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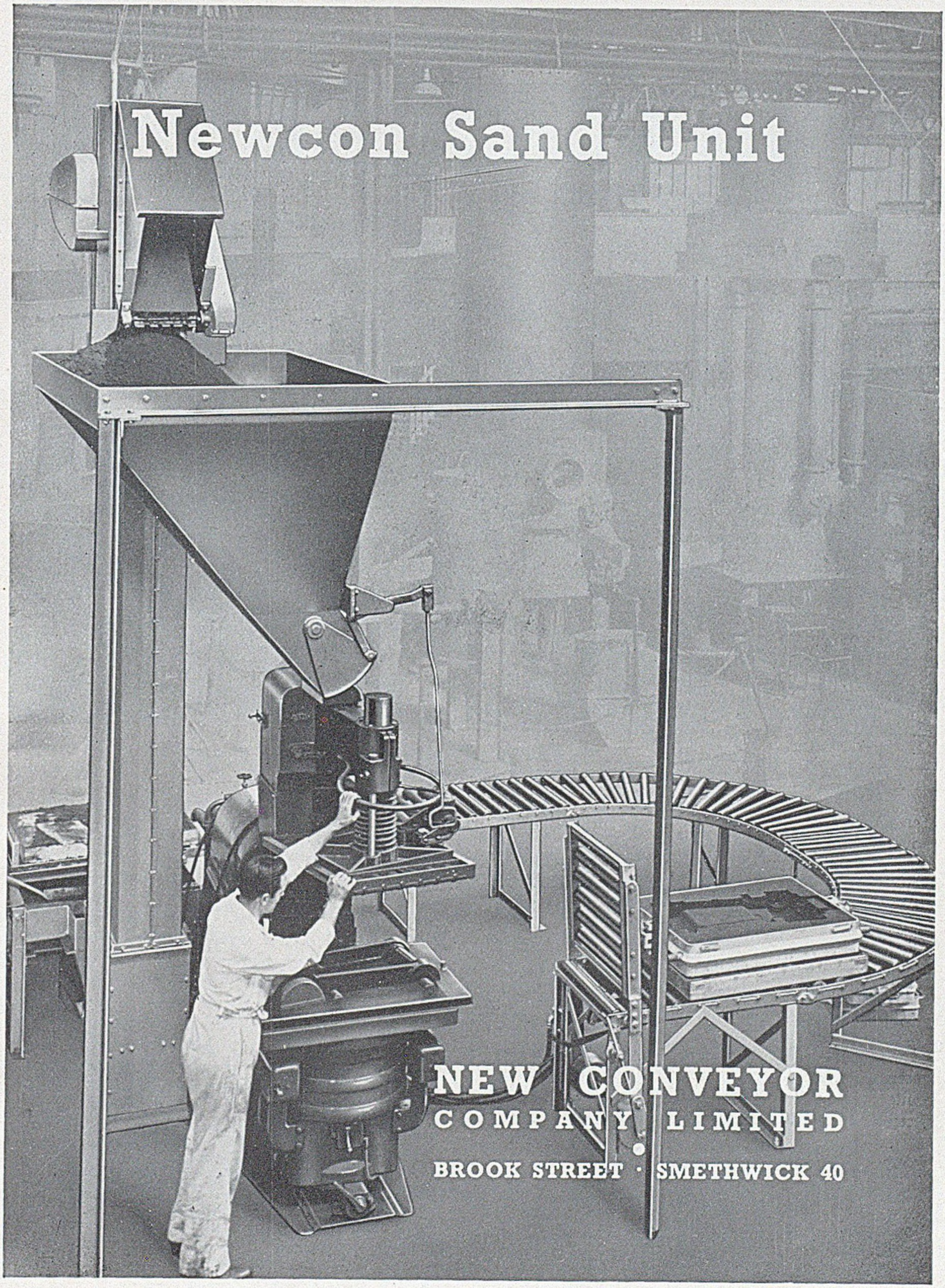
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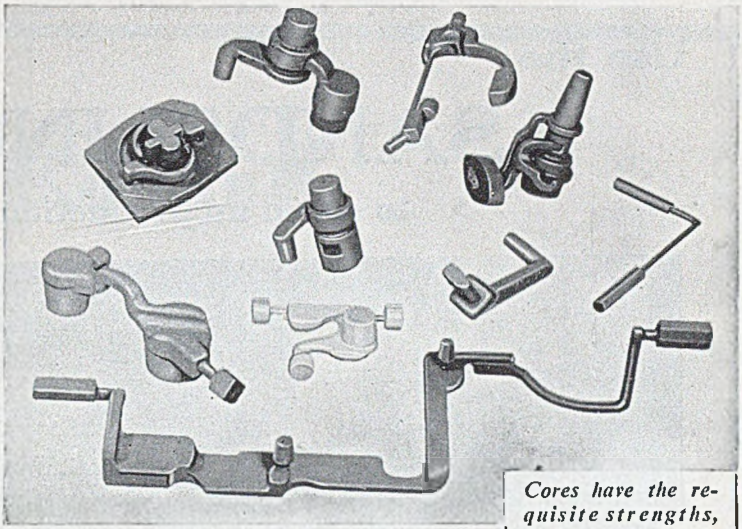

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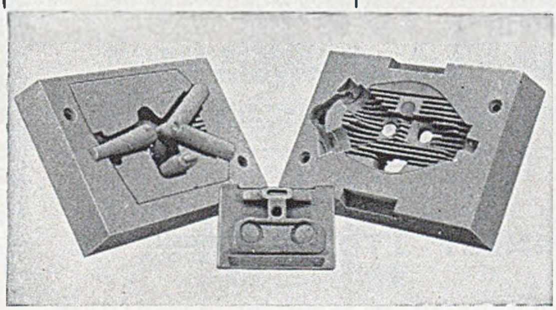
Intricacy and accuracy with Glyso in the sand mix for this mould and core assembly.



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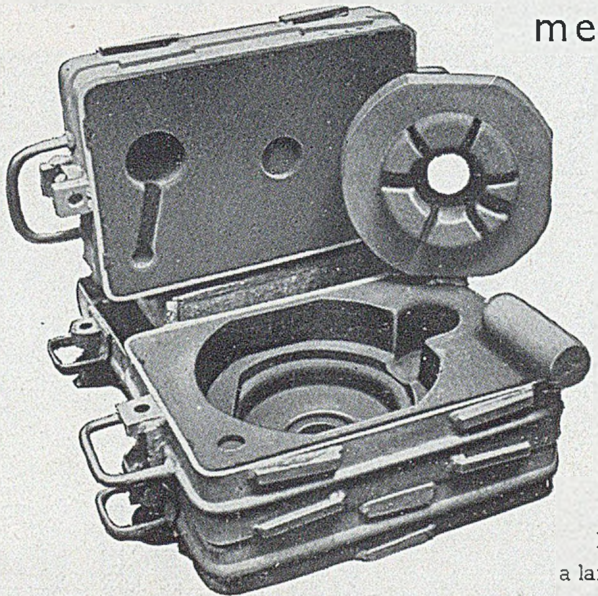

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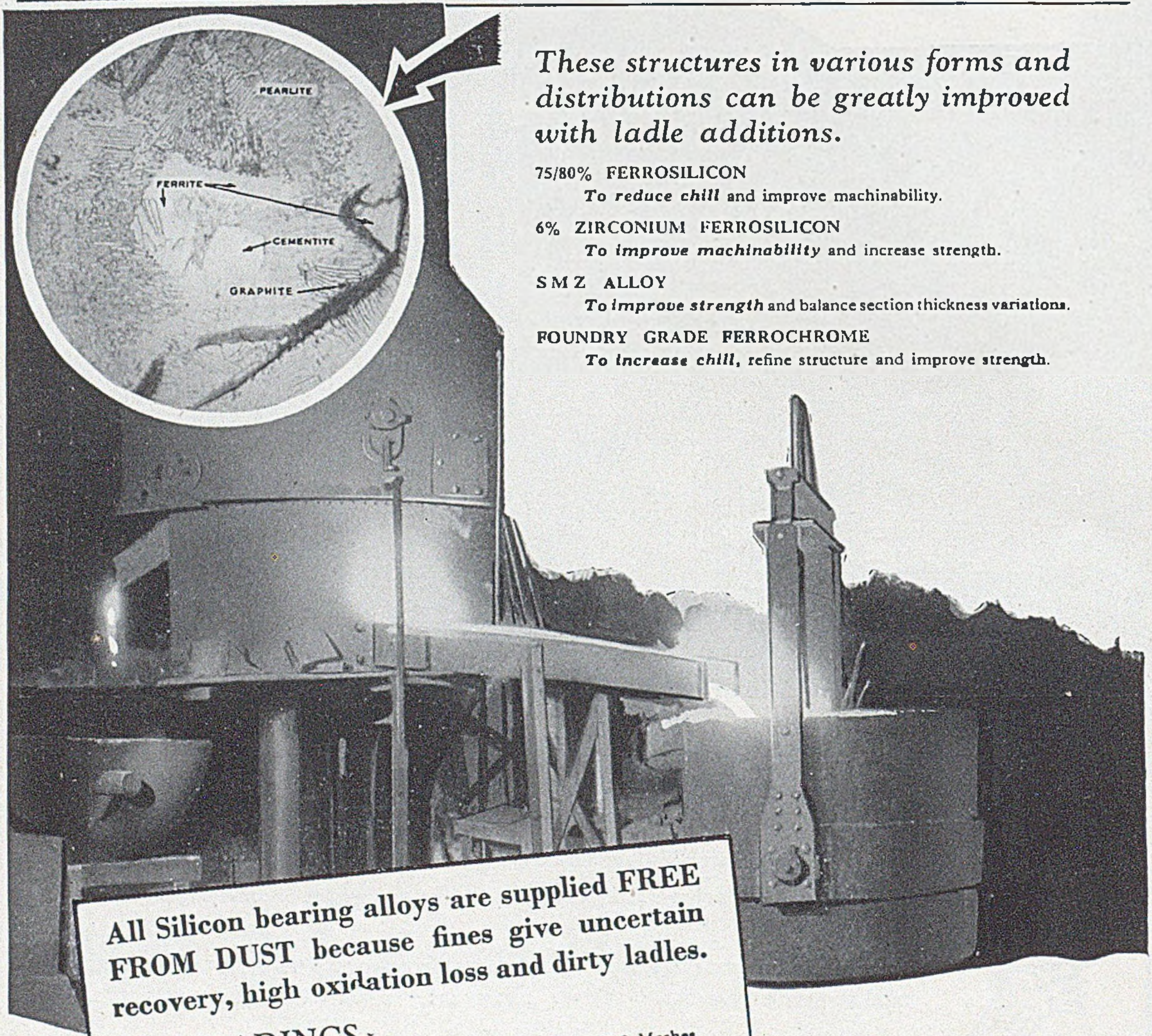
GRADED ALLOYS for LADLE ADDITIONS . . .



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Magnetic Moulding Machines

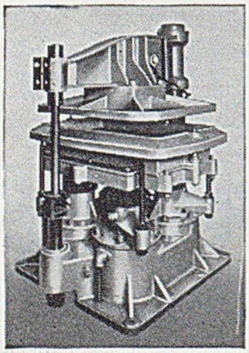
Operation and Applications

In foundries laid out for large scale repetition work moulding machines long ago proved their worth; today the advantages afforded by the Magnetic type of moulding machine are helping towards even greater efficiency and economy. These machines whilst frequently having a somewhat higher initial cost than other types of mechanical moulding machines gain by their low installation charge, negligible maintenance and the immense saving in running costs amounting to as much as £85 in twelve months.

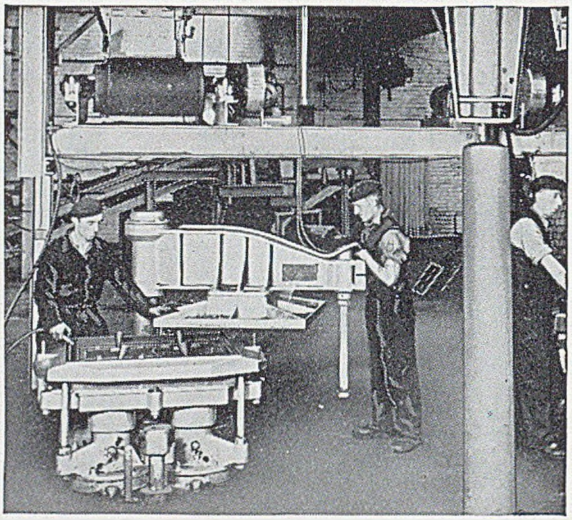
Moulding pressure in the magnetic types is applied through a D.C. solenoid. Apart from the cable connecting the machine to the power supply, there are no other connections, pipes or any exterior equipment, although a D.C. supply is of course essential. It is, in this respect, virtually self-contained, and, since there are few moving parts, requires very little maintenance.

Operation

No technical knowledge is required by the operator, for the machines are automatically controlled by a simple push-button system that is practically foolproof. When the push-button is released at the end of the pressure stroke the pattern is automatically stripped from the mould, the stripping speed being controlled by the rate of displacement of oil in the main dashpot. Electric vibrators are normally fitted which are energised momentarily immediately the "squeeze" push-button is released, to ensure that the pattern is stripped cleanly from the mould. Electric heaters (with 3-heat control switch) can be supplied to prevent the moulding sand from adhering to the pattern. The machines can usually be arranged to suit equipment already standardized for machine moulding methods. But it is, perhaps, on the evidence of power consumption-figures that the case for magnetic moulders presents its strongest argument. Unlike hydraulic or pneumatic machines where compression power must be maintained at all times throughout the shift, magnetic moulding machines only use electric power during the time the actual moulding stroke is being made—for perhaps $1\frac{1}{2}$ to 2 seconds. A typical example is quoted of a magnetic moulding machine producing 350 complete moulds in boxes 20″ x 12″ x $3\frac{1}{2}$″ deep, for an electrical consumption of approximately $3\frac{1}{2}$ units; a remarkable figure by any comparison. When a battery of machines is in use, the electrical control includes a sequence selector device to prevent the solenoids of two or more machines being energised simultaneously, thus automatically limiting the instantaneous power demand.



Down-sand frame magnetic moulding machine.



Magnetic moulding machine producing moulds for heavy cooker-frame castings

Types of Machine and Applications

The two most popular types in current use are the "Squeeze-strip" and "Down-sand Frame squeeze strip" machines. The former has a very wide and diverse application; the latter is particularly applicable to the production of moulds for flat or shallow castings where the box depth does not exceed 6 inches.

"Double-face Boxless" and "Roll-over" types are also manufactured to meet special requirements. Slight differences in the types of machine available enable manufacturers to choose a model most suited to their particular requirements.

The field of application is wide and includes the production of moulds for the components of gas, electric and solid fuel combustion cookers and stoves; industrial and agricultural machine parts, electrical fittings and instrument components.

Magnetic Moulding Machines are made exclusively by British Insulated Callender's Cables Limited in their Prescot factory; this organization also provide the customary "After Sales Service".

For those who wish to know more about the application of Magnetic Moulding Machines in the foundry, BICC have published detailed information (Publication 276 V) which is available on request to:

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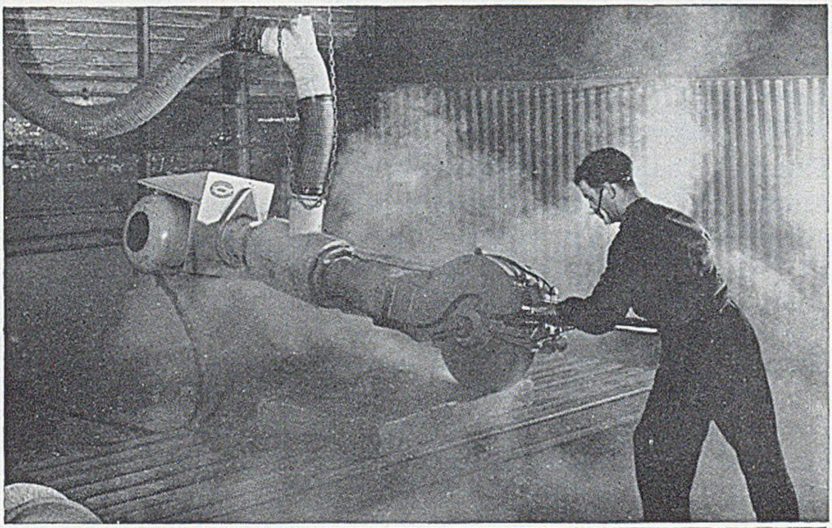

GRINDING
WOOD
WITH
EXHAUST
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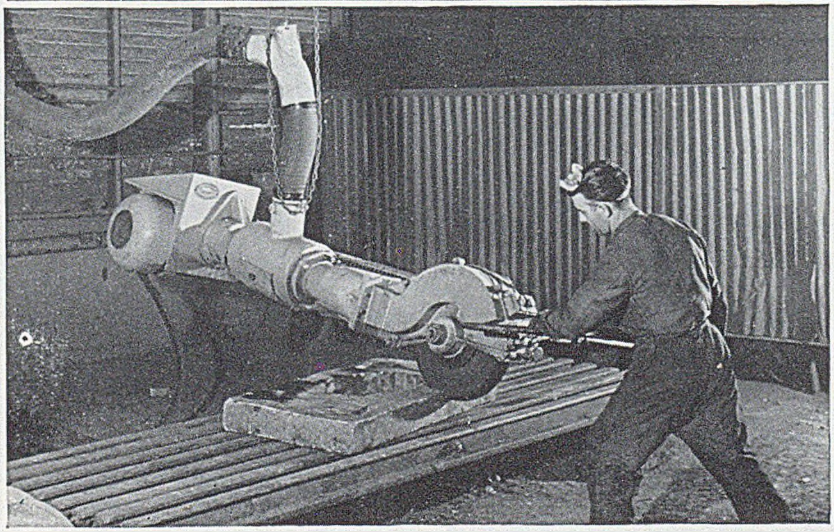

GRINDING
WOOD
WITH
EXHAUST
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Reproduced above are unretouched photographs taken by The English Steel Corporation Ltd., Sheffield, showing the machine grinding wood for the purpose of photographing the smoke produced.

The second photograph, not faked in any way, shows the remarkable extraction achieved.

This grinder has been designed and built as a result of experiments over four years on an entirely new theory of dust extraction.

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A Record of Service

The recently issued annual report of the Council of Ironfoundry Associations* is one of the most important documents to be placed before manufacturers of cast iron, as it deals with questions vitally affecting the welfare of every firm in the industry. It gives convincing proof of the necessity for such an organization to guard the interests of the iron founder against the ever-increasing legislative burdens being imposed upon the industry. The year covered by the report was perhaps the most important since the C.F.A. came into existence, because not only was there the Iron and Steel Bill but additionally the "Draft Iron and Steel Foundry Regulations, 1953." Whilst not all foundries agreed that the handling of these matters was perfect, the inescapable fact that emerged was the need for a strong and representative employers' association.

The final outcome of the recent Bill is now shown to be not too onerous and the new Board will, we are sure, have the cordial support of the whole industry. The "foundry regulations" should by now have been studied by all foundry concerns and if the managements have been wise, they will have registered their objections where the clauses are impossible or too difficult to operate. Such objections, when they are sent to a co-operative organization, have a good chance of being reinforced by others similarly placed and so help to create a much stronger case than can be made out by one (or even severally presented) individual cases. These activities are just extra to the normal day-to-day work of the C.F.A. Transport is a subject that is constantly the cause for investigation and representation. The raw-materials market, also, comes in for regular study and the case cited of an ample supply of coke associated with local shortages is typical of the need for co-operative action.

