, S.W.1.

The Board of Trade, following a deputation from Tees-side industrialists and local authorities, has agreed to include South Tees-side and Cleveland in the terms of the North-East Development Scheme, under which the area will receive special help in improving its post-war industrial position.

Eighty-three employees of William Jessop & Sons, Limited, and J. J. Saville, Limited, of Sheffield, have each been presented with a framed illuminated certificate and a Bank of England note in recognition of more than 40 years' service. Mr. F. Wardrobe, a director, was presented with a certificate for 44 years' service. Two of the employees have each served for 63 years.

A light metals factory which has been erected in Central Scotland for the Ministry of Aircraft Production was officially opened on June 9. Sir William Murray Morrison, vice-chairman and managing director of the British Aluminium Company, Limited, presided, and the opening ceremony was performed by the Rt. Hon. Thomas Johnston, M.P., Secretary of State for Scotland. Sir Stafford Cripps, Minister of Aircraft Production, said that Scotland had, in the past, suffered to some extent from too small a diversity of industry. A number of new industries had been established in Scotland, which it was hoped would not be wartime excrescences, but part of the industrial plan of the future.

Mr. R. R. Stokes, M.P., speaking at the annual meeting of Ransomes & Rapier, Limited, said that although a great number of their products were known to have gone abroad for general purposes, export as such during the year had been negligible. The regulations under Lease-Lend continued to hamper trade, and markets in which they were strong had now been completely taken from them. They had instances of refusal to grant permits for spares even to customers in the Colonies and Dominions. It would seem to be time for the Government to reconsider the whole Lease-Lend restriction policy and open markets at least in those countries where British trade flourished before the war.

The report for 1943 of the directors of Ransomes & Rapier, Limited, engineers and ironfounders, of Ipswich, states that in the accounts for 1940, 1941 and 1942 stocks of heavy steel were overstated. The excess, which has been automatically written off by the insertion of the correct stock figure at December 31, 1943, is more than sufficient to account for the fall in trading profits disclosed by the 1943 accounts. The discrepancies referred to, which were attributable to extreme pressure of work on a wartime staff, coupled with unprecedented congestion in the works, were brought to light by the installation, completed in 1943, of modern methods for the racking and storing of heavy steel.

COMPANY RESULTS

(Figures for previous year in brackets)

Gjers, Mills & Company—Final dividend of 10%, making 12½%.

Ruston & Hornsby—Dividend of 12½% on the ordinary stock (same).

Electric Furnace Company—Final dividend of 4½%, making 8% (same).

Cannon Iron Foundries—Interim dividend on the ordinary shares of 5% (same).

Beyer, Peacock—Further year's arrears on the 5½% preference shares to June 30, 1939.

Albert Phillips (Ireland)—Net loss for 1943, £326 (£450); credit forward, £835 (£1,161).

Twyfords—Net profit for year to March 31 last, £33,703 (£41,272); dividend of 8½% (same).

Mason & Burns—Net profit for the year to March 31, after depreciation, £16,763 (£18,513); income-tax and E.P.T., £11,575 (£13,271); dividend of 20% (same); forward, £6,323 (£6,135).

William Denny & Bros.—Profit, £79,306 (£80,926); to general reserve, £35,000 (same); war damage contribution, £3,874 (£4,750); dividend of 10% (same); forward, £14,815 (£14,383).

Butterley Company—Net profit for the year ended March 31, after providing for taxation, £109,260 (£144,783); final dividend on the ordinary stock of 8½%, making 12½% (same).

James Booth & Company—Net profit for 1943, after providing for depreciation, taxation, etc., £102,322 (£99,715); ordinary dividend of 15% (same); to reserve, £30,000 (same); forward, £98,956 (£93,484).

Metropolitan Electric Cable & Construction—Net profit for 1943, £43,726 (£34,626); taxation, £24,518 (£18,655); preference dividend, £2,475; preference reserve, nil (£10,000); ordinary dividend of 7½% (same); forward, £17,452 (£2,969).

Keith Blackman—Profit, £192,451 (£149,601); taxation, £150,000 (£96,080); deferred repairs, £3,000 (£10,000); to reserve, £10,000 (£15,000); preference dividend, £5,500 (same); ordinary dividend of 20% (same) £25,000; forward, £43,497 (£44,546).