Costing is always to the forefront of the studies of the Council, as a really widespread knowledge of what it really costs to make a casting goes a very long way to arresting uneconomical price-cutting and materially reduces the pressure of the staff at Carey Street. The educational work, recruitment and similar activities are noteworthy and in the long run will give results to the great benefit of the whole of the foundry industry. It should be remembered that a high proportion of the work done by the C.F.A. is voluntary and the industry is really grateful to those firms and individuals who at no little cost to themselves work for the general good of the industry. Yet the work of the Council is such that it needs more than gratitude. It requires the support of those firms, large and small, who are content to let others carry a load. It is only common justice that such support should be wholeheartedly accorded.

* Extracts shortly to be printed.

Re-purchase of Steel Interests

G.K.N. Still Interested

In the near future the company expected to be invited to discuss the possibility of the return to its ownership of iron and steel works previously connected with the group, said Mr. J. H. Jolly, chairman, in his statement, dated May 12, accompanying the annual report and accounts of Guest, Keen & Nettlefolds, Limited, for the 53 weeks ended January 3.

He reminds shareholders that he said last year that the Board would be interested in purchasing those works subject to fair financial terms on reacquisition and the extent to which free enterprise might be allowed. That was still the directors' purpose providing the conditions, which were of paramount importance, could be satisfied. They believed that under management the costs of steel production would be less, and its quality for its manufacturing companies would be better than under nationalized control. The matter would be decided in the light of the terms offered to the company, and the conditions as they affected the iron and steel trade today.

Total compensation received by the company for the transfer of securities to the Iron and Steel Corporation was £18,700,000.

Cammell Laird and English Steel

Until it was known what interest could be acquired in the English Steel Corporation, Limited, and upon what terms, the Board could not decide whether the re-acquisition of such an interest was desirable or not, said Mr. J. C. Mather, chairman of Cammell Laird & Company, Limited, Birkenhead, at the company's recent annual meeting. He said that the possession of a substantial interest in such a concern had obvious advantages for the company. He hoped that necessary information on which to make a decision would be obtainable without much further delay.

Urging the shipbuilding and engineering unions to reconsider their claims for higher wages, Mr. Mather stated that orders for the wagon-building department had fallen off during the last three or four months, due largely to lack of purchasing power and exchange difficulties. In addition, foreign competition was increasing.

Essential Imports into Brazil

Brazil's new exchange law, in force since February 21, reserves the official exchange rate (52.41 cruzeiros to £1) for imports of essential raw materials, machinery, and equipment, listed in accordance with the Brazilian Customs Tariff. Raw materials include unspecified metallic minerals; iron and steel and alloys thereof; copper, aluminium, lead, zinc, and nickel, finished and semi-finished; coal, coke, and briquettes, and sub-products.

Under machinery and vehicles are included:—Farm machinery and implements; equipment for well-drilling, mining, and metallurgy; tractors; axles, gears, flywheels, pulleys, cylinders, and other transmission parts for machines; locomotives, electric trains, and accessories for railway rolling stock; unassembled jeeps; motor and sailing vessels of over 500 tons; aircraft; floating dredgers and cranes.

The list of manufactures includes iron and steel sheet and rolled products, stainless steel tubes, pipes and accessories, wire, barbed wire, steel wire rope, unfinished rails, and tools.

Merchandise not considered strictly essential, such as private motor-cars, may be imported at the free exchange rate.

The free exchange rate is now around 105 cruzeiros to £1, subject to exchange availabilities.

Foundry Coke Merchants' Association

The annual general meeting of the Foundry Coke Merchants' Association was held at the Waldorf Hotel, London, on May 21, preceded by a luncheon, which was well attended by members and guests. The chairman, Mr. Arnold Carr, of Thos. W. Ward, Limited, Sheffield, in a pleasing speech welcomed the guests, amongst whom were numbered representatives of the producers and the Ministry of Fuel. Stressing the friendly relations between his department and the distributors, Mr. H. H. Prosser, of the National Coal Board, replied on behalf of the guests.

The meeting which followed was addressed by the retiring chairman, Mr. Arnold Carr, who gave a résumé of the year's work and progress. Mr. Arnold Carr, who was one of the founders of the Association, had been its chairman by annual election since its inception. It was greatly regretted by the committee and members that he felt it necessary at last to retire from the leadership.

Mr. R. J. McDonald, of McDonald, Muter & Company, Limited, London, was elected chairman for the ensuing year and emphasized in his address to the meeting that the primary object of the Association was the welfare and promotion of the interests of its members in the marketing of foundry coke. There were a number of merchants vending foundry coke who, regrettably, were not members of the Association. The larger the membership the greater would be the chance of improving the interests of all concerned. Mr. McDonald, on behalf of the Association, thanked Mr. Carr for all the splendid work he had done during his many years of chairmanship, particularly during the difficult war years in helping to keep the foundry coke trade cemented together and free from undue interference.

Mr. Arnold Carr was elected vice-chairman of the Association and the retiring members of the committee were re-elected *en bloc*, as were the other officers. Mr. J. J. Selby, of Charringtons, who was elected chairman of the London branch at a previous meeting, reported on the year's work of the London section. A warm tribute was paid to Captain Treharne, of Crooke & Company, Limited, on his retirement from the chairmanship of this branch after several years of able leadership. The annual dinner of the Association is to be held in February next year, at the May Fair Hotel, London.

T.U.C. Members on Steel Board

However much the trade union movement might dislike the change in the control of the steel industry, the fact remained that denationalization had taken place and the trade unions still had to care for the interests of their members, said Mr. Arthur Deakin, general secretary of the Transport and General Workers' Union, at Newport (Monmouthshire), recently. Addressing the annual trade conference of the tinplate and galvanized section of the union, he said: "I think denationalization was a grave mistake, but we have got to take care of the situation in the best way we possibly can."

Mr. Deakin referred to some who had criticized their colleagues, in particular Sir Lincoln Evans, for joining the Iron and Steel Board. He said that the trade union leaders of Britain could at least claim not to engage in the doubtful exercise of sacrificing the best interests of their members by refusing to face the hard economic facts of life.

Pressure-cast Aluminium Pattern Equipment*

By D. H. Potts

After first dealing in outline with spheres of application of aluminium pattern equipment made by the pressure-cast plaster process, the Author next indicated advantages and the ranges of type and accuracy of patterns which could be produced. The second part of the Paper was a step-by-step account of the Author's earlier work in this field†. The third part was an account of the making of a double-sided patternplate having two impressions (cast integrally with the plate) and a step joint. This represented present-day practice at the Author's foundry. The considerable discussion both at London and Birmingham, which is recorded, disclosed a most lively interest in the whole development.

The manufacture of aluminium pattern equipment by the pressure-cast plaster process can be of considerable assistance to the jobbing founder by providing inexpensive and accurate pattern equipment suitable for machine moulding, core-blowing and other mechanical methods of production. One of the main factors limiting general adoption of these methods has previously been the cost of the necessary equipment. When the cost of this is brought down, so falls in almost direct proportion the quantity of castings required to off-set the cost of repetition-type patterns. It is in this field that the plaster process should be exploited to its fullest extent.

* Paper presented to the London and Birmingham branches of the Institute of British Foundrymen. The Author is associated with the Westinghouse Brake & Signal Company, Limited.

† This part of the Paper is not reproduced here. Substantially, it formed a contribution presented jointly by the present Author and E. C. Mantle, M.Sc., to the Brass-foundry Productivity Conference, printed in the JOURNAL for July 31, 1952.

Almost any type of pattern can be made by the process to be described, but the major savings occur when making multiple-impression plates, patterns and patternplates with stepped joints, and matchplates. By this plaster process, aluminium matchplates can be made cheaper than any other type of pattern suitable for machine moulding, and in America, where the plaster process is well established, many foundries have adopted matchplate moulding on jolt-squeeze machines as the standard method of production for small and medium-size castings, irrespective of the quantities involved. By so doing, they have achieved a standard method of patternmaking and mould production, whilst still maintaining the degree of flexibility so necessary to the jobbing foundry.

With matchplate moulding, the machine moulder

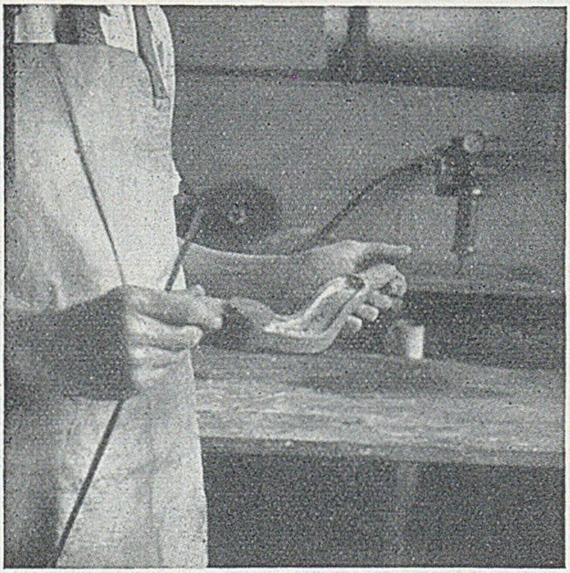


FIG. 1.—*The Master Wooden Pattern is examined for Finish and the Moulding Joint Line decided upon.*

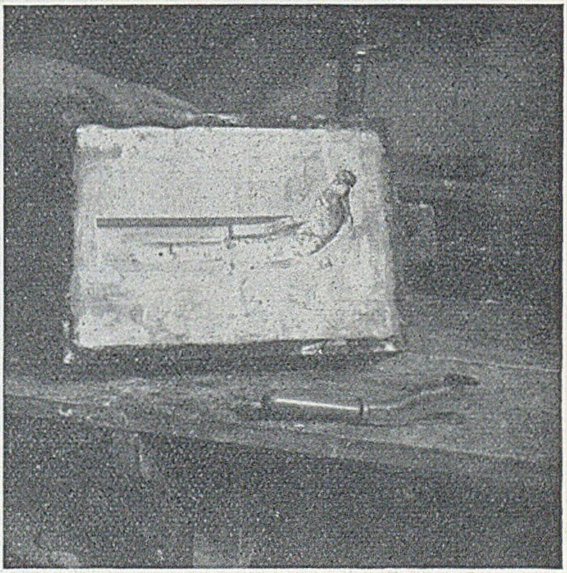


FIG. 2.—*A Rough Odd-side is prepared in ordinary Plaster of Paris by Gouging out to take the Pattern.*

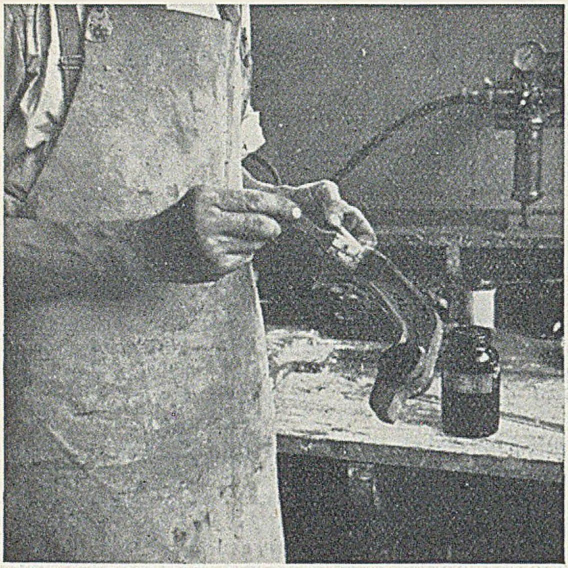


FIG. 3.—*Pattern and "Master" Odd-side are treated with a Parting Fluid consisting of One Part of Petroleum Jelly and Two Parts Kerosene.*

makes a complete mould and cores-up in a single cycle of operations. Thus, the operator with his machine becomes a complete unit around which can be built a simple and effective layout. This can be added to, until sufficient capacity has been created.

Outline of the Method

The process also lends itself to the smaller unit as well as to the large concern, in that relatively little expensive equipment is required. Basically, the method consists of moulding the required pattern in a plaster which will withstand the temperature of molten aluminium and impart a good finish to the castings. These moulds are then stoved and made ready for casting. On top of the mould is fixed a receiver, which is sealed off from the mould by a thin asbestos disc. Metal is poured into the receiver, and a cover is placed into position, which is then connected to a low-pressure air line. The air supply is turned on, the pressure breaks the seal and the mould is cast and held under pressure, until the metal has solidified.

By casting under these conditions, very fine definition of the master pattern is obtained, and almost all the normal finishing operations and machining are eliminated. No rapping of the master pattern is necessary to assist withdrawal from the plaster mould. The finished castings are, therefore, a very accurate reproduction of the original master pattern. When making a multi-impression job, where all the patterns are cast integral with the plate, each impression is formed from a single master pattern. Thus, from the previous remarks, it will be appreciated that each impression and finished metal pattern must be identical and providing the master pattern and the corresponding coreboxes have been made accurately, good core fits are bound to follow.

Irregular or step-jointed patterns and pattern-plates can be made almost as easily as can flat-jointed ones. Neither block cores to pick up the joints, nor costly machining operations are required. Aluminium coreboxes suitable for core-blowing can be made with equal ease, and this tends to balance the foundry production rate of core and mould making.

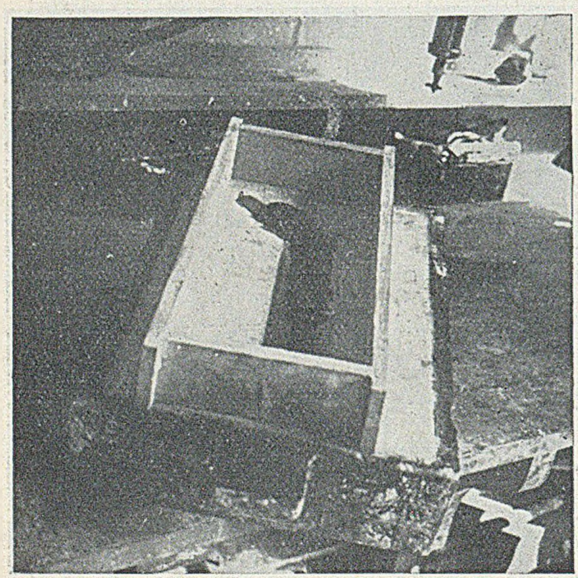


FIG. 4.—*Pattern placed in the Odd-side and Framed ready to form the Production Odd-side.*

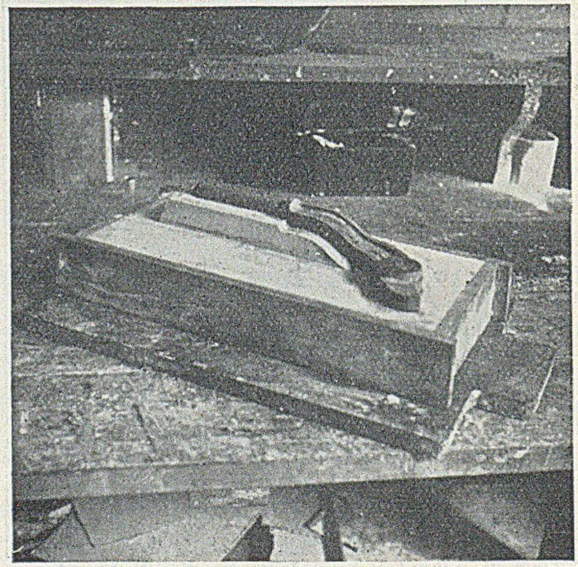


FIG. 5.—*Production Odd-side in Metal-casting Plaster, Production Impressions can next be formed.*

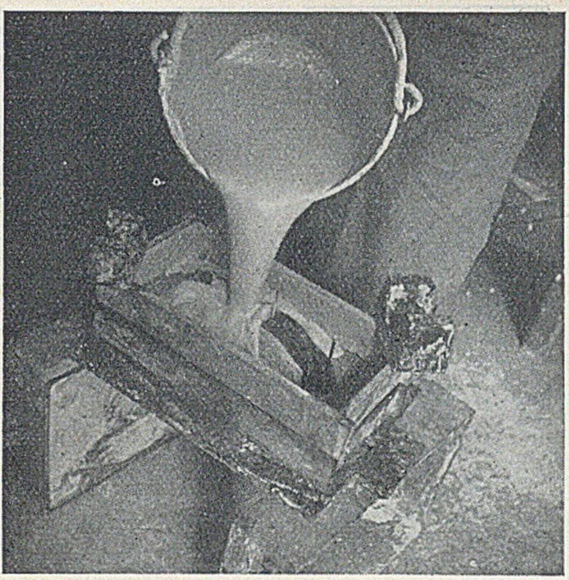


FIG. 6.—*Pouring the First Half Production Impression. Nails are placed in the Pattern to Assist Withdrawal, and to form Vents.*

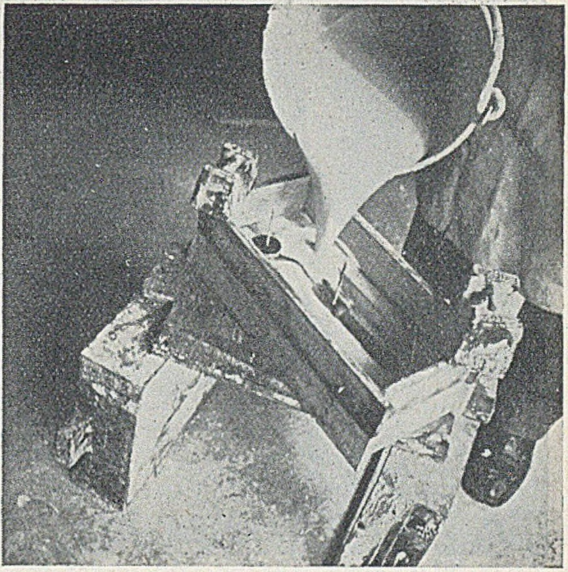


FIG. 7.—*Using the First Half Production Mould; its Opposite Half is formed from it in exactly the Same Manner. One Complete Mould has then been formed.*

The key to the system is the plaster, and thanks to the co-operation of the British Plaster Industry, a suitable plaster has now been developed in this country which is equal in all respects to that available in America. There is now no reason why this method of patternmaking should not take its place beside the older and more accepted methods, and be developed to its fullest extent.

PRESENT-DAY SEQUENCE OF OPERATIONS

What follows is a running commentary on the making of a double-sided moulding plate (having two impressions cast integrally with the plate) and a step joint. The description outlines the cycle of operations followed under production conditions, and using the single wooden master pattern (Fig. 1), operations in producing the moulding plate (Fig. 18) are described. Information regarding the plaster itself, stoving times, parting agent, etc., is given in the Appendix.

"Master" Odd-side

Initially, the master pattern is examined for finish and the joint-line is decided upon, Fig. 1. It is essential that the finish on this pattern be of a high standard, as any inaccuracy or blemish will be reproduced faithfully. The pattern should be treated with one or two coats of good-quality, water-resistant, clear varnish. Next, using ordinary plaster of paris, a rough odd-side, known as the "master" odd-side is prepared (Fig. 2). Little time need be spent on this, as it is used only once and then discarded. The pattern is then treated with a parting agent (Fig. 3). A better method than brushing is to use a spray, as a much finer distribution is possible.

The pattern is placed on the "master" odd-side (Fig. 4) and the joint made good with modelling clay. The face of this odd-side is treated with the parting agent. A wooden frame is then placed on the "master" odd-side, and a further odd-side is poured in metal-casting plaster. This double procedure is necessary in order to get a first-class joint and to pick up accurately the location from the

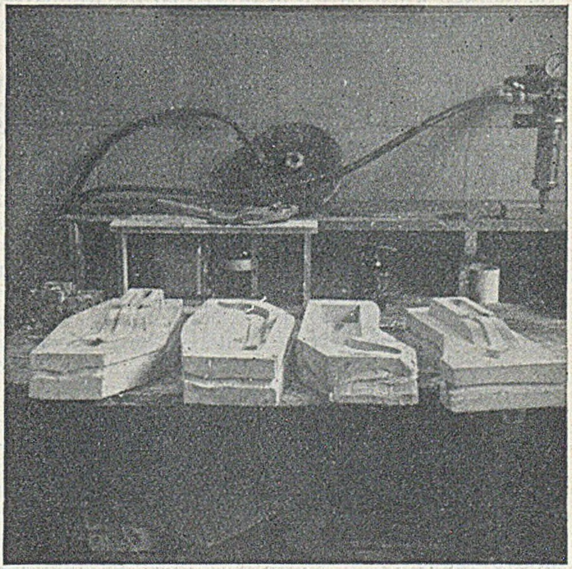


FIG. 8.—*Individual Moulds are trimmed on the outside to fit into the Area of the Matchplate. Grooves are also cut round the Outside to key them into the Complete Mould.*

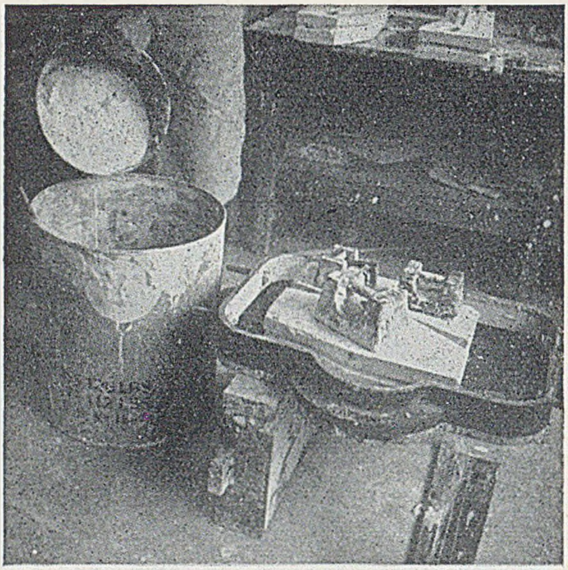


FIG. 9.—*First Half-mould assembled on a Machined Plate ready for Pouring. If possible it is better to mix the whole amount of Plaster in one Container.*

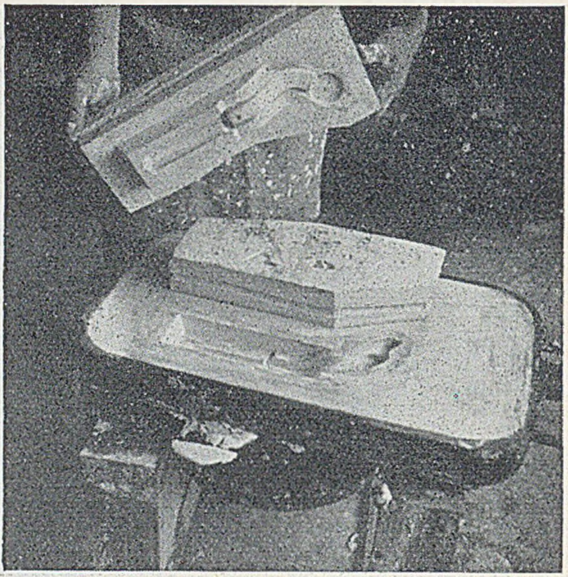


FIG. 10.—*First Half-mould turned over and touched-up where necessary. Next, the other individual moulds are placed into position for Casting in Plaster, a Step-joint forming the Location.*

step joint. This odd-side (Fig. 5) is known as the production odd-side.

Use of Production "Odd-side"

Using the production odd-side, a series of individual moulds are prepared in metal-casting plaster (Figs. 6 and 7). As each mould is completed, the corresponding tops and bottoms should be marked when parted in order that the top halves can be assembled with the correct bottom halves in subsequent matching operations.

The steps taken in forming the individual moulds are as follow:—Starting with the production odd-side (Fig. 5), the face of this is treated with the parting agent and a wooden frame is placed in position (Fig. 6). One or two nails are tapped gently into the pattern to form vent holes through the plaster mould. These holes are subsequently used when withdrawing the pattern, for, by blowing air down them, the vacuum between the plaster and the pattern can be broken and the pattern withdrawn without rapping. Thus a very accurate impression of the original master-pattern is formed. The metal-plaster slurry is prepared, and the one half of the first individual mould is poured.

After setting, the production odd-side and half-mould are parted. Using the first individual half-mould, the corresponding matching half is cast on it. Thus one complete individual mould is formed in metal-casting plaster. Each individual mould will in this case form only one impression, and the above sequence of operations must be repeated until sufficient individual moulds have been made to cast the number of impressions required on the production plate. In this case, two sets of individual moulds must be made.

Having made the individual moulds, they are trimmed to size to fit within the moulding area of the production plate. Grooves are cut round the outside (Fig. 8) to act as a keying system when the individual moulds are formed into a complete half-mould.

First Half-mould

Using the two centre individual moulds (see Fig.

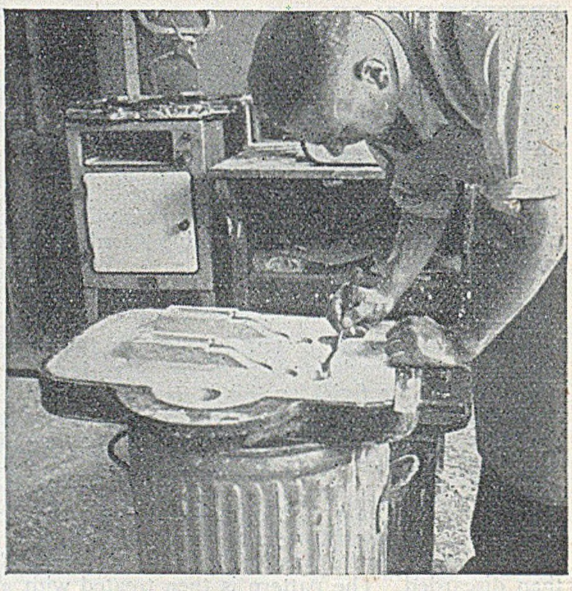


FIG. 11.—*Any Gating System required is at this stage cut into the Plaster Half-moulds, but a better way is to incorporate Wooden Runner Patterns.*

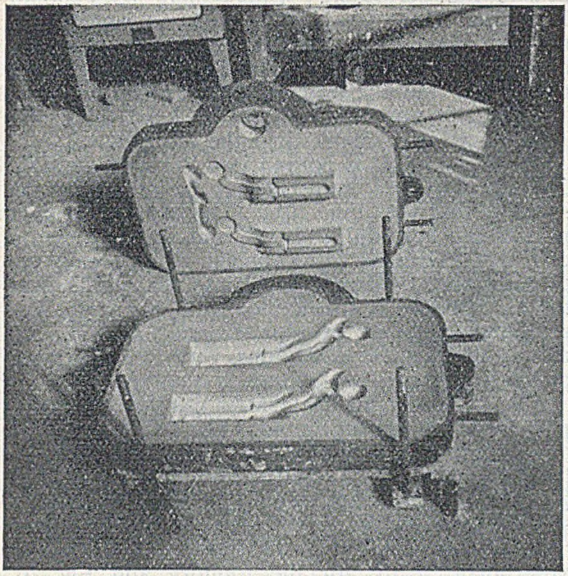


FIG. 12.—*Mould made ready for casting (after Stoving) by bolting the Unit together.*

7), the first complete half-mould is formed. For this, the individual half-moulds are placed face downwards on an accurately-machined plate, which has been previously treated with the parting agent. The moulds are weighted, and the moulding box is set around them. The location holes of this box should be bushed in order to maintain accuracy. This mould is now ready to be poured.

In Fig. 9, left, the metal-casting plaster is shown being prepared. Sufficient plaster to form the one half-mould should be mixed in one container. These containers should always be kept clean, and fresh water used each time. When set, the individual half-moulds will be held in position by the grooves.

Second Half-mould

The first half-mould is turned over, touched up if necessary and the face treated with the parting agent. The corresponding individual half-moulds are next positioned (Fig. 10). The individual moulds are in this case located by means of the step joint. If there were no step joint, a dowelling system would have been incorporated at the earlier stages.

To form an accurate dowelling system, two or three steel rods are cast vertically in the first individual half-mould. The length of these rods should be twice the depth of the individual moulds, so that, when the first half is set, the rods can be pushed upwards. A wooden frame is then placed on this half-mould, and the corresponding half is poured in the normal way. When set, the rods will have formed location holes in the two half-moulds, which can be used throughout subsequent operations accurately to locate the individual moulds.*

Gating and Stoving

The two half-moulds having been formed, the gating system required by the foundry can be cut in the plaster (Fig. 11). A better method, however, is to have wooden patterns for the gating system, so that this can be formed when pouring the plaster moulds. The moulds are then ready for stoving.

After stoving, and whilst quite hot, the moulds are made ready for assembly. For this, the

* Another dowelling system is described and illustrated in "The Brassfoundry" Productivity Report, pages 61 to 65.

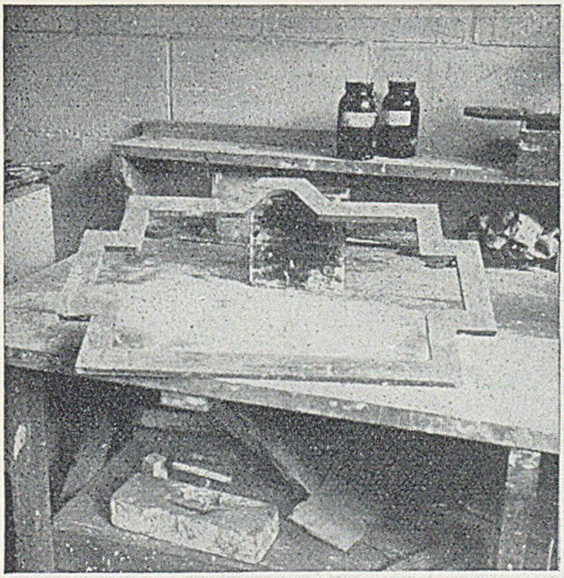


FIG. 13.—*Steel Frame placed between the Two Half-moulds to form the Shape and Thickness of the Matchplate.*

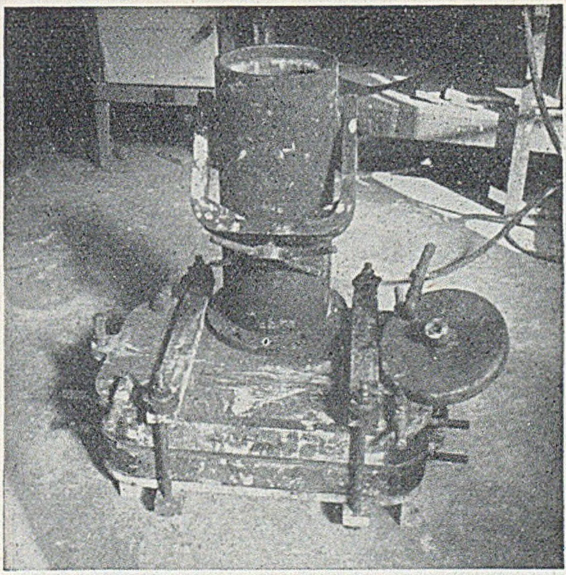


FIG. 14.—*Mould assembled ready for casting. On top of the Mould is fixed a Top Plate to which is attached the Metal Receiver.*

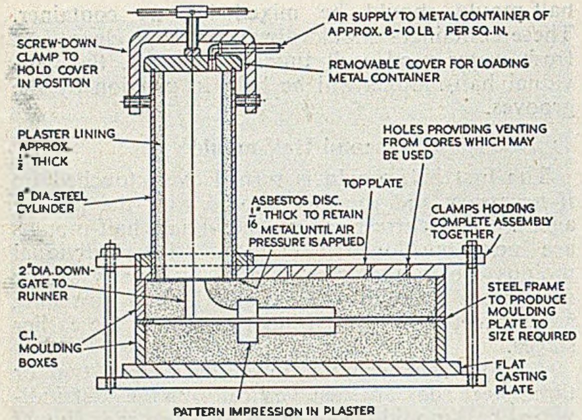


FIG. 15.—*Sectional View of the Pressure-casting Equipment used for Aluminium Matchplate Production.*

bottom-half is placed on a bottom-board and bolts are positioned to hold the assembled mould and casting unit in position. A steel frame (Fig. 13) is placed between the half-moulds to form the thickness, and size of the actual moulding plate. Hollow steel bushes are used to locate the two moulding boxes so that bolts may be passed through the bushes if necessary to hold the unit more firmly, and prevent metal " flash " at the mould joint, when pressure is applied.

Assembly and Pouring

The casting unit is now assembled and made ready for pouring (Fig. 14 to 17.) This unit is also shown diagrammatically in Fig. 15, and consists of two half-moulds between which is fixed the steel frame (Fig. 13); a top-plate to which is attached a metal receiver—connected to a low-pressure air line at 6 to 8 lb. per sq. in. A number of holes should be drilled in the top-plate to assist in venting the mould. Between the mould and the top-plate an asbestos disc is pinned, between the downgate to the mould and the bottom of the metal receiver. This disc is approximately $\frac{1}{16}$ to $\frac{1}{8}$ in. thick and 1 in. larger in diameter than the receiver.

When the metal is poured into the receiver (Fig. 16) it is prevented from entering the mould by the asbestos disc (see Fig. 20). The top cap is then placed into position (Fig. 17), and an air pressure of 6 to 8 lb. per sq. in. is applied. This breaks the asbestos seal, the metal flows into the mould, and the air pressure is maintained until the metal has solidified—a matter of approximately 20 min. By casting under these conditions, very fine definition of the original master pattern is obtained.

Fig. 18 shows the plate after casting and stripping from the plaster mould. The triangular piece on the left of the plate is the runner, coupling up the plate to the metal receiver through a 2-in. downgate. Sufficient metal should be used to leave a slug of metal in the receiver 3 to 4 in. deep after running the plate. Fig. 19 shows the completed patternplate ready for the foundry and, Fig. 20, two production castings produced from the plate. These are unfettled and indicate the accuracy of the pattern equipment, as there is little flash and no sign of a lap joint.

APPENDIX

Parting Agents:

So far, three parting agents have been tried by the Author; details of these are given in order of merit. The best method of applying the parting agent is by means of a spray gun, as a much more even distribution is possible:—

(1) Petroleum jelly 1 part; kerosene 2 parts (by weight).

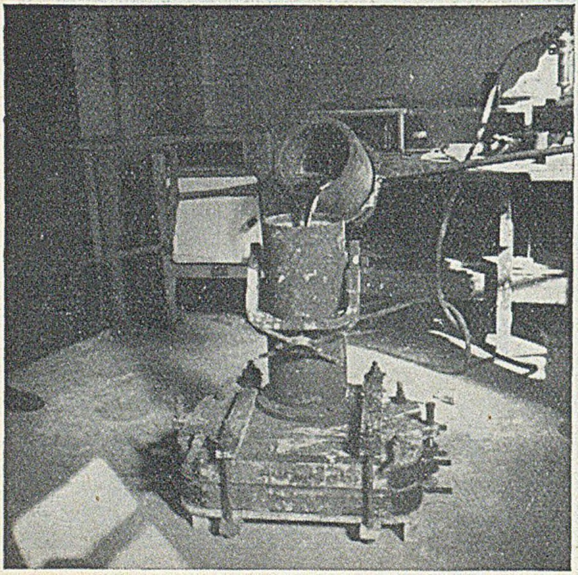


FIG. 16.—*The Receiver is filled using Metal at as low a Temperature as possible*—600 *to* 620 *deg. C.*

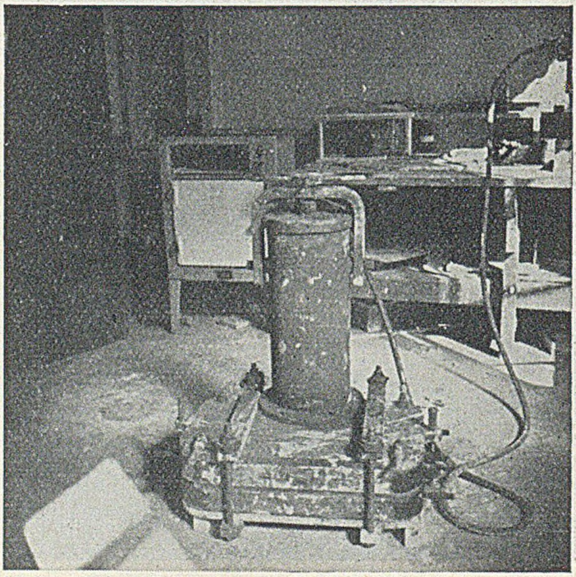


FIG. 17.—*After the Receiver has been filled, the Cover is put on and coupled to a Low-pressure Air Line.*

(2) 6 oz. Stearic acid; 3 pints kerosene (hot) and 1/10 oz. of "Aerocol."

(3) Ordinary light machine-oil; (this was used during preliminary experiments only).

Preparation of Plaster Slurry:

Only sufficient plaster for immediate requirements should be mixed. The preparation of the plaster is one of the most important steps in the process. Containers should be kept clean, and fresh water used for each mix. The water and plaster must be measured accurately and the plaster trickled into the water whilst stirring gently. This will prevent formation of lumps, and entrapment of air in the slurry.

Mix: Water 125 and plaster 100 parts (by weight).

Stoving:

This again is an operation over which control must be exercised. The final stoving temperature should not exceed 210 deg. C. (410 deg. F.). The moulds should be held at this temperature for at least 10 hrs., and should be taken up gradually, *i.e.*, 200 to 250 deg. F. for 3 hrs. followed by 300 to 350 deg. F. for 3 hrs. and then up to the final temperature.

Metal:

Both L.33 (L.M.6) and D.T.D.24 (L.M.4) aluminium alloys have been used for casting matchplates. All the usual precautions should be followed when handling these alloys. Metal pouring temperature should be kept very low and should not exceed 610 deg. C.

Contraction:

Provided the plaster has been mixed and stoved correctly, it will neither expand nor contract and the usual double contraction for metal-pattern equipment of 1/60 between the master and aluminium pattern equipment may be used, to which is added the contraction for the production castings.

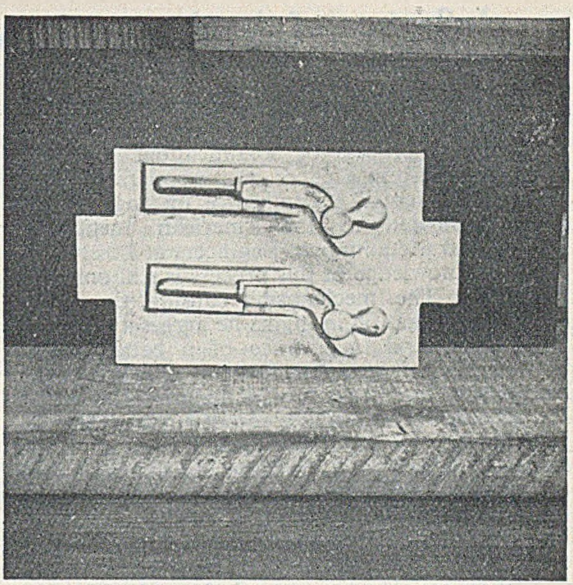


FIG. 19.—*Matchplate after being wire-brushed only, no other Dressing being necessary.*

Air Pressure and Asbestos Disc:

The air pressure should be kept low at 6 to 8 lb. per sq. in. The asbestos disc is made of soft asbestos approximately $\frac{1}{16}$ in. thick. This thickness may have to be varied to suit the size of the receiver, and the amount of metal being cast.

All the experimental work on this process of producing patterns has been carried out at Westinghouse Brake & Signal Company, Limited, and the Author gratefully acknowledges permission to publish the account.