Yorkshire Copper Works—Profit for 1943, after depreciation and taxation, £68,179 (£66,569); dividend of 10% on the ordinary stock (same) and a bonus of 5% (same); to reserve for contingencies, £10,000; to general reserve, £30,000; forward, £20,865 (£18,492).

Hattersley (Ormskirk)—Profit for the year ended March 31, after E.P.T., £85,195 (£79,879); written off expenditure on A.R.P., £3,100; to reserve for war damage, £1,500 (£2,000); to general reserve, £10,000; dividend of 17½% (same); forward, £14,826 (£12,664).

John Harper & Company—Profit for the year ended April 2, £103,122 (£109,326); balance, after providing £91,002 for taxation, £582 for war damage insurance, writing off £1,066, the cost of increasing the nominal capital of the company, and paying preference dividend and interim ordinary dividend, £23,429; final dividend of 10%, making 15%, less tax, on the ordinary shares, £10,000; further dividend of 8% on the employees' preference shares, £521; to capital redemption reserve, £5,000; forward, £7,908.

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Shorts (Lifts), Lloyds Bank Chambers, Hustlergate, Bradford—£10,000. J. R. Phillips.

E. J. Toms & Son (Engineers), 20, Grosvenor Place, London, S.W.1—£1,000. E. J. and D. F. Toms.

United Pattern Makers, Stock Exchange Buildings, 33, Great Charles Street, Birmingham, 3—£1,000.

Barclay Stuart Engineering Works, Spencer House, South Place, London, E.C.2—£5,000. R. G. Creecy, W. Fox, and M. and A. M. Goldmann.

Olson & Company, 69, Faversham Avenue, Bush Hill Park, Enfield, Middlesex—Engineers. £1,000. W. E. Olson and H. D. and E. V. Murray.

A. Vigurs (Aston), 23, Colmore Row, Birmingham, 3—Manufacturers of metal stampings and pressings, tools, etc. £3,000. A. Vigurs, H. H. Cooper, and V. F. Nicholls.

Lancs Gen-Roll Equipment Company, Mitre Buildings, Padiham Road, Burnley—Mill furnishers, millwrights, engineers, etc. £500. A. V. Gent, D. Clarke, and H. Carman.

Birmall Manufacturing Company—Manufacturers of hardware, chemicals, hollow-ware, etc. £1,000. J. T. Davis, 431, Whalebone Lane North, Chadwell Heath, Essex, subscriber.

Hiduminium Applications, 95, Farnham Road, Slough—Manufacturers of light metals and alloys, etc. £1,000. W. C. Devereux, H. G. Herrington, S. Sanders, E. A. Reynolds, A. J. S. Aston, and J. H. Catling.

CONTRACTS OPEN

The date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Cheltenham—Supply and laying of 2,300 lineal yds. of 4-in. dia. spun iron mains, complete with specials, fittings, etc., for the Rural District Council. Mr. F. H. Rossor, 14, Imperial Square, Cheltenham. (Fee £2 2s., returnable.)

Woolstone—Supply and laying of 1,800 lineal yds. of 3-in. dia. spun-iron mains, complete with specials, fittings, etc., for the Cheltenham Rural District Council. Mr. J. H. Haiste, 22, Queen Square, Woodhouse Lane, Leeds, 2. (Fee £2 2s., returnable.)

DR. S. LIVINGSTON SMITH, superintendent of the engineering department at the National Physical Laboratory, Teddington, has been appointed Director of Research of the British Shipbuilding Research Association recently formed by the Shipbuilding Conference in close co-operation with the Department of Scientific and Industrial Research. It is expected that his services will be available to the Research Association as from September next. Dr. Smith was appointed superintendent of the engineering department of the National Physical Laboratory in 1939.

Raw Material Markets

IRON AND STEEL

Some of the foundries have now reduced their pig-iron stocks to the required limits and have been issued with further licences. The turnover in high-phosphorus iron has therefore been on a slightly better scale. Most of the orders, however, cover relatively small tonnages and there is far more interest in medium- and low-phosphorus grades and in refined iron, which are the principal raw materials of the general engineering foundries. These latter establishments, contrary to the experience in the light-castings trade, are fairly busy on Government orders, and prospects of sustained activity have been enhanced by the arrival of more adequate coke supplies. There is no certainty that recent irregularities in this respect will not recur and, as opportunities are afforded, foundries are endeavouring to increase their reserves of fuel.