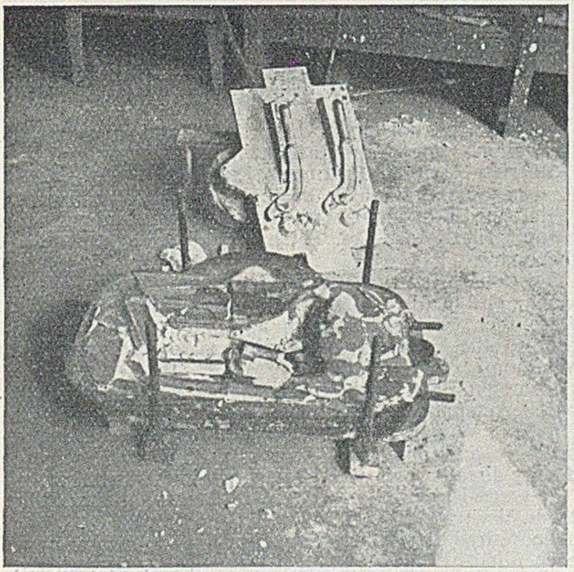


FIG. 18.—*Matchplate stripped from the Plaster Mould. Vents from the High Spots can be seen.*

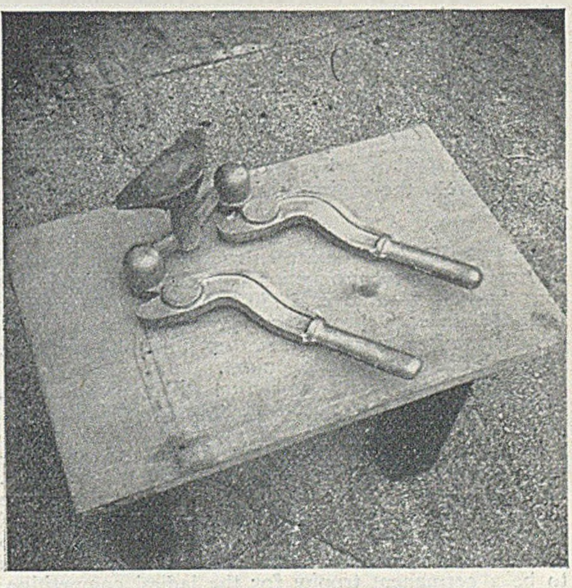


FIG. 20.—*Two Production Castings made from the Patternplate Described.*

Influence of Accelerated Solidification on Soundness

It has long been recognized that the internal soundness of steel masses is principally dependent on the process of solidification, but, states Edgar Marburg in a paper on "Accelerated Solidification in Ingots: Its Influence on Ingot Soundness," presented to the American Institute of Mining and Metallurgical Engineers at Los Angeles recently, knowledge of this process is still only fragmentary. The mechanisms causing the several types of segregation in ingots he agrees are not well understood, and in absence of a better conception of the solidification process, it seems to him hardly surprising that mould design varies widely. He proceeds to describe a recent study of the subject carried out at Homestead Works of United States Steel Company, pointing out that as a result of reconstructing the complete solidification patterns of a big-end-up and a small-end-up ingot, including the zones of accelerated solidification, the conclusion is reached that in both ingots a core of vertical solidification extends from the base cone to the hot-top junction and that solidification proceeds vertically rather than transversely, as has been previously assumed. New mechanisms for segregation in ingots are therefore suggested.

Little improvement in internal quality of the ingot may be anticipated from increase of taper beyond those now used in current design. Further, there appears to be an optimum mould-wall thickness for each ingot size to result in maximum width of vertical core at the top of an ingot. The weight of some moulds of current design, particularly those for large ingots, appear to be too heavy from the viewpoint of both quality and economy. Departures from current mould design should, the author thinks, be considered. These should be aimed at increasing rates of vertical (relative to those of transverse) solidification in ingots.

The decline in the group trading balance of the Consolidated Zinc Corporation, Limited, London, W.1, for the year 1952, from £7,307,729 to £3,169,933, reflects mainly the fall in prices of lead and zinc, says Mr. J. R. Govett, the chairman, in his statement with the accounts.

Australia to Increase Steel Production.—An increase in Australia's steel production from just over 1,000,000 tons in 1951-52 to over 1,750,000 tons by 1955-56 is intended under a programme providing for the construction of blast furnaces, open-hearth furnaces, rolling mills, and a tinplate plant.

The increased home production will reduce imports, especially of finished steel from the United States.

I.B.F. 1953 Golf Meeting.—Further to our announcement of May 28, the committee of the I.B.F. Golfing Society have accepted with pleasure an attractive Coronation Challenge Rose Bowl presented by Mr. E. G. Evans, of the Birmingham branch, who is the present holder of the Handicap Cup. This is to be a permanent trophy for the ladies' competition, open to wives and daughters of members competing at the annual golf meetings.

Correspondence

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

Family Service Record?

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—In your issue of October 17, 1940, "Marksman," of "Random Shots," enquired "Can anyone beat this record of family service?" Well, here goes:—

I joined the Hill Top Foundry Company on June 10, 1914—39 yrs.' service.

My father, Arthur Bunn, was with this company, first as a moulder and then as foundry manager, with unbroken service for over 50 yrs.

My grandfather, Thomas Bunn, was a moulder and foreman with this company for an unbroken period of service of 60 yrs.

My great-grandfather, Alexander Bunn, served the company with unbroken service for over 50 yrs.

This is a family record in a direct line of unbroken service with the same company of at least 199 yrs.

I have not included any relatives of the Bunn family who also served the same company for very many years.

Yours truly,
THOS. BUNN,
Director and Works Manager.

Hill Top Foundry Company, Limited,
Anchor Works, Smith Road,
Wednesbury, Staffs.
June 8, 1953.

[The paragraph in question in the JOURNAL of 1940 read: "Can anyone beat this record of family service? A man named Wilson, who is this year celebrating his 65th year with the Jessop Steel Company, of Washington, is a descendant of a Jonathan Wilson, who went to work for the Jessops, of Sheffield, in 1774. Ever since that time there has been some member of the family with the same firm; thus the Wilsons can boast of 166 years with the same firm."—EDITOR.]

Board Changes

M.T.E. CONTROL GEAR, LIMITED—Mr. Sydney Player has resigned the chairmanship.

BRITISH NATIONAL ELECTRICS, LIMITED—Mr. David M. Hutton, general manager, has been appointed a director.

BRITISH ENGINEERS SMALL TOOLS & EQUIPMENT COMPANY, LIMITED—Lt.-Col. T. Child has been appointed to the board.

TREDEGAR IRON & COAL COMPANY, LIMITED—Following the death of Lord Aberconway, chairman, Mr. Alexander Grieve has been appointed a director to restore the number of directors to the required minimum.

SWEDISH BALL BEARING COMPANY—Mr. H. Hamberg has been appointed chairman in succession to the late Dr. Sven Winguist; Mr. J. Larsson has been appointed ordinary and managing director and Mr. I. Stenberg deputy-director and vice-managing director.

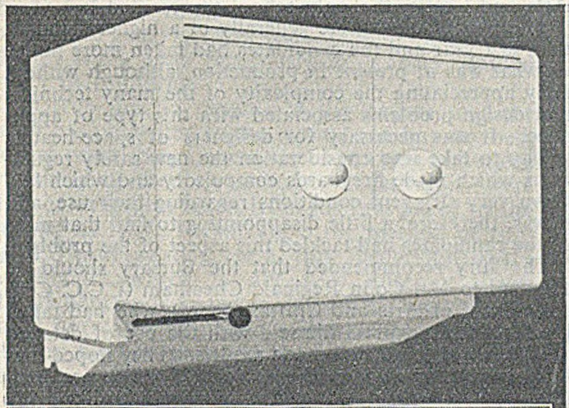
MASSEY-HARRIS, LIMITED—Mr. G. H. Thomas, Mr. M. F. Verity, Mr. R. H. Metcalfe, and Mr. H. W. Waite have retired from the board, and the vacancies have been filled by Mr. A. P. B. Anderson, Mr. G. Galletly, Mr. A. D. Mackay, and Mr. F. Milner, who has relinquished his appointment as secretary and is succeeded by Mr. W. K. Mountfield.

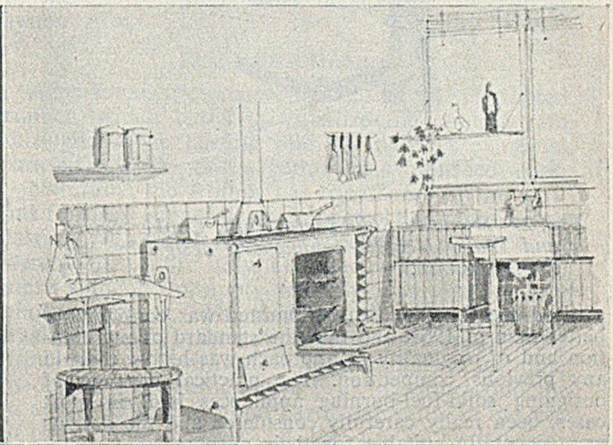
R.S.A. Bursaries Competition

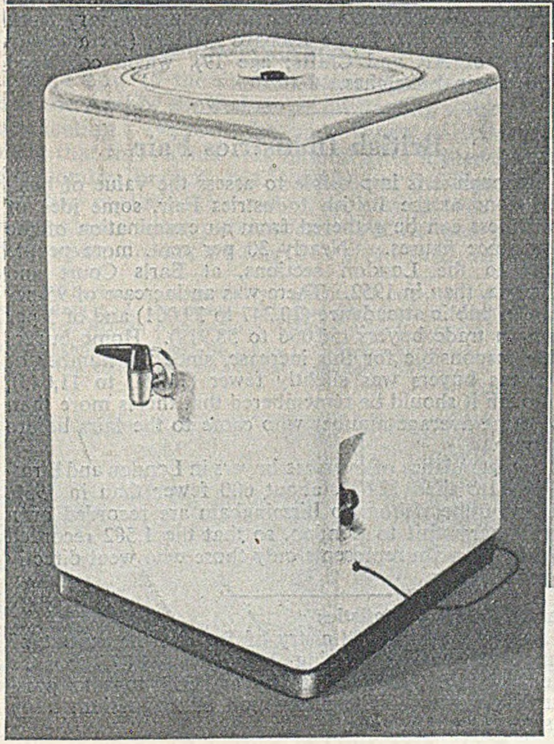
Again included in the 1952 competition of the Royal Society of Arts was a section covering the design of new domestic solid-fuel-burning appliances. There were eight candidates from five schools. The requirements of the test were to provide an original design for a solid-fuel-burning appliance to be fitted in the kitchen of a typical two, three or four bedroom house normally found on modern housing estates, to provide the heating, cooking, and hot-water facilities necessary for the normal requirements in such a house. Candidates were asked to submit a perspective drawing of the appliance, showing the overall appearance and indicating the candidate's preferred colour scheme, and one or more scheme drawings to explain the general arrangement, construction, materials, treatment and finish. They were also asked to state the heating capacity of the boiler and the radiation surface of any radiators and piping to be used in conjunction with it. The accompanying illustrations, reproduced by courtesy of the Royal Society of Arts show various designs submitted in several sections of the competition, which also embraced electrical and gas appliances. In these latter sections, Fig. 1 (*a*) and (*b*) are reproduced mainly as examples of enamelled ware.

Report

The Jury were much pleased at the impressive increase in the numbers of both students and centres represented in the solid-fuel section; particularly as it was clear that interest in the competition was now spreading over the whole country. They were also







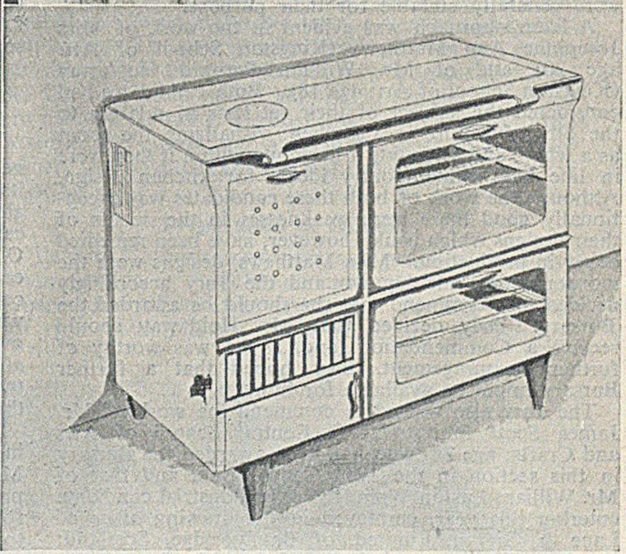


FIG. 1.—*R.S.A. Bursary Competition Entries.*
(*a*) (Top left) Gas-heated Kitchen Cupboard, designed by Mr. C. R. Cheetham; (*b*) (Lower left) Domestic Electric Washboiler, commended design by Mr. J. W. Cooper; (*c*) and (*d*) (Right) Solid-fuel-burning Appliances to provide Heating, Cooking and Hot-water Facilities (upper) by Mr. W. B. Holdaway, and (lower) by Miss J. A. Matthews.

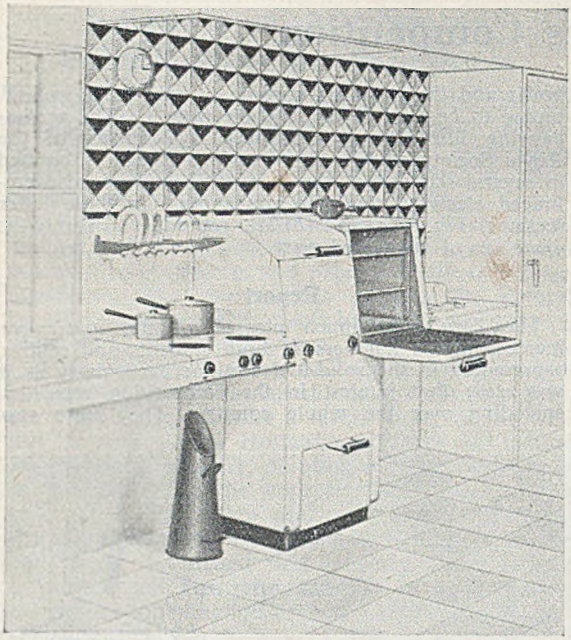


FIG. 2.—*Domestic Solid-fuel-burning Cooker, Space and Water Heater, commended design by Mr. J. Scott Smith.*

glad to see that the work submitted was considerably better than in 1951, and that the standard of presentation and of originality of approach was higher than in any previous competition. The practical problem of designing solid-fuel-burning appliances had, in most cases, been really carefully considered and the designs were generally suitable for their purpose.

A fresh approach was evident in the work of Miss Josephine Ann Matthews (Kingston School of Art: age 20), and of Mr. William Bernard Holdaway (Kingston School of Art: age 18). Both candidates had considered the subject of their set tests in relation to the other furniture in a kitchen; visualizing the room as a whole and achieving a harmony within it they were in line with contemporary ideals for kitchen design. Although the work of both these candidates was exceptionally good there were weaknesses in the details of their designs which could, however, have been remedied easily in production. Miss Matthews' designs were the more practical of the two and the Jury accordingly decided to recommend that she should be awarded the Bursary. They decided that Mr. Holdaway should receive a Commendation (and, as he was worthy of further encouragement, they hoped that a further Bursary might be available for him).

The Jury also wished to commend the work of Mr. James Scott Smith (L.C.C. Central School of Arts and Crafts: age 25) who had been awarded the Bursary in this section in the 1951 Competition, and that of Mr. William Easton Wren (the only industrial candidate entering this year, employed in the drawing office of Lane & Girvan, Limited, of Bonnybridge, Scotland: age 27). They were glad to find that Mr. Scott Smith had maintained his previous standard, especially in his presentation which was excellent; but while his designs had many interesting points they would not always have been practical and his appliances submitted in his set test would have been too big for their purpose. Mr. Wren's conception of solid-fuel-burning appliances was, on the whole, unimaginative, but the Jury felt that his excellent and workmanlike drawings deserved commendation.

Other Appliances

In the domestic gas-appliances section, an original design was required for each of the following: (1) a domestic gas-fired space heater to be either wall fitted, wall suspended, built-in low level, or free standing, and to be suitable for use in a living room; and (2) any domestic gas appliance, other than a gas fire, for use in the home. Candidates were asked to submit a coloured perspective drawing showing the external appearance and fully detailed constructional drawings of both appliances.

Although the Jury were disappointed to see that the entry in this section was still small, they welcomed the slight increase in the number of students and particularly the appearance of the Birmingham College of Arts and Crafts, which had joined the L.C.C. Central School of Arts and Crafts, the only school represented last year.

The entries again were generally of a higher standard than last year and the candidates had taken more notice of what was at present in production, although without fully appreciating the complexity of the many technical and design problems associated with this type of appliance. It was necessary for designers of space-heaters to-day to take into consideration the new safety regulations which made fireguards compulsory and which laid down very stringent conditions regarding their use, and it was, therefore, a little disappointing to find that none of the candidates had tackled this aspect of the problem.

The Jury recommended that the Bursary should be awarded to Mr. Colin Reginald Cheetham (L.C.C. Central School of Arts and Crafts; age 26), who had taken great pains to express himself with the use of detailed drawings and some well-made models. They hoped that both the other two candidates would persevere with this type of design work, and particularly liked the experimental approach shown in the preliminary work submitted by Mr. Leslie Richard Gilbert (Birmingham College of Art and Crafts; age 19), which contained some original sketches.

British Industries Fair

Although it is impossible to assess the value of business done at the British Industries Fair, some idea of its success can be gathered from an examination of the attendance figures. Nearly 30 per cent. more people came to the London sections, at Earls Court and Olympia, than in 1952. There was an increase of 95 per cent. in public attendance (20,247 to 39,001) and of 3 per cent. in trade buyers (56,066 to 58,919). Home buyers were responsible for this increase, since the number of overseas buyers was slightly fewer (11,593 to 11,045), although it should be remembered that this is more than twice the average number who came to the fairs before the war.

The attendance of overseas buyers in London and Birmingham totalled 12,627, about 600 fewer than in 1952. Many of the visitors to Birmingham are recorded on a preliminary visit to London, so that the 1,582 recorded for Birmingham represents only those who went directly to that section.

Latest Foundry Statistics

According to the Ministry of Supply, the output of aluminium castings during March was 1,875 tons as sand castings 2,628 as gravity- and 911 tons as pressure-die-castings. The production of magnesium alloy castings was 388 tons.

Runners and Risers

*By E. Daybell, P. A. Russell, and R. W. Ruddle, M.A.**

(*Continued from page* 609)

Runners and Risers for Iron Castings

By P. A. Russell, B.Sc., F.I.M.

Probably the invitation to the Author to represent the grey-iron producers in this trio of short papers was because he took part in a similar symposium before the East Midlands branch[5] of the Institute of British Foundrymen, in which, at personal instigation, one of his foremen, Mr. Measures, first published details of the "Connor" runner and so brought into fairly general use a type of runner that had only been used previously by a very limited number of foundries.

It is true that in several of the papers that the Author has presented to the Institute he has stressed, amongst other things, methods of running and more particularly of feeding castings. Illustrations were shown of examples taken from his first paper to the Institute[6] in 1927. These† show the method of running a heavy casting *via* a top feeder through a strainer core, which is not very different from methods being advocated to-day. This method was frankly borrowed from the malleable-iron industry. Again, in his first paper to the London branch,[7] 18 years ago, he showed methods of running and feeding alloy-iron castings.

Connor-block Runner

Coming now to the Connor-block runner, or lip feeder, the Author showed slides illustrating some of its application. He took the opportunity of stating publicly that this runner was named after a member of the London branch, but it could not be claimed to be his exclusive invention, as was proved by correspondence after publication. Yet he was still glad that Mr. Connor's name was given to it, as he believed that he was the first to apply it in a general manner. Subsequent experience had shown that this type of runner was more easily applied, as a feeder, to high-phosphorus irons, and as the phosphorus decreased to, say, 0.2 per cent., its use as a feeder became more limited. It had, in the Author's foundry, led to the increased use of the lip runner, in preference to the normal ingate method, and new illustrations (Fig. 30) show how this principle of lip running could be used to effect considerable economy in the moulding-box area occupied by the runner system.

Distributed Runner

A personal preference is held for a distributed runner, which tends to equalize the cooling rate throughout the casting and the pictures exhibited showed examples taken from earlier published work.

Naturally, the Author has tried some of the various forms of runner devised for steel and non-ferrous castings with which the other speakers at this meeting were dealing more fully. They seemed, in some ways, more difficult to apply to grey iron, particularly phosphoric iron. The skin of such an iron was too weak to apply the atmospheric pressure feeding principle and their longer total solidification time made the exothermic-sleeve principle more difficult to apply. He had found particular value in the use of exothermic powder on the top of feeders and rather less value in the exothermic sleeves and knock-off cores. The cost of exothermic sleeves was rather frightening to the producer of grey-iron castings, and in the only case which was being regularly applied in his own foundry, the cost (taking great care to use exothermic compound only in the part of the riser where it was effective) worked out at 2s. per cwt. of casting.

Preparation of Runners

Personal interest in runners, as a practical foundryman producing "jobbing" castings, had in recent years gone rather away from the "feeding" aspect of runners and risers to the realization of the im-

* The Authors are, respectively, associated with K. & L. (Steelfounders and Engineers), Limited; S. Russell & Sons, Limited; and British Non-Ferrous Metals Research Association.

† The Author's illustrations taken from previous papers were shown on the screen at this present meeting.—EDITOR.

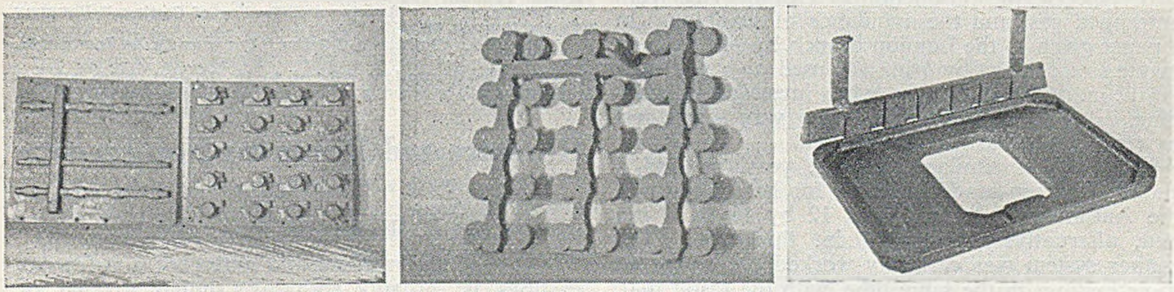


FIG. 30.—*Three Examples showing how the Connor Runner is at present being used in Ironfoundry Practice. It also effects a Saving in Moulding-box Space.*

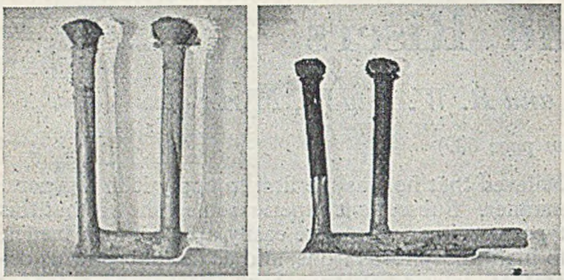


FIG. 31.—*Examples of Two Runner Systems for the Same Job, that on the R.H.S. having been prepared by Coating with Blacking prior to Casting. The Downgates are 2 ft. long and pass about 1 ton of Metal. The L.H.S. Downgate shows Evidence of Sand Wash.*

portance of the runner system as a whole in the production of good castings, or, putting it another way, in the prevention of scrap. So few moulders or foremen seem to realize the importance of the runner, which the customer never sees. Yet every drop of metal that forms the casting has to pass through the runner system, which is often subjected to far more erosive action than one would be prepared to allow the main mould to endure. Yet runners, particularly downgates, were seldom formed in facing sand and, in dry-sand moulds, were extremely difficult to "black." Fig. 31 showed two examples of the same runner, one of which had been coated previously with a blacking wash. These downgates are about 2 ft. long and have to pass between them a ton of metal. The erosion evident in the L.H. section of Fig. 31 must mean that the sand, probably entrained in the metal and called by the foundry "slag," entered the casting. When examining American jobbing-foundry practice last year, the Author was impressed by the precautions taken to prevent this trouble. These usually took the form of very-carefully-made oil-sand cores to form the downgates of all large castings. The cores were carried in stock, to be drawn on by the moulders and cut to length to suit the job.

Pouring Rate

Also of importance is the effect of pouring rate, as controlled by the runner system, on the production of good castings. Pouring rate can be significant in two respects—the production of castings free from entrapped gas, and the avoidance of scabbing. In a paper given to the London branch by Mr. Pell, an ingate size of $\frac{5}{8}$ in. by $\frac{1}{8}$ in. was used on a test casting 12 in. by 12 in. by 2 in. when investigating scabbing. It was obviously applying a very severe test by running the casting so slowly.

Working on similar lines last year, to find a suitable "green-sand" mixture for heavy castings, the Author used test castings 12 by 10 by 1 in.; and, alternatively, 2 and 3 in. thickness. The runner system was carefully worked out to fill all three castings in the same time, with the result that, in the early stages, the 1-in. thick castings scabbed on the bottom whilst those 3 in. thick did not, simply because the bottom of the mould was covered three times as quickly in the latter case. Runner systems, properly thought out, could play a great part in the reduction of scrap through scabbing.

Also, the Author believed that pre-conceived ideas on runners of many foundrymen have been upset by seeing the various films now available on the flow of metals, particularly the excellent one produced by the I.B.F. technical sub-committee[8] and which no doubt members had already seen. The film upset personal ideas on the "distributed runner" to which reference had already been made, and foundrymen should realize the desirability of observing runner effects by means of cutting away part of the top of a mould—though this was not as effective as the slow-motion photography method employed by the TS.35 sub-committee.

No summary of running and feeding methods would be complete without reference to Mr. Farmer's paper[9] given to the Birmingham branch of the Institute in 1951, and it was strongly recommended that those interested in the subject who may have missed reading it should remedy the omission immediately.

Attention was also drawn to the paper on "Principles of Gating," by Mr. G. Martin,[10] published in a recent issue of the FOUNDRY TRADE JOURNAL, which very fully summarized the present state of knowledge with regard to the running of iron castings, and which gave many formulæ for the calculation of runner sizes.

Finally, it was suggested that it is an urgent problem in the foundry industry to obtain the data necessary to put the running of castings on to a logical basis. At the moment, the majority of runners are made by guesswork and no two persons' ideas of an ideal running system seem to coincide. It has been the boast of the Institute that it has played a great part in changing foundrywork from "rule of thumb" methods to scientific methods, but this does not apply to runners, and the Author hoped that the Institute would in future pay considerable attention to this aspect.

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[6] Russell, P. A., "Shrinkage Holes in Small Grey-iron Castings," *Proc.* I.B.F., Vol. XXI, 394.

[7] Russell, P. A., "Experiences in the Manufacture of High-grade and High-duty Alloy-iron Castings," *Proc.* I.B.F., XXVIII, 482.

[8] I.B.F. Technical Council Sub-committee, TS.35 Report, "Flow of Metal," FOUNDRY TRADE JOURNAL 92, 673.

[9] Farmer, H. S., "Running and Feeding of Castings," FOUNDRY TRADE JOURNAL 90, 357.

[10] Martin, G., "Principles of Gating," FOUNDRY TRADE JOURNAL 94, 63.

Note.—The illustrations referred to in the text which are not reproduced will be found in the papers mentioned in these References.

Runners and Risers for Non-ferrous Castings

By R. W. Ruddle, M.A., A.I.M.

Although the running and gating of non-ferrous castings is, broadly speaking, similar to that of ferrous castings, the precise techniques employed differ considerably in detail and there is often a difference in the emphasis which must be given to the various factors which one considers when designing a running and feeding system. In a symposium of this kind it is, of course, quite impossible to deal exhaustively with the subject, and all that it can be hoped to do is to indicate the principle points which require attention.

FEEDING

The first point to make about the feeding of a non-ferrous casting is that the chills and feeders used must be so dispositioned as to secure directional solidification. In other words, the chills and feeders should make the thinnest sections of the casting freeze first, followed by progressively thicker sections and finally by the feeders. This generally means that the chills will be attached to the thinner sections and the feeders to the heavier sections. The positions of the gates are also important factors in securing directional solidification, as will be indicated later.

Before entering into more detail on this subject, it is necessary to consider the influence of the constitution of the alloy. Broadly speaking there are two kinds of non-ferrous alloys; on the one hand there are those of short freezing range, which include the pure metals and many of the eutectic alloys, and here aluminium-bronze is a good example. On the other hand, there are the alloys having long freezing range; this group comprises most of the gunmetals and nearly all the light alloys. The short-freezing-range alloys solidify by what is known as skin formation. In this process, solidification begins by the formation of a shell of solid metal at the mould walls and proceeds by the steady thickening of this shell until all the metal in the casting is solid. In the absence of any feeder, castings will contain a deep pipe or centre-line shrinkage, and it is the purpose of the feeder to prevent the formation of such a pipe.

Castings in these alloys are readily made sound by attaching to the heavier sections of the casting, feeders the solidification time of which is slightly greater than that of the casting, so that there is a temperature gradient towards the feeder. This gradient need only be quite small. Various methods of calculating the correct size of feeder have from time to time been suggested; probably the simplest is to employ Chvorinov's "rule." According to this "rule," the solidification time of the casting is proportional to the ratio of the square of its volume to the square of its area. Therefore, the desired result will be obtained by calculating the ratio for the casting in question and attaching a feeder the ratio of which is slightly—say 20 per cent.—greater than that of the casting.

Alloys having Protracted Freezing Range

The long-freezing-range alloys freeze in an entirely different manner, the whole assembly of casting and feeders solidifying at more or less the same time. During solidification, the casting consists of a pasty mass of solid plus liquid metal; there is slightly more solid near the mould wall than at the centre, but the difference is not large. For this reason, these alloys are very liable to dispersed porosity, or microporosity as it is often called. In the absence of a feeder, microporosity will be widespread throughout the casting and there will generally be regions of very coarse porosity near the heat centres—a distribution clearly detrimental to the properties of the casting. The presence of feeders having solidification times greater than that of the casting will transfer these concentrations of porosity into the feeders, but usually will not greatly affect the porosity distributed generally throughout the casting. This, of course, means that directional solidification towards the feeder will not of itself necessarily prevent the occurrence of distributed porosity in the casting.

It is not possible to render castings in these alloys *completely* sound unless the temperature gradients in the solidifying metal besides being directed towards the feeders, are also very steep. Temperature gradients of the required steepness cannot generally be obtained in sand castings unless the casting is of very thin section or is heavily chilled. However, fortunately for the foundryman, the residual porosity in these alloys, provided it is well dispersed and does not form a continuous network, is not on the whole very harmful to mechanical properties, pressure-tightness, or other desirable qualities. Therefore, the problem of securing a serviceable casting in these long-freezing-range alloys is generally to ensure that there are no severe local concentrations of porosity. This can be done with the aid of feeders, the size of which may be calculated on much the same lines as has been described for the skin-forming alloys. It may sometimes be convenient to employ other methods to break up the concentrations of shrinkage; for example, controlled metal/mould reaction may be used very successfully with bronzes and leaded gunmetals. The use of chills may be particularly valuable with these long-freezing-range alloys. If the thinner sections of the castings are heavily chilled, the temperature gradients in the direction of the feeders are greatly steepened and this will reduce the general level of porosity throughout the casting. The use of chills is especially useful when heavy sections are being cast, for the heavier the section the greater the general level of porosity which cannot be avoided, no matter how big the feeders.

Having stressed the importance of feeders when making castings in alloys of long freezing range, it must be added that in some castings of uniform section, such as a simple plate, which do not contain any marked heat centres, heavy concentrations of porosity may often be absent even when no feeder is used. This is particularly true of some bronze and gunmetal castings. It is often possible, therefore, to make a serviceable casting of this kind without any feeder, although it is not suggested that the omission of feeders is good practice.

Design of Feeders

When designing a feeder, particular attention should be devoted to the shape of the feeder and to the method of attachment to the casting. The

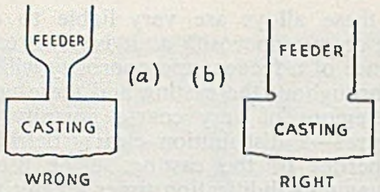

FIG. 32.—*(a) Incorrect and (b) Correct Methods of Attaching a Feeder Head to a Casting.*

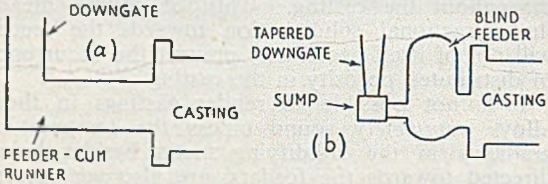

FIG. 33.—*(a) Incorrect and (b) Correct Methods of Feeding a Casting through the Runner.*

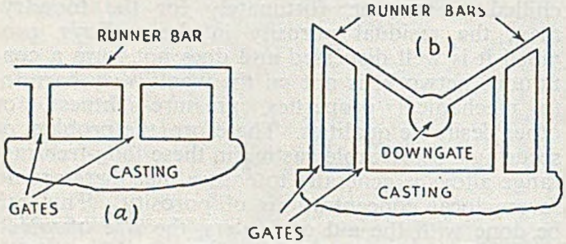

FIG. 34.—*Plan Views of Multiple Gating Systems. With Design (a) most of the Metal flows through the End Gate; Design (b) gives more equable Flow through all the Gates.*

most efficient shape for a feeder is a sphere, but this is usually rather impractical, and it is necessary to fall back on the nearest efficient shape, which is a cylinder. A cylinder, the height of which is about $\times 1.5$ the diameter, is suitable for most skin-forming alloys. The height may be rather less than this with alloys having a freezing range. It is important that the feeder be attached to the casting in such a way that premature freezing at the point of attachment is avoided. The use of narrow necks is therefore to be strongly condemned. However, there is one way in which the feeder may be attached to the casting by a narrow neck without detriment to its efficiency, that is, by use of a Washburn core. This is a biscuit-like core of insulating material, which is fixed in the mould at the base of the feeder; the core contains a small hole through which the feeding liquid passes. Because the core heats up quickly and is of low conductivity it has little chilling effect and does not impede feeding. These cores enable the feeder to be readily removed from the solid casting—a great economic advantage with the harder alloys, such as aluminium bronze.

Insulating and Exothermic Materials

Recently, several ways in which the efficiency of feeders can be greatly improved have been advanced In the first place, with alloys which are cast at temperatures above about 900 deg. C., the solidification time of open feeders can be prolonged by 20 per cent. or so, simply by covering the top with sand or some better insulating material. It is recommended that this should always be done. Secondly, a considerable improvement in feeder efficiency can be produced by surrounding the feeder with a sleeve of insulating or exothermic material. To take for example, a particular casting in aluminium-bronze which, made in the usual way, required a feeder 3-in. dia. by $4\frac{1}{2}$ in. high, it was found that this casting could be made sound with the aid of a feeder 2 in. dia. by $1\frac{5}{8}$ in. high when the feeder was surrounded by a plaster sleeve. The use of a plaster sleeve thus reduced the volume of the feeder by about 80 per cent. Similar results were obtained with exothermic materials. The use of these techniques naturally involves some expense and it is not suggested that they can be applied economically to all castings. However, the advantages of increased yield, reduced metal losses and reduced fettling costs, which are obtained, may be substantial in the case of larger castings.

Several new types of feeder have been introduced in recent years of which the blind feeder is, it is thought, the most useful. The advantage of the blind feeder is that it can be readily attached to any part of the casting and may overcome moulding difficulties.

RUNNING

The purpose of any running system is to introduce the metal into the mould at the right place without turbulence and with the minimum contact with air; the running system should also avoid introducing slag and dross into the mould cavity and should avoid erosion of the mould. The relative importance of these different functions of the runner depends somewhat on the constitution of the alloy; for example, mould erosion is generally worse with the denser alloys, that is the copper-base non-ferrous alloys as opposed to the light alloys. Again, the avoidance of turbulence and contact with air is most important with those alloys which readily form oxide skins, such as aluminium-bronze, manganese-bronze and the light alloys; with other alloys it may be relatively unimportant.

The point of introduction of the metal into the mould is of extreme importance with all alloys. In general, the metal should be introduced into the heavy sections of the casting and as near as possible to the base of the feeders. If this be done, the metal flows from the heavy section into the lighter extremities of the casting, cooling on the way, so that, if the pouring temperature be correct, by the time metal reaches the lighter extremities it is on the point of solidification. At the same time, the passage of the metal through the heavier sections towards the extremities, heats the mould surrounding these sections and thus retards the freezing of this part of the casting. As the result of all this, freezing begins in the thinner sections and is progressive towards the heavier sections.

Furthermore, if the gate be in the immediate vicinity of the feeder, the feeder is eventually filled with hot metal and of course this is also favourable to directional solidification. For these reasons, top pouring is usually desirable if the feeders are placed on top of the casting. If top pouring be not possible, on account of the danger of turbulence or mould erosion, and bottom pouring must be resorted to, blind feeders may prove the best solution. A good technique is to run the casting through a blind feeder. This is often done with some alloys, notably the gunmetals, which may not require much feeding to obtain a serviceable casting. A single feeder in the runner may serve the whole casting. Unfortunately this is often rather badly arranged in practice. As is shown in Fig. 33, the correct way of doing the job is to have a pattern for the feeder and runner and thus to incorporate a properly-shaped feeder in the running system.

Downgates

Although there is no opportunity here to enter into the design of running systems in general, there should be mentioned a few of the things which are either good or bad practice. First of all, as regards the pouring basin, the main factor is that it is highly desirable that it should be of proper design, for otherwise it is very difficult to keep the gating system full of metal. Secondly, the downgate or sprue should be of a reasonable size so that it can be kept full, for example it is useless attaching a 1½-in. dia. downgate to a 10-lb. casting. The best shape for a downgate is a stick or slot tapered towards the bottom; the usual parallel-sided downgate is unsatisfactory because the metal stream breaks away from the sides of the tubular hole and turbulence and entrapment of air are the result. It is true that the parallel-sided downgate can be kept full by a choke at the bottom, but this results in much turbulence and is therefore undesirable, especially with alloys which oxidize readily. The bend at the junction of the downgate and cross-runner is most important if it is necessary to avoid turbulence. The best shape to employ is a smooth, rounded bend, but this is generally uneconomic as it necessitates use of a core. The next best type of bend, and one which is recommended, is a rectangular sump. With this type of junction, the metal flows out quite smoothly along the cross-runner.

The main thing to be said about the cross-runner is that its sectional area should be 1½ to 2 times that of the downgate so as to reduce the velocity of the metal and thus avoid injection of metal at high speed. Depending on the constitution of the alloy, it may be desirable to incorporate a dross trap or strainer core in the cross-runner; the latter can also be placed at the base of the downgate. Some form of dross trap is particularly desirable, when casting alloys such as aluminium-bronze which readily form oxide skins.

Multiple Gating

Multiple-gating systems are much more difficult to design and, here, it is necessary to pay careful attention to the dimensions of the different members of the system so as to ensure that the flow of metal through the different gates is approximately equal. For example, it is of little good trying to use the type of gate shown in Fig. 34(*a*) if the cross-sectional areas of the different members be all identical, for practically all the metal will flow through the end gate. The correct way to deal with a gate of this kind is either to proportion the different sections so that the flow is the same from each gate, or, alternatively, to design the system something like Fig. 34(*b*) which has the same effect.

One final point about gating—all too often one finds in practice that little attention is given to the gating system; frequently the design of the gating system is roughly indicated to the moulder by the foreman and is cut by hand. Naturally, no two running systems made in this way are ever alike. It is difficult to over-emphasize the desirability of having a proper pattern for the entire gating system, for only in this way is it possible to secure consistent results.