The re-rolling mills rank as the busiest section of the steel industry. Bookings extend to three or four months ahead, and although the Control has hitherto ensured that adequate supplies of re-rolling material are available, the maintenance of this state of affairs calls for unremitting effort. Fortunately, the steelmakers are now in a position to provide bigger tonnages, but users are glad to accept defectives as well as prime billets and the consumption of sheet bars has now fully overtaken the supply.

The biggest proportion of the output of steel plates is claimed—as heretofore—by the shipbuilders, but a change is noticeable in the character of their specifications, which chiefly relate to the lighter gauges. Other users, among whom the building of locomotives and rolling stock figure prominently, are calling for increased deliveries and the plate mills are all working to capacity limits. Orders for heavy joists and channels are still scarce, but long waiting periods for small bars, light sections, etc., are the rule rather than the exception. New orders for sheets are not flowing quite so freely, but, in this instance, the quieter turn may be due to the fact that the mills have big programmes in hand, and are not in a position to indicate delivery dates within a reasonable period.

NON-FERROUS METALS

The large tonnage of shipping needed for the Continental operations will almost certainly mean that cargo space will be limited during the next few months and the scale of imports into this country may be affected. It is extremely unlikely that there will be a shortage of any of the non-ferrous metals for the war factories, but it is now fairly definite that there will be no possibility of civilian releases for some time. So far, zinc has been the only metal on which the Control have relaxed their restrictions.

There have been no important developments in the tin situation of late. Both here and in America supplies continue to be adequate to cover essential requirements. Although tin is not in such plentiful supply as some of the other non-ferrous metals (copper, for example), it is understood that sufficient stocks are held to tide over any emergency, such as interruption of shipping facilities, and there is certainly no fear of any immediate shortage.

Copper supplies in this country are plentiful, and it is believed that impressive stocks are held in reserve. Compared with last year's levels, there has been an unmistakable falling off in consumption. It is not yet known to what extent the European fighting will influence the situation. The materials now being used are the accumulation of several years' intensive production. In any case, a large amount of scrap will become available, and if it is necessary to increase munitions output, fabricators will find themselves well supplied.

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

560,626 NEWTON & COMPANY, LIMITED, L. H., and BOLLAND, W. E. Cold forging machines.

560,847 WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY. Method of producing compositions for activating metal and alloy metal surfaces to improve the process of forming corrosion resistant coatings.

560,848 WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY. Production of phosphate coatings on the surfaces of metals and alloys.

560,881 O'SHEI, W. E. Die casting or injection moulding.

560,932 GARDNER, D. Electric furnaces.

560,957 MOND NICKEL COMPANY, LIMITED. Welding rods.

560,986 RENNERFELT, I. Method of producing formed objects from finely subdivided pig-iron without melting, and objects made according to the method.

OBITUARY

MR. JAMES DAVIE, of James Davie & Sons, ironfounders and engineers, Stirling, has died at sea while serving as a chief engineer in the Merchant Navy.

LIEUT.-COL. R. T. G. TANGYE, of Glendorgal, St. Columb Minor, Cornwall, died on June 12. He was chairman of Tangyes, Limited, from 1930 to 1934.

MR. W. E. KNIGHT, a director of Darwins, Limited, and of Andrews Toledo, Limited, and managing director of Metal Mouldings, Limited, has died at Birchington.

MR. BERTRAM BALFOUR, a brother of Lord Riverdale, and a director of Arthur Balfour & Company, Limited, Sheffield, died recently, at the age of 69. Mr. Balfour had been president of the Sheffield Hacksaw Trades Association and a vice-president of the British Hacksaw Trades Federation.

CURRENT PRICES OF IRON, STEEL AND NON-FERROUS METALS

(Delivered, unless otherwise stated)

Wednesday, June 21, 1944

PIG-IRON

Foundry Iron.—Cleveland No. 3: Middlesbrough, 128s.; Birmingham, 130s.; Falkirk, 128s.; Glasgow, 131s.; Manchester, 133s. Derbyshire No. 3: Birmingham, 130s.: Manchester, 133s.; Sheffield, 127s. 6d. Northants No. 3: Birmingham, 127s. 6d.; Manchester, 131s. 6d. Staffs No. 3: Birmingham, 130s.; Manchester, 133s. Lincolnshire No. 3: Sheffield, 127s. 6d.; Birmingham, 130s.