Conclusions

In conclusion further emphasis should be added. Assuming that the metal poured into the mould is of good quality, the soundness and properties of the casting are entirely controlled by the running system used and feeding methods employed. It has been personal experience that, only too often, reasonable care is taken to ensure that the quality of the metal poured into the mould is adequate but feeders and runners are designed and constructed in a most slapdash manner, and a poor casting is the ultimate product.

Fined for Scrap Deals

Alfred Ellison, of Perry Barr, were fined £534 with 10 guineas costs, at Birmingham Magistrates Court on June 4, on 19 summonses of buying scrap iron above the controlled price and on 11 summonses of buying more than the permitted allocation, and Stanley Horsefield Smith, a scrap merchant of Soho Pool Wharf, Hockley, was fined £238 with 10 guineas costs for supplying scrap metal to the firm above the permitted maximum price.

Prosecuting for the Ministry of Supply, Mr. T. E. Dale stated that on November 20 last year, an investigating officer inspecting invoices at Ellison's found that extra charges had been paid for haulage and labour, or for breaking and sorting the scrap iron. That violated price-control regulations. In some cases, £2 a ton in excess of the permitted price had been paid and in other cases £4 a ton. It was also found that the company had bought considerably more scrap metal than their permitted allocation. When these facts came to light, the company had been very frank.

For Ellisons, Mr. E. G. Beresford said that when the offences were committed, export orders were very heavy and often the firm had only enough scrap to keep going for two days. Employees had been asked to collect from their homes any scrap they could to keep production going. With regard to the buying of metal above the controlled price, it was stated that an official of the firm, who had since been superseded, "panicked and began stockpiling."

Book Reviews

Equipment for the Thermal Treatment of Non-Ferrous Metals and Alloys—A Symposium published by the Institute of Metals, 4, Grosvenor Gardens, London, S.W.1. Price 15s.

This symposium contains seven papers given to the Institute last year on various aspects of the subject, written by people actually engaged in work of the nature described, connected with well-known companies of high technical standing.

The first paper is a joint effort of C. J. Evans, P. F. Hancock, Dr. F. W. Haywood, and Mr. J. McMullen, presented on behalf of the electric-resistance furnace section of B.E.A.M.A. (British Electrical and Allied Manufacturers' Association). The paper reviews the various types of electric furnaces available for thermal treatment, including billet heating. Light alloys and copper, nickel and their alloys are dealt with separately, because of the different temperature ranges and different requirements as to furnace atmosphere. After describing the thermal treatments required with aluminium and magnesium alloys, the authors describe salt baths, forced air-circulation, batch furnaces and continuous furnaces, including flash-annealing furnaces. Conveying mechanism is dealt with in some detail and typical installations are described and clearly illustrated. In the heat-treatment of copper, nickel and their alloys, the question of the furnace atmosphere becomes very important, and special attention is given by the authors to the description of the principles of this type.

The paper by J. F. Waight of West Midlands Gas Board gives a report on up-to-date gas-heating in thermal-treatment furnaces, preceded by some remarks on the heat transfer in gas-fired furnaces, burner systems, furnace structure and heat losses. Furnace atmospheres and their control, especially sulphur removal, are dealt with in a special section. The description of a number of actual furnace installations completes the picture. From the paper one gains the impression that gas-heated furnaces are highly reliable and versatile.

E. Davis and S. G. Temple (both I.C.I., Limited, Metals Division) review the annealing of copper and copper alloys, giving the metallurgical background as well as the industrial procedure, and weighing carefully the pros and cons for batch-type and continuous furnaces. H. J. Hartley and E. J. Bradbury of Henry Wiggin & Company, Limited, and the Mond Nickel Company, Limited, contribute a careful description of the theory and practice of bright annealing of nickel and its alloys, with details on the effects of alloying elements, impurities and the components of the furnace atmosphere such as steam, hydrogen, carbon and sulphur. The design of the furnaces and of the apparatus and methods for production and testing of the suitable furnace atmosphere is described in some detail, and the paper is concluded with a survey of desirable improvements.

The last three papers deal with the heat-treatment of light alloys. C. P. Paton of Northern Aluminium Company, Limited, gives a survey of the various heat-treatment requirements, followed by technical considerations affecting fuels, heating media, circulation, furnace atmospheres, temperature measurement and control, quenching, drying and general handling. The various types of furnaces are described, and in the closing chapters the position is reviewed, generally, and an attempt is made to outline future trends.

The paper of R. T. Staples (T.I. Aluminium, Limited) on "Flash Annealing of Light Alloys" starts with a statement of the advantages of the process both from the metallurgical and the production point of view. The metallurgical conditions for the production of a fine-grained annealed structure are discussed and the dominating influence of rate of heating, especially on heterogeneous alloys, is emphasized. The design of flash-annealing furnaces is then critically surveyed and their performance described in a number of interesting tables comparing also the effect of batch-annealing and flash-annealing on the properties of various materials. Discussing further prospects, this author points out that the heating rates achieved so far are only about one-tenth of the rate achieved in a salt bath, and that there seems to be a chance of emulating the salt bath by means of induction heating. The improvement in quantity and reduction in size of furnaces connected with the high rate of heating are in his opinion sufficiently important to justify further developments.

M. Lamourdedieu in a short note gives the general layout and some very interesting details on an installation for the continuous solution treatment of Duralumin strip 56 in. wide and about 0.1 in. thick as produced in the light-metal rolling mill at Issoire. The most interesting feature is the rapid heating of the strip by induction coils to nearly full temperature in a few seconds, followed by a stabilizing of the temperature in a heated chamber. Some of the many special problems connected with such an unconventional design and their solutions are mentioned.

The discussion in which metallurgists, production engineers and furnace builders took part, is well worth reading. It reveals that there are quite a number of controversial points even with the conventional types of furnaces. As to the more modern types, views are far from being clarified, and there was expressed a desire for closer and more organized co-operation between furnace builders, handling-gear makers and metallurgists in order to achieve some coherence regarding the relative merits and economics of various types.

E. S.

Metal Data, by S. L. Holt. Published in this country by Chapman & Hall, 37, Essex Street, London, W.C.2. Price 80s. net.

The first edition (1943) of this book was issued as Metals and Alloys Data Book, and was reviewed in our issue of February 10, 1944. It was then stated that the book was "most useful," and the same commendation applies with still greater force as the number of pages has been increased from 334 to 526 and the tables from 320 odd to 565. This book, apart from the two prefaces and a section showing by photomicrographs the grain size of steels, consists wholly of tables and 173 graphs. For cast iron there are 28 tables, and in one of them (Table 285), which covers the specific applications of alloy cast irons, 25 different compositions are listed. In their use in this country it is as well to shade down the carbon content, as, generally speaking, carbon has slightly less hardening effect in America. Steel castings—cast steels in this book—are covered by no fewer than ten graphs and 32 tables, one of which lists 40 odd different compositions for varying purposes. In a similar way the wrought steels and non-ferrous alloys are dealt with, and in addition there is a well-chosen group of tables of "general data," one of which is almost necessary for British readers, and that is Table 553, which converts tons to pounds. Whilst extensive reference is made to trade names of materials, it enhances rather than detracts from the worth of the book, as they are, in general, internationally known. The book is particularly well indexed Steel castings—cast steels in this book—are covered by and contains much tabular matter.

V. C. F.

Coronation and Birthday Honours List

The Queen's combined Coronation and Birthday Honours List, published on June 1, contains awards to a number of people associated with the foundry, iron and steel, and allied industries. Two prominent industrialists, Sir Peter Bennett and Sir Ralph Glyn, are in the list of baronies created, while Sir Percy Mills is included among the baronetcies. The list of knights contains the names of several well-known industrialists, Mr. S. C. Goodwin, Mr. S. F. Markham, Mr. S. W. Rawson, and Mr. W. R. Verdon Smith being among them. Another new knight is Mr. Andrew Naesmith, one of the part-time members of the recently appointed Iron and Steel Board. Brief notes on some of the awards are given below.

VISCOUNT

LORD WOOLTON, Chancellor of the Duchy of Lancaster since 1952. In addition to having occupied several Ministerial appointments, Lord Woolton has had a distinguished career in industry, having been chairman and senior managing director of Lewis's Investment Trust, Limited, and its subsidiary companies. He is a past-president of the Royal Statistical Society and was a member of the Hambledon Committee on the Teaching of Industrial Art.

BARONS

SIR PETER FREDERICK BLAKER BENNETT, for political and public services. A past-president of the Federation of British Industries, he is joint managing director of Joseph Lucas Industries, Limited. He was formerly a director of Imperial Chemical Industries, Limited, and of Lloyds Bank, Limited. A member of the British Productivity Council, Sir Peter was formerly a member of the Anglo-American Productivity Council. He is a past-president of the Society of Motor Manufacturers and Traders and of Birmingham Chamber of Commerce and a former member of the council of the International Chamber of Commerce. He has been Unionist M.P. for Edgbaston since 1940.

SIR RALPH GEORGE CAMPBELL GLYN, for political and public services. He is chairman of the Skefko Ball Bearing Company, Limited, and a director of J. Samuel White & Company, Limited, shipbuilders, boilermakers, etc., of Cowes, Isle of Wight, and other companies.

BARONETS

SIR PERCY HERBERT MILLS, for services to housing. Chairman of the National Research Development Council, Sir Percy is vice-chairman and managing director of W. & T. Avery, Limited, and a director of a number of other companies, including the Barry Wehmiller Machinery Company, Limited, the Berkel & Parnall Slicing Machine Manufacturing Company, Limited, and Textile Machinery Makers, Limited. Sir Percy is a past-president of Birmingham Chamber of Commerce.

MAJOR-GEN. SIR EDWARD L. SPEARS, for public services. Sir Edward, who is chairman of the Institute of Directors, is associated with a number of companies, including Ashanti Goldfields Corporation, Limited, and Associated Portland Cement Manufacturers, Limited.

SIR HERBERT GERAINT WILLIAMS, for political and public services. President of the Ballast Sand and Allied Traders' Association and the Engineers' Buyers' and Representatives' Association, Sir Herbert has connections with industry through many companies. He is chairman of Bennis Combustion, Limited, and a director of the Power Plant Company, Limited, the Harper Automatic Machine Manufacturing Company, Limited, S. Instone & Company, Limited, Franco Signs, Limited, and other companies. Sir Herbert was secretary and manager of the Machine Tool Trades Association, Inc., 1911-28.

KNIGHTS BACHELOR

ALDERMAN GEOFFREY MORRIS BARNETT, for political and public services in Leicester. A member of the board of many companies, his directorships include John Jardine, Limited, manufacturers of power-transmission appliances, etc., of Nottingham, Midland Machine Trust, Limited, Richard Simon & Sons, Limited, Ross Engineering Company (Leicester), Limited, and the Sileby Engineering Company, Limited.

DR. EDWARD CRISP BULLARD, F.R.S., director of the National Physical Laboratory, Department of Scientific and Industrial Research, since 1950, prior to which he was Professor of Physics at the University of Toronto from 1948 to 1949.

MR. ERNEST WENSLEY LAPTHORN FIELD, director of the Scottish Engineering Employers' Association. In 1944, Mr. Field was appointed director of the North West Engineering Trades Employers' Association. He was for many years assistant to the engineering director of John Brown & Company, Limited, Clydebank.

MR. STUART COLDWELL GOODWIN, for political and public services in Sheffield. Among other industrial positions, he is chairman and managing director of Goodwin & Company, Limited, steelmakers, of Neepsend, Sheffield, joint managing director of Neepsend Rolling Mills, and a member of the board of many other companies, including Colver Bros., Limited, Ferro-Alloys & Metals, Limited, Files (Sheffield), Limited, and Hard Metal House, Limited.

The HON. FRANCIS JOHN HOPWOOD, managing director of the Shell Petroleum Company, Limited, and its subsidiaries, and chairman of the Shell Oil Company.

MAJOR SYDNEY FRANK MARKHAM, for political and public services. He has been Conservative M.P. for Buckingham since 1951, and is a director of Richard Johnson, Clapham & Morris, Limited, Manchester.

MR. ANDREW NAESMITH, general secretary of the Amalgamated Weavers' Association. He is one of the eight part-time members of the recently appointed Iron and Steel Board. He is also a member of the general council of the Trades Union Congress and a part-time director of the Bank of England.

MR. STANLEY WALTER RAWSON, director-general of Machine Tools, Ministry of Supply, since 1951, in which position he supervises the supply of machine tools for the defence programme. He joined Dorman, Long & Company, Limited, in 1929, and in 1934 went to John Brown & Company, Limited, becoming a director in 1935 and managing director in 1949. During the recent war he supervised the construction and installation of heavy plant for the Ministry of Aircraft Production. His Board appointments include Clydebank Shipbuilding & Engineering Company, Limited; Cravens Railway Carriage & Wagon Company, Limited; Cravens, Limited; Firth Brown Steels, Limited; Hard Metal Tools, Limited; High Speed Steel Alloys, Limited; Michell Bearings, Limited; Nitralloy, Limited; and Powderloys, Limited.

MR. HAROLD CHARLES WEST ROBERTS, Chief Inspector of Mines and Quarries, Ministry of Fuel and Power. Mr. Roberts succeeded Sir Andrew Bryan in this position on August 1, 1951, having been Deputy Chief Inspector for over five years prior to his promotion. Mr. Roberts was awarded the C.B.E. in the 1948 New Year Honours.

Coronation and Birthday Honours List

MR. WILLIAM REGINALD VERDON SMITH, for public services in Bristol. Chairman of Bristol Local Employment Committee, he is joint managing director of the Bristol Aeroplane Company, Limited, a director of Babcock & Wilcox, Limited, Rotol, Limited, and other companies.

MR. THOMAS OCTAVE MURDOCH SOPWITH, for services to aircraft production. Chairman of the Hawker Siddeley Group, Limited, he is also joint managing director of the Gloster Aircraft Company, Limited, and a director of A. V. Roe, Limited, and several other companies.

ORDER OF THE BATH

K.C.B.

SIR JOHN DOUGLAS COCKCROFT, F.R.S., chairman of the Defence Research Policy Committee since last year, Scientific Adviser to the Minister of Defence, and director of the Atomic Energy Research Establishment, Ministry of Supply, since 1946.

C.B.

MR. ERNEST TURNER JONES, principal director of Scientific Research (Air), Ministry of Supply.

MR. JOHN ALFRED RALPH PIMLOTT, under-secretary, Ministry of Materials.

ORDER OF THE BRITISH EMPIRE

K.B.E.

MR. JOHN ANTHONY CARROLL, Deputy Controller (Research and Development), Admiralty.

SIR GREVILLE SIMPSON MAGINNES, chairman and managing director of the Churchill Machine Tool Company, Limited, Manchester. Sir Greville's other business interests include the chairmanship of Associated British Machine Toolmakers, Limited, the deputy-chairmanship of Tube Investments, Limited, and a seat on the board of the Iron Trades Employers' Insurance Association, Limited, and the Iron Trades Mutual Insurance Company, Limited.

SIR FREDERICK ERNEST REBBECK, chairman and managing director of Harland & Wolff, Limited, Belfast. He is also on the board of Colvilles, Limited, Short Bros. & Harland, Limited, and other companies.

C.B.E.

MR. A. AGAR, chairman and managing director of Davidson & Company, Limited, engineers and ironfounders, etc., of Belfast; MR. EDMUND BRUCE BALL, a joint managing director of Glenfield & Kennedy, Limited, Kilmarnock. He is also chairman of Blackett, Hutton & Company, Limited, and Hydrautomat (1931), Limited, and a director of Alley & MacLellan, Limited; MR. F. S. BARTON, principal director of Electronic Research and Development, Ministry of Supply; MR. R. W. CHESHIRE, Deputy Chief Scientific Officer, Admiralty; MR. D. D. W. COLE, Assistant Controller (Production), Atomic Energy Establishment, Risley, Ministry of Supply; MR. B. E. COMMON, chairman of the Tyne Improvement Commission; MR. W. J. DUNCAN, Mechanical Professor of Aeronautics and Fluid Mechanics, University of Glasgow; MR. A. FAGE, superintendent, Aerodynamics Division, National Physical Laboratory, D.S.I.R.; DR. J. E. HURST, past-president of the British Cast Iron Research Association, and past-president of the Institute of British Foundrymen and of the Institute of Vitreous Enamellers. He was appointed a director of Bradley & Foster, Limited, in 1933, managing director in 1949, and deputy chairman in 1950; MR. L. LE COUTEUR, Deputy Chief Inspector of Factories, Ministry of Labour and National Service; COL. B. H. LEESON, director of the British Electrical and Allied Manufacturers' Association; MR. A. M. MOONEY, deputy director of Electrical Engineering, Admiralty; MR. C. W. MOSS, a director of Vickers-Armstrongs, Limited; MR. D. A. OLIVER, metals economy adviser, Ministry of Supply; MR. D. N. RAYNER, Director of Contracts, Ministry of Supply; MR. MICHAEL MILNE-WATSON, chairman of the North Thames Gas Board; MR. A. T. WORBOYS, chairman of the London Brick Company, Limited; MR. H. S. YOUNG, Deputy Chief Scientific Officer, Ministry of Defence.

O.B.E.

MR. A. J. BOWRON, managing director, F.N.F., Limited, textile engineers, of Burton-on-Trent; MR. W. BUCKIE, technical manager, Swan, Hunter & Wigham Richardson, Limited, Wallsend; MR. J. G. BULLEN, general manager, Highland Reduction Works, British Aluminium Company, Limited; MR. R. COUSLAND, shipbuilding manager, J. Samuel White & Company, Limited, Cowes; MR. P. H. FORD, lately works manager, Guest, Keen & Nettlefold, Limited, Birmingham; MR. J. T. GRAHAM, employer vice-chairman of the North Midland Regional Board of Industry and assistant managing director of Worthington-Simpson, Limited, manufacturers of pumps and pumping machinery, founders, etc., of Newark (Notts); MR. W. H. GRINSTED, chief engineer, Siemens Bros. & Company, Limited, of Woolwich, London; MR. G. C. LOWRY, clerk to the governors, Imperial College of Science and Technology, University of London; MR. J. C. NEEDHAM, chairman of Evershed & Vignoles, Limited, manufacturers of electrical instruments, of Chiswick, London, and a director of Thos. Walker & Son, Limited, manufacturers of nautical instruments, of Birmingham; MR. CLAUDE MEYER SPIELMAN, managing director of Whessoe, Limited, gas plant engineers, etc., of Darlington, and chairman of Durham Steelwork, Limited, Gateshead; MR. W. C. SWIFT, Assistant Director, Engineering, Ministry of Supply; MR. J. H. WIGGLESWORTH, general secretary, Iron, Steel and Metal Dressers' Trade Society.

M.B.E.

MR. W. G. ALLEN, senior experimental officer, Directorate of Electronics Research and Development (Air), Ministry of Supply; MR. A. ANSLOW, production manager, Joseph Sankey & Sons, Limited, manufacturers of pressings, stampings, etc., of Wellington (Salop); MR. E. W. ASHBY, chief tanker designer, Joseph L. Thompson & Sons, Limited, Sunderland; MR. E. B. BABLER, chief of metallurgical and general research laboratory, Allen West & Company, Limited, Brighton; MR. A. BAXTER, assistant manager, shipbuilding department, Vickers-Armstrongs, Limited, Barrow-in-Furness; MR. A. H. BLACKWELL, a director and works manager, David Brown Companies, Meltham (Yorks); MR. J. BRYCE, manager, shipyard plant department, Harland & Wolff, Limited, Belfast; MR. A. H. CARDING, works director, Smart & Brown (Machine Tools), Limited; MR. R. N. L. CLARKE, plant manager, Imperial Chemical Industries, Limited, Alkali Division; MR. S. E. DEVONALD, lately chairman, London and Southern England District, Joint District Scrap Drive Committee, British Iron and Steel Federation; MR. V. GRAY, naval architect, Cochrane & Sons, Limited; MR. W. J. HOBBS, works manager, Drayton Regulator & Instrument Company, Limited; MR. G. KING, senior research chemist, Albright & Wilson, Limited; MR. A. H. LAIDLAW, chief draughtsman, Vosper, Limited; MR. R. H. LINNELL, factory superintendent, British Thomson-Houston Company, Limited; MR. J. MACGREGOR, works manager, Thermotank, Limited; MR. F. PEARSON, manager, heavy duty cooking apparatus

(*Continued on page* 680, *col.* 2)

I.B.F. Conference Works Visits

(*Continued from page 635*)

LEYLAND MOTORS, LIMITED

Leyland Motors, Limited, are claimed to be the largest manufacturers of their type in the British Empire and have on the pay roll nearly one-third of the total employed in the British commercial vehicle industry. The firm's turnover with those of its subsidiary companies was more than £28½ million in 1952. The present company, formerly the Lancashire Steam Motor Company of 1896, was registered 32 years ago. It has an issued capital of £2,900,000, its assets to-day being valued at more than £13,000,000. Leyland products consist of heavy-duty and medium-capacity commercial vehicles with gross ratings from 10 to 22 tons, single- and double-deck buses and industrial Diesel engines.

The main factories of the company are concentrated round the original site at Leyland, where properties extend to more than 300 acres. A separate factory of over 12½ acres at Chorley, Lancs, is set aside exclusively for spare parts manufacture and repairs. Leyland vehicles are designed, engineered and manufactured in entirety by the company's own engineers and in their own factories, the whole of the manufacturing processes, including body building, being carried out in the Lancashire group of factories. Many of the castings for the vehicles are also produced, either by the subsidiary company, West Yorkshire Foundries, Limited, or in the firm's home foundry at Farington.

As at present envisaged, the I.B.F. party will inspect the foundry and the engine factory, concentrating in the latter on the machining of the combined cylinder block and crankcase which the visitors will have seen being manufactured in the foundry (Figs. 7 to 9). The Farington foundry occupies an area of 11,600 sq. ft. and consists of three bays, 350 by 65 ft., with additional subsidiary buildings. Its annual output is 10,000 tons of iron and steel castings. The majority of this output consists of cylinder castings for automobile engines, both for the company's own vehicles and for other manufacturers. A small portion of the foundry is reserved for the production of steel castings, mainly for the company's own vehicle production. The foundry also specializes in the production of centrifugally-cast cylinder liners, of which it has a steady production of approximately 1,000 a day. Equipment for the melting of steel and iron is of a modern type and sand for moulding and coremaking is prepared and conditioned in fully-mechanized plant. Of particular interest are the recently-installed furnaces for the stress-release heat-treatment of cylinder castings.

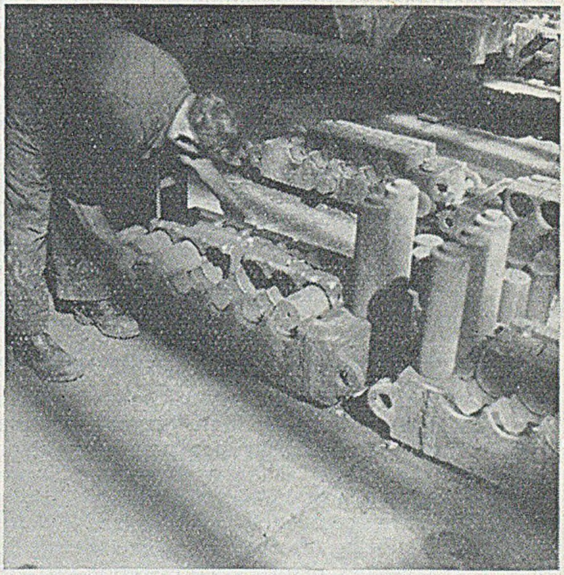

FIG. 7 (LEFT).—*Layout of the Oil-sand Coreshop at the Foundry of Leyland Motors, Limited.*

FIG. 8 (ABOVE).—*Core-assembly for a Cylinder-block Casting at Leyland Motors, Limited.*

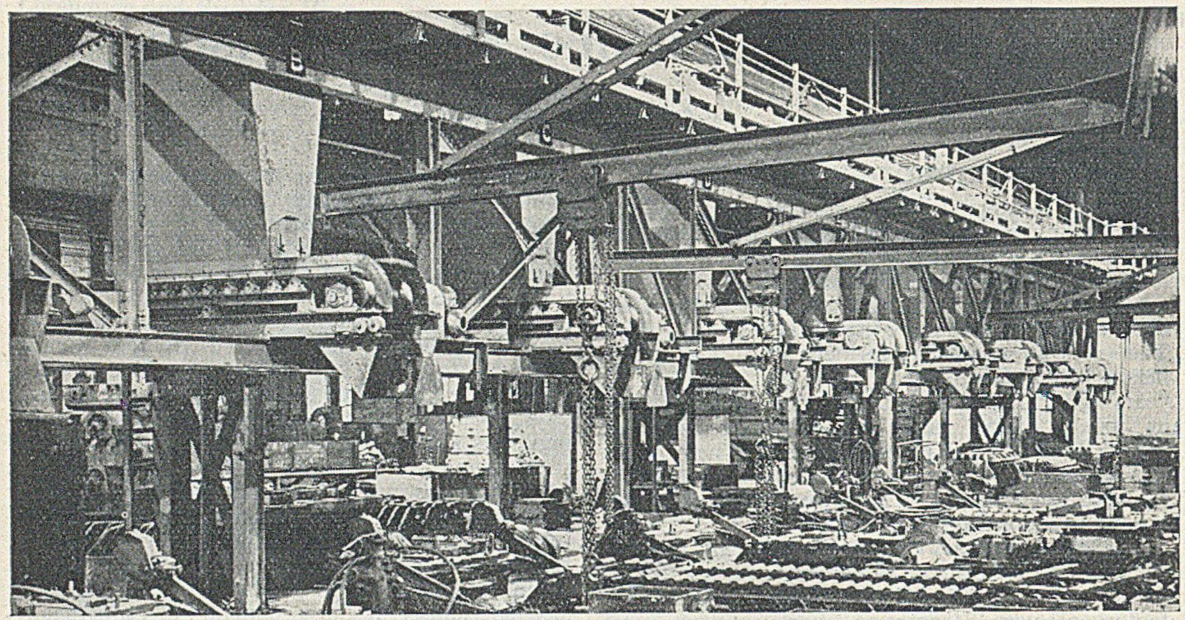

FIG. 9.—*Set-up for the Machine Moulding of Engine Castings at Leyland Motors, Limited.*

Of the three plants at Leyland, the North Works is devoted to machining and heat-treatment of vehicle parts (except for a section which manufactures fuel injectors); the South Works is chiefly for vehicle body building and the principal activity of the Farington factory, which includes the foundry, is the manufacture and assembly of engines. Also in the South Works is the Apprentices' Training Centre, while separately, theoretical training is given in the company's day continuation school. Every boy apprenticed to the company continues his general education by attending one day a week at this school, where later a technical bias is introduced into his studies. For 12 months he receives individual tuition in the use of machine and hand tools in the Training Centre before entering the works. All employees of the company are members of the Leyland Motors Social and Athletic Club, which provides for bowls, cricket, football, hockey, tennis, rifle shooting, etc.

HORWICH LOCOMOTIVE WORKS FOUNDRY

The mechanized foundry of British Railways at Horwich, one of the largest in the country, was installed to produce 51,000 tons of railway chairs and baseplates, also 17,000 tons of locomotive and carriage and wagon brake-blocks annually. It consists of two completely mechanized plants, the larger one being the chair plant and the smaller one the brake-block plant. A core section provides for both plants. The chair plant was brought into operation in September, 1950, and the brake-block plant in August, 1951. Both plants are served with raw materials from a stock gantry 630 ft. long and of 80 ft. span.

Melting arrangements consist of four 20-tons per hr. cupolas and four of 8 tons per hr. Both types are served by charger cranes using the drop-bottom design of charging skip. The production of moulds is from machines of the under-sand frame type,

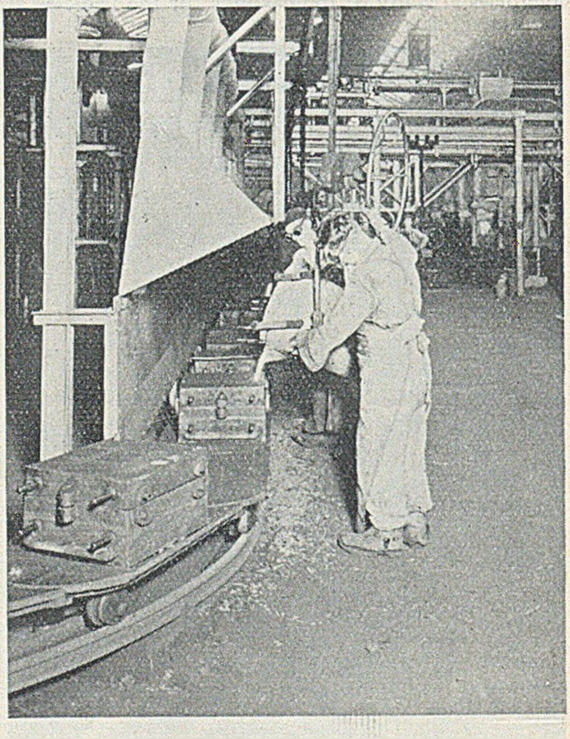

FIG. 10.—*One of the Pouring Sections at B.R. Horwich Foundry on the Plant served by the 20-ton per hr. Cupolas. Note the Exhaust Hoods.*

arranged in pairs. A roll-over and straight squeeze machine consist of one pair. Fig. 10 shows one of the pouring sections on a mould conveyor.

The sand reconditioning plant contains two 30-ton per hour continuous sand mills on the chair plant and one of similar capacity on the brake-block plant. Naturally-bonded sand is used.

An interesting feature of the plant is the fully-automatic knockout (Fig. 11) which is electrically operated and vibrates the mould, shakes out the sand and casting and conveys the box-parts to the return conveyor.

Ancillary Plant

The cooling and dressing arrangements follow the same continuous pattern as the rest of the foundry, as from the knock-out the castings pass into skips attached to a pendulum-type conveyor which runs outside the foundry for the cooling time necessary. On its return, the castings are unloaded prior to shot-blasting and fettling, which are carried out between two moving conveyors, and then pass on to the despatch section. The coremaking section installed consists of a small fully-mechanized sand-preparation plant and four vertical core-blowing machines.

A considerable amount of equipment has been installed for dust and fume extraction, together with a novel feature of washing the castings during their cooling cycle. Attached to the foundry is an amenity block containing washing facilities for personnel, a locker room and shower-baths of the modern type, having lockers for clean and soiled clothing. the building incorporating its own heating and air-conditioning plant.

BRITISH NORTHROP LOOM COMPANY, LIMITED

The works of the British Northrop Loom Company, Limited, Blackburn, is claimed to be the largest of its kind in Europe. The firm specializes in the productions of the famous Northrop fully-automatic loom, and as there are more than 40 main models of loom to cover a full range of textile fabrics woven in this country and overseas, the variety of components is extremely great.

The floor area of the premises covers 1,500,000 sq. ft. and over 2,500 operatives are employed, producing approximately 9,000 of the various models every year. The foundry has an area of approximately 180,000 sq. ft. and is set out in three bays, one 75 ft. wide and one of 50 ft. wide running the full length of the foundry building, *i.e.*, approximately 1,000 ft., as well as one shorter bay 50 ft. wide, approximately 400 ft. long. All have concrete floors, and there are three small pits for occasional heavy castings. The output is of the order of 150 to 200 tons per week, and the personnel employed is about 300. Most of the castings are produced in grey iron, but there is also a fully-equipped brass foundry housed in the main building.

Special Site Development

Care and foresight in deciding the site of the foundry buildings, coupled with extensive excavation, has resulted in the foundry yard for the storage of raw materials being adjacent to the five cupolas and on the *same level* as the cupola staging, which is approached by a concrete road. This enables all sand to be fed by gravity to the sand bunkers, and all moulding materials to be weighed and fed to the cupolas with the minimum of lifting. The centre bay is 47 ft. high to the ridge and is provided with two 5-ton cranes for carrying metal, etc. The crane

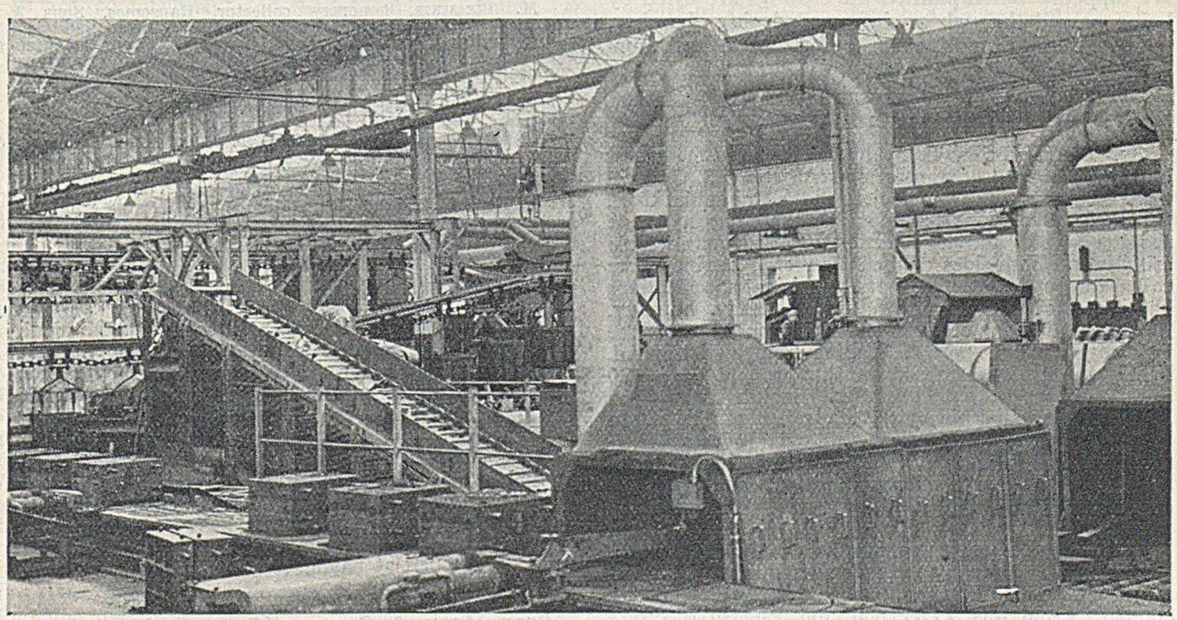

FIG. 11.—*View of Mould Pushers, Knock-out, and Ventilation Arrangements on the Chair Plant at B. R. Horwich Foundry.*

I.B.F Conference Works Visits

rail is 20 ft. from the floor level. The two main bays are provided with a sliding section of the roof 5 ft. wide, which, when open, allows for almost half the length of the bay to be uncovered at any one time, and thoroughly ventilated.

The foundry is lit by mercury-vapour lamps of 400 w. in the main bay and 250 w. in the side bays, supplied by the General Electric Company, Limited. Bathrooms, shower-baths, dressing cubicles, washing rooms, lavatories, and first-aid rooms are provided in the main foundry building.

Machinery and Plant

Most of the castings produced are small, the largest being those of the loom frame itself, running to about 5 cwt. Most are made by machine moulding with plate patterns. All the patterns are made on the premises in a very well equipped wood and metal patternshop, situated below the foundry floor.

The sand-mixing and sand-recovery plant, with the magnetic extractor, is modern, and deals adequately with all types of sand needed, reducing waste to a minimum. For filling the boxes for the larger castings, five tractor-type impeller-type sand-throwing machines are employed. The coremaking department is equipped with a continuous core-oven, and most of the cores are produced on core-blowers by women operators.

The dressing shops is equipped with rotary-table type and barrel-type shot-blasting machines, etc., together with portable pneumatic grinding and chipping tools for dressing the larger castings.

Most castings are painted immediately they are dressed, to ensure cleanliness in the machine-shops and to reduce to a minimum the work of painting the completed looms. Dipping, painting with a brush, and spraying, are all used, but most castings are dipped. When painted the castings are dried by being passed through an infra-red drying chamber, which provides quick, even drying, and a hard surface to the coating.

New "Chief Joseph Dam" Bids

Once again a British company has tendered the lowest bid for 10 big power transformers for the U.S. Government's Chief Joseph Dam project on the Columbia River. When the tender was first put out, the company made the lowest bid, and its rejection aroused considerable criticism on both sides of the Atlantic. New bids were called for on the grounds that the original specifications had been too loosely drawn up. Recently, however, the Army Bureau of Engineers announced that the English Electric Export & Trading Company, Limited, had again tendered the lowest bid, roughly £158,130 lower than the nearest U.S. offer. English Electric has reduced its original bid by the equivalent of £25,000, to £629,040, with 99.56 efficiency rating. Industrie Elettriche di Legano, of Italy, put in the next lowest bid—£653,570—with 99.51 efficiency rating, and Moloney Electric, of St. Louis, £787,200, with 99.61 efficiency rating.

The British company was, however, outbid by the U.S. Westinghouse Company on tenders to supply four generators for the dam, it was announced this week. The U.S. company's bid was £1,535,650 and English Electric's £1,570,540. The final decision on the tenders for both these contracts will be made in Washington.

Coronation and Birthday Honours List

(*Continued from page 676*)

department, William Green & Company (Ecclesfield), Limited; Mr. C. M. Plowman, adviser to the Industrial Relations Committee of the Gas Council; Mr. G. A. H. E. Poole, factory manager, Joseph Lucas, Limited; Mr. J. R. Reed, branch accountant and office manager, English Electric Company, Limited; Mr. H. N. Scott, manager, outside engineering department, Harland & Wolff, Limited; Mr. T. A. Smith, chief engineer, Alley & MacLellan, Limited, engineers and ironfounders, etc.; Mr. J. S. Thompson, chief metallurgist and production manager, Durham Chemicals, Limited; Mr. H. Turner, foundry manager, International Combustion, Limited; Mr. F. G. V. Vincent, plant engineer, Supermarine Works, Vickers-Armstrongs, Limited; Mr. F. B. Wilson, technical adviser, Guest, Keen & Nettlefolds (Midlands), Limited.

B.E.M.

T. E. Allen, working burner and machine caulker, Vickers-Armstrongs, Limited; W. Ashford, site foreman, Steel Scaffolding Company, Limited; A. Barker, senior assistant (scientific) Chemical Defence Experimental Establishment, Ministry of Supply; L. G. Blanc, mechanic examiner, Directorate of Inspection of Electrical and Mechanical Equipment, Ministry of Supply; W. H. Brown, foreman toolmaker, Ernest Stevens, Limited; A. Burdon, chargehand, Sigmund Pumps, Limited; W. T. J. Cox, radar chain installation engineer, Marconi's Wireless Telegraph Company, Limited; E. Dean, lately tool-room miller, Renold & Coventry Chain Company, Limited; W. D. Denholm, principal smith, N. Hingley & Sons, Limited, Dudley (Worcs); C. A. Downes, chief inspector, Bristol Tramways & Carriage Company, Limited, Bristol; J. Fulton, head foreman plumber, Harland & Wolff, Limited; R. Gilbert, foreman, Holman Bros., Limited; G. Glaysher, mechanic, National Physical Laboratory; J. Husbands, electrical fitter, Electric Construction Company, Limited; J. S. Jeal, centre lathe turner, Dewrance & Company, Limited; H. R. Johnson, engineering and maintenance foreman, Whessoe, Limited; D. Jones, leading hand, zinc distillation plant, National Smelting Company, Limited; L. Leach, process foreman, Magnesium Elektron, Limited, P. J. T. MacAulay, leading draughtsman, Cammell Laird & Company, Limited; A. McCulloch, chargehand, Drysdale & Company, Limited, Glasgow; W. E. Nutting, hot saw grinder, Round Oak Steel Works, Limited; E. E. Peach, foreman electrician, Patent Shaft & Axletree Company, Limited; Miss A. M. Pleasants, honorary collector, Ransomes, Sims & Jefferies' savings group, Ipswich; J. E. Prothero, electrical fitter, English Electric Company, Limited; E. Prout, machine-shop foreman, Priestman Bros., Limited; F. J. Richards, engineering craftsman Chatwood Safe & Engineering Company, Limited; C. T. Richardson, transport foreman, Hadfields, Limited; E. Simmons, chargehand coppersmith, J. Russell & Company, Limited, Liverpool; F. Thomas, head foreman loftsman, Vickers-Armstrongs, Limited; T. C. Thompson, boilershop plater, Harland & Wolff, Limited; C. Warde, tool-shop assistant foreman, Automatic Telephone & Electric Company, Limited; H. Wardle, chief foreman fitter, Walmsleys (Bury), Limited; W. J. Webber, foreman, Aluminium Wire & Cable Company, Limited.