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

Hematite.—Si up to 2.25 per cent., S & P 0.03 to 0.05 per cent: Scotland, N.-E.Coast and West Coast of England, 138s. 6d.; Sheffield, 144s.; Birmingham, 150s.; Wales (Welsh iron), 134s. East Coast No. 3 at Birmingham, 149s.

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

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

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

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

Cold Blast.—South Staffs, 227s. 6d.

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

FERRO-ALLOYS

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

Ferro-silicon (5-ton lots).—25 per cent., £21 5s.; 45/50 per cent., £27 10s.; 75/80 per cent., £43. Briquettes, £30 per ton.

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

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

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

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

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

Ferro-chrome.—4/6 per cent. C, £59; max. 2 per cent. C, 1s. 6d. lb.; max. 1 per cent. C, 1s. 6½d. lb.; max. 0.5 per cent. C, 1s. 6¾d. lb.

Cobalt.—98/99 per cent., 8s. 9d. lb.

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

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

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

SEMI-FINISHED STEEL

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

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

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

FINISHED STEEL

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

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

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

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

NON-FERROUS METALS

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

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

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

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

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

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

Brass.—Solid-drawn tubes, 14d. per lb.; brazed tubes, 16d.; rods, drawn, 11⅝d.; rods, extruded or rolled, 9d.; sheets to 10 w.g., 10⅞d.; wire, 10⅝d.; rolled metal, 10½d.; yellow metal rods, 9d.

Copper Tubes, etc.—Solid-drawn tubes, 15½d. per lb.; brazed tubes, 15½d.; wire, 10d.

Phosphor Bronze.—Strip, 14d. per lb.; sheets to 10 w.g., 15d.; wire, 16½d.; rods, 16½d.; tubes, 21½d.; castings, 20d., delivery 3 cwt. free. 10 per cent. phos. cop. £35 above B.S.; 15 per cent. phos. cop. £43 above B.S.; phosphor tin (5 per cent.) £40 above price of English ingots. (C. Clifford & Son, Limited.)

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

NON-FERROUS SCRAP

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

Returned Process Scrap.—(Issued by the N.F.M.C. as the basis of settlement for returned process scrap, week ended June 17, where buyer and seller have not mutually agreed a price; net, per ton, ex-sellers' works, suitably packed):—

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

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

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

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

IRON AND STEEL SCRAP

(*Delivered free to consumers' works. Plus 3¾ per cent. dealers' remuneration.* 50 *tons and upwards over three months, 2s. 6d. extra.*)

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

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

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

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

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

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FOUNDRY GENERAL MANAGER, M.I.Brit.F., A.M.I.P.E., age 39, comprehensive, practical, technical, commercial training, metallurgist, expert repetition, wide range GREY and MALLEABLE, light castings, hand and power, semi and full mechanisation, modern methods, ratefixing, costs, layout, development, material production, labour control and incentive; accept full responsibility all departments; fully accustomed heat-treatment, scientific annealing control, maintenance, general machining, assembly, industrial finishes, vitreous and porcelain enamelling, galvanising, sheradising, etc.; keen, energetic, loyal worker; excellent production and commercial record; open short notice post MIDLANDS, offering SCOPE; accustomed pioneering malleable development, unskilled labour, etc.; exempt further military service; salary commence £750/£800, or results arrangement; pincipals only; confidential.—Box 554, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

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IT is desired to secure the full commercial development in the United Kingdom of BRITISH PATENTS NOS. 534268 and 542264, which relate to Production of Cast Iron, either by way of the grant of licences or otherwise on terms acceptable to the Patentee.—Interested parties desiring copies of the patent specifications should apply to STEVENS, LANGNER, PARRY & ROLLINSON, 5 to 9, Quality Court, London, W.C.2.

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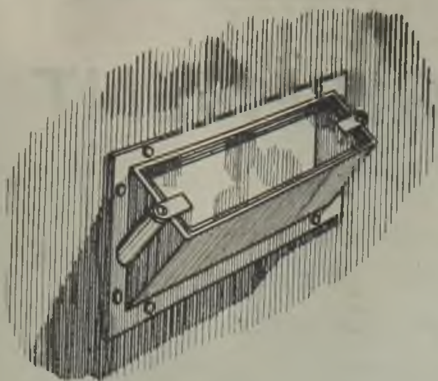

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