Japan to Have a Steel Combine

As a result of competition expected due to the operation of the European Coal and Steel Pool, iron and steel manufacturers in Japan are to form a production combine. They are also calling for Government subsidies totalling more than £25,000,000 to offset the cost of pig-iron and coal.

Steelmakers have in mind to restrict production, at the expense of smaller concerns who would receive only limited supplies of pig-iron and semi-finished products and to enforce dual prices for heavy products, with export prices at international levels, and the domestic price maintained at paying levels.

Bede Metal & Chemical Company, Limited—Mr. Albert Mitchell, general manager and secretary, has been appointed a director.

Notes from the Branches

London—East Anglian Section

At the annual general meeting of the East Anglian section of the Institute of British Foundrymen, held in the Lecture Hall, Central Library, Ipswich, on April 21, with Mr. R. J. Hart presiding, the following officers were elected for the 1953-1954 session:—As *president,* Mr. H. S. Ward; as *senior vice-president,* Mr. C. N. Jennings; as *junior vice-president,* Mr. W. E. Cates; as *secretary,* Mr. L. W. Sanders; as *members of council,* Mr. Dobbie and Mr. Whipp for three years and Mr. Hipkin for two years.

The secretary, in presenting his annual report, said that during the past session the section had enjoyed a full technical programme of seven monthly meetings, the subject matters of which were as follow:—(1) Presidential address and films (" Lloyd's Nowadays " and " Making Aluminium Aircraft Cylinder Heads "); (2) Brains Trust; (3) " Synthetic-resin core-binders "; (4) French film " *Avec le Feu Sacré,*" and " Any Questions "; (5) sub-committee T.S.35's film: " Flow of Metal into Moulds "; (6) " Past, Present and Future Developments of Shell Moulding "; and (7) the annual general meeting, to be followed by " Impressions of American Jobbing Foundries." A tribute of appreciation was due to the authors and various managements whose co-operation made this varied and interesting programme possible.

On September 16, a works visit to Lake & Elliot, Limited, took place, and the visitors had an enjoyable and instructive afternoon. The annual dinner and social evening took place on November 7, and the section were honoured by the presence of the London branch president, Mr. D. Graham Bisset. Approximately 60 members were present, an increase of ten on the previous year.

Membership.—Membership, at 90, showed no change from the preceding year. The average attendance at technical sessions was 32, or approximately 35 per cent. of the total. Whilst this figure was considerably higher than most branches in the country, it should not give rise to any complacency, and the section should aim to reach 100 per cent.

On the proposal of Mr. Child, the secretary's report was adopted.

American Jobbing Foundries

After the business meeting, a talk was given by Mr. C. N. Jennings, of Ransomes & Rapier, Limited, who had visited the United States in the early autumn of 1952. It was entitled " Impressions on American Jobbing Foundries," and created much interest among the members present. Mr. Jennings' method of relating his foundry experiences, coupled with pleasing anecdotes of American cities and their way of life, was an exceptionally fine way in which to illustrate a subject so widely diverse as jobbing founding.

An interesting discussion followed, some of the points raised being given in what follows:—

MR. CARRICK asked to what extent was specialization of product and concentration of ranges encountered, and also the extent of all-union shops in America.

MR. JENNINGS replied that there was generally more concentration of ranges and considerably more specialization than in this country. The unions were based on a local agreement, which was in existence for twelve months before further revision was necessary.

MR. HART enquired whether machining allowances were smaller than in this country.

(*Continued at the foot of col. 2*)

Boron in Steel

Experience in the production and use of boron steels was described during a special meeting of the Iron and Steel Institute in London recently, and a comparison of results led to interesting discussions. Steelmakers in Britain have long been aware of the influence of boron in minute quantities on steel hardenability. They have learned, too, something of its limitations. Shortages in times of emergency have led to concentration of attention on substitute steels, and boron as an alloying element was fully investigated for this purpose. Three papers were submitted at the meeting, one by DR. H. ROHL (United States Steel Corporation) on " The Manufacture and Use of Boron Steels in the United States " and a contribution on " American Applications of Boron and Other Low-alloy Steels," by MR. H. B. KNOWLTON (International Harvester Company). The British contribution was made by MR. R. WILCOCK, whose paper on the " Effect of Boron on the Mechanical Properties of Low-alloy Steels," already published in the *Journal* of the Institute, was submitted for discussion jointly with Mr. Knowlton's paper.

Towards the conclusion of the meeting, the deliberations were ably summed up by MR. T. R. MIDDLETON (English Steel Corporation, Limited), who said there had been a good deal of scepticism in this country about the use of boron steels, but he would not like Mr. Knowlton to go back to the U.S.A. feeling that we had done nothing. On the contrary, this boron business was not new, and in the special-steel industry a good deal of work had been done. What improvements in hardenability could be brought about by boron additions were already known, but he suggested that greater hardenability was not wanted, and probably with the deep drawing qualities which represented such a large percentage of the output, boron would be fatal.

So far as the low-alloy steels were concerned, there were reasons why we in this country had not been able to do what Mr. Rohl and his collaborators had done in the U.S.A. In America there were very large tonnages of a single type of steel going into one particular product, and it could be heat-treated in specialized plant. Here a cast of steel very often had to be used for a variety of purposes not always known to the steelmaker. Another reason was that so much material was supplied in the form of heat-treated bar, and the components machined. A further reason was that certain specifications imposed an impact value.

MR. JENNINGS replied that these were very similar to those of British practice.

MR. WARD asked if more production was obtained from the Sandslinger than from the larger moulding machines.

MR. JENNINGS said that American jobbing foundries undertook a wide variety of sizes of castings, to which the Sandslinger was more suited than the larger type of moulding machine. The latter was limited in the range of moulding box sizes it would accommodate by its platform; the Sandslinger was not in any way limited, and it was possible to raise boxes from 3 ft. up to 30 ft. if and when necessary.

At the conclusion of the discussion, a vote of thanks to Mr. Jennings was proposed by Mr. Coates, who said that a feature of the lecture was the pleasing manner in which it was presented; he went on to say that he had never heard of carbon blocks being substituted for chills, which could be a source of trouble rather than the reverse, if used by an inexperienced moulder. It was interesting to note that a very wide use was made in America of coloured labour, who were paid the same rate as whites.

Imports and Exports of Iron and Steel in April

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in April. Figures for the same month in 1952 are given for the purpose of comparison, and totals for the first four months of 1952 and 1953 are also included. (All figures in tons.)

Total Exports of Iron and Steel by Destination

Destination.	Month ended April 30.		Four months ended April 30.	
	1952.	1953.	1952.	1953.
Channel Islands ..	563	517	2,323	2,302
Gibraltar	128	182	338	802
Malta and Gozo ..	144	112	653	1,212
Cyprus	554	1,169	1,461	4,870
Sierra Leone	540	1,002	1,900	2,257
Gold Coast	4,093	3,973	12,509	17,736
Nigeria	2,246	5,975	15,646	22,212
Union of South Africa	12,270	15,189	49,858	60,290
Northern Rhodesia ..	2,095	2,052	9,691	10,264
Southern Rhodesia ..	4,344	8,476	16,301	21,931
Tanganyika	1,239	1,651	7,630	6,923
Kenya	3,502	7,629	15,690	26,298
Uganda	556	1.012	3,017	2,878
Mauritius	761	838	1,867	2,976
Bahrein, Qatar, and Trucial Oman ..	1,475	2,456	5,807	9,856
Kuwait	1,200	2,349	6,907	10,068
India	9,140	7,605	25,059	26,721
Pakistan	6,394	1,869	24,660	13,397
Malaya	8,059	5,884	27,429	26,183
Ceylon	2,271	2,031	7,924	8,797
North Borneo ..	144	631	1,035	2,410
Hongkong	1,959	3,290	5,763	11,335
Australia	26,464	11,706	121,140	70,951
New Zealand	12,620	9,315	45,466	46,031
Canada	15,342	20,842	58,836	57,781
Jamaica	1,596	1,069	8,793	7,303
Trinidad	2,456	2,389	15,331	15,727
British Guiana ..	539	1,119	1,718	2,470
Anglo-Egyptian Sudan	1,526	2,292	4,089	10,468
Other Commonwealth	1,502	6,012	8,985	26,064
Irish Republic ..	4,400	4,423	21,565	19,757
Soviet Union	36	1	37	4
Finland	4,838	2,489	23,057	11,653
Sweden	9,149	4,755	37,235	27,500
Norway	5,246	5,722	21,402	22,534
Iceland	676	190	1,085	825
Denmark	6,743	6,063	32,973	31,043
Poland	18	30	50	142
Western Germany ..	110	1,836	511	2,995
Netherlands	7,727	12,443	31,011	51,130
Belgium	622	1,031	2,815	7,651
France	186	1,119	918	3,463
Switzerland	757	939	2,944	3,263
Portugal	691	653	3,245	5,546
Spain	623	1,186	1,678	2,072
Italy	1,230	2,221	5,956	16,650
Austria	32	29	160	446
Yugoslavia	55	259	2,337	1,389
Greece	249	885	1,409	1,546
Turkey	604	1,020	2,889	4,035
Netherlands Antilles..	358	344	4,030	4,677
Belgian Congo ..	309	220	1,173	861
Angola	65	1,007	1,894	2,001
Portuguese E. Africa	595	296	1,465	1,436
Canary Islands ..	10	21	372	278
Syria	185	88	720	504
Lebanon	1,437	784	5,660	2,601
Israel	1,010	699	5,566	3,045
Egypt	2,742	5,611	12,029	11,136
Saudi Arabia	401	247	2,041	981
Iraq	4,136	4,900	16,026	22,487
Iran	901	595	4,332	1,499
Burma	1,323	3,088	4,519	7,218
Thailand	891	2,005	3,066	5,008
Indonesia	1,145	2,088	4,800	4,988
China	8	19	8	90
Philippine Republic ..	215	20	1,593	662
U.S.A...	2,897	5,343	17,394	13,959
Cuba	110	698	718	1,558
Colombia	391	873	2,096	3,309
Venezuela	3,178	4,784	16,973	19,687
Ecuador	214	285	1,618	1,084
Peru	635	470	3,396	3,095
Chile	583	239	1,542	1,010
Brazil	3,440	146	8,317	1,444
Uruguay	626	71	2,398	370
Argentina	4,577	1,431	14,352	5,389
Other foreign ..	1,957	994	7,255	7,529
TOTAL	204,233	215,896	848,025	870,162

Total Imports of Iron and Steel and Origin

From	Month ended April 30.		Four months ended April 30.	
	1952.	1953.	1952.	1953.
India	111	24	155	125
Canada	8,685	14,753	22,921	53,155
Other Commonwealth countries and the Irish Republic ..	404	19,636	1,591	37,609
Sweden	2,086	1,120	9,434	7,078
Norway	6,046	3,076	23,213	20,013
Western Germany ..	7,899	1,616	32,199	9,045
Netherlands	10,233	11,996	44,528	38,495
Belgium	25,711	24,139	93,671	97,281
Luxembourg	6,120	9,469	45,142	46,171
France..	13,471	32,177	83,878	115,498
Italy	297	2,727	2,475	5,688
Austria	3,882	38,830	24,033	138,852
Japan	13,146	11,192	40,200	42,709
U.S.A...	69,463	7,380	132,167	92,816
Other foreign countries	337	4,015	2,368	22,369
TOTAL	167,891	182,150	557,975	726,904
Iron and steel scrap and waste, fit only for the recovery of metal	46,982	62,111	160,866	242,433

Exports of Iron and Steel by Products

Product.	Month ended April 30.		Four months ended April 30.	
	1952.	1953.	1952.	1953.
Pig-iron	181	280	1,122	2,203
Ferro-tungsten ..	26	—	75	21
Other ferro-alloys ..	316	231	1,426	956
Ingots, blooms, billets, and slabs	15	36	123	160
Iron bars and rods ..	416	173	1,326	779
Wire rods	58	161	397	3,963
Bright steel bars ..	913	1,104	4,396	5,895
Alloy steel bars and rods	1,600	1,419	5,340	5,626
Other steel bars and rods	7,863	8,653	37,244	36,443
Angles, shapes, and sections	9,178	9,776	45,183	42,839
Iron and other castings and forgings ..	723	1,110	4,003	3,820
Girders, beams, joists, and pillars (rolled)	2,840	1,689	12,302	7,942
Hoop and strip ..	4,874	3,362	18,077	15,908
Iron plates and sheets	88	90	190	162
Tinplate	28,404	15,331	99,454	89,914
Tinned sheets ..	133	98	486	611
Terneplates and decorated tinplates ..	81	31	293	486
Other steel plate (¼ in. thick and over) ..	16,551	18,496	77,309	80,488
Galvanized sheets ..	5,503	8,308	21,658	32,675
Black sheets	11,632	9,356	46,297	44,070
Other coated plates and sheets	1,141	885	3,977	3,736
Cast-iron pipes up to 6 in. dia.	6,721	7,566	30,049	28,011
Do., over 6 in. dia. ..	6,021	7,138	22,198	24,373
Wrought-iron tubes ..	32,450	40,836	144,245	151,331
Railway material ..	18,093	28,254	69,475	90,537
Wire	4,608	5,066	18,719	19,136
Cable and rope ..	2,648	3,139	9,843	11,733
Wire nails, etc. ..	1,308	2,283	5,684	6,053
Other nails, tacks, etc.	574	575	2,404	1,459
Rivets and washers ..	531	412	2,125	1,783
Wood screws	392	232	1,497	780
Bolts, nuts, and metal screws	2,233	1,742	9,121	6,896
Baths	1,811	391	7,040	1,444
Anchors	958	1,153	3,624	3,823
Chains, etc.	1,048	862	3,825	3,252
Springs	568	720	2,091	1,892
Holloware	7,617	8,812	31,476	36,481
Doors and windows ..	1,694	1,512	7,189	6,994
TOTAL, including other manufactures not listed above	204,233	215,896	848,025	870,162

Personal

MR. R. W. M. MACALPINE has been appointed assistant manager of the London district office of the British Thomson-Houston Company, Limited.

MR. EDWARD C. HOUSTON, chief metallurgist since 1937, has been appointed works manager of the Blochairn works of the Steel Company of Scotland, Limited.

MR. GEORGE CALLADINE has now returned to Glow-Worm Boilers, Limited, Milford, near Derby, after a five-week business trip to Kenya and Tanganyika, where he visited the company's agents.

MR. J. C. M. MACLAGAN, managing director of Greenwood & Batley, Limited, engineers, machine-tool makers, etc., of Leeds, has been appointed a part-time member of the Yorkshire Electricity Board.

MR. N. A. JENKINSON has been appointed London manager of the crane department of Babcock & Wilcox, Limited, engineers and boilermakers, etc., of London, E.C.4, on the retirement of MR. A. MERRY.

MR. HOWARD FAIRBAIRN, head of the die drawing office at the Birmingham Aluminium Casting (1903) Company, Limited, and superintendent of the toolroom there, is leaving the firm at the end of June.

CAPTAIN (E) WILLIAM GREYSON, M.SC., R.N.R.—a past-president—has been elected an honorary member of the Institution of Mechanical Engineers. He is head of the marine department of the Babcock and Wilcox group.

DR. C. J. DADSWELL, president of the Institute of British Foundrymen, in collaboration with Mr. J. E. Russell and Mr. R. Fielding, is to present a paper to the Automobile Division of the Institution of Mechanical Engineers on July 2.

MR. R. M. ARNOLD has been appointed deputy manager of the outside department of C. A. Parsons & Company, Limited, engineers, turbine makers, etc., of Newcastle-upon-Tyne; MR. J. M. HILL is now in charge of the outside erection pipe division.

MR. MATTHEW ALEC SWAIN has become chairman of Matthew Swain, Limited, Manchester, in succession to his father the late Mr. Matthew E. Swain; MR. ROBERT DAVID SWAIN has been elected to the Board of the company and MR. RICHARD CRAWSHAW remains as managing director.

THE EARL OF HALSBURY, managing director of the National Research Development Association, has become chairman of the National Institute of Industrial Psychology, succeeding General SIR RONALD ADAM, the Institute's chairman since 1947. He is a member of the Advisory Council on Scientific Research and chairman of the Science Museum Advisory Council.

I.B.F. Conference Handbook.—The handbook of the 50th Annual Conference of the Institute of British Foundrymen covers in full detail the various items organized for the instruction and entertainment of the participants. It is almost incredible to think of Blackpool as a foundry centre, yet works in Accrington, Horwich, Trafford Park, Blackburn, Barrow and Leyland are to be visited. For the ladies, a well-balanced programme has been arranged. There are to be a mannequin parade, visits of historic and industrial interest, plus, of course, the annual dinner and a supper/dance in conjunction with the menfolk.

Heat-treatment of Nodular Cast Irons

An investigation of the effect of heat-treatment upon the hardness, microstructure and combined carbon content of some nodular cast irons is the subject of a paper by JAMES H. BARNETT in the Quarterly of the Colorado School of Mines (Vol. 47, No. 1). The author alleges that at the present time, there is practically no published material available which describes the changes in microstructure and hardness of nodular cast irons as a result of direct quenching from various temperatures, both above and below the critical temperature of the material. It was for the purpose of securing such information that the study reported was undertaken. The major purposes of the problem were:—(1) To determine the effect of soaking time and quenching temperature upon the microstructure, combined carbon content and hardness of several nodular cast irons, and (2) to determine whether nodular cast irons which were nodulized by using different nodulizing compounds behave in the same manner upon being quenched from the same temperatures.

According to the author, the following observations seem to be justified, based on the data obtained:—(1) Nodular iron, as cast, has good properties, especially when compared with most ordinary grades of grey cast iron; these can be further improved by suitable heat-treatment. (2) Cementite decomposes in nodular iron at temperatures commonly used in the annealing of malleable iron, but it forms tiny spheroids of graphite instead of flake or temper graphite. (3) Final traces of pearlite in nodular-iron microstructures are relatively persistent and are broken down only after exposure to high temperatures for long periods of time. (4) Mg/Ni nodular irons are hardenable to such a degree that their use in highly wear-resistant applications seems feasible. (5) Pearlite in the matrix of nodular cast irons may be removed by holding the iron at sub-critical temperatures as in the second-stage annealing of malleable cast iron. (6) With the Mg/Ni nodular iron investigated, the temperature required to produce the expected tempered microstructure in quenched specimens is higher than 1,000 deg. F. (540 deg. C.) when tempering periods of three hours or less are used. (7) Nodular iron is a versatile ferrous product the characteristics of which, with proper treatment, can be changed so that it will meet any one of a number of different requirements.

Largest Castings in Scotland?

William Beardmore & Company, Limited, Glasgow, are at present engaged on an order for six castings, believed to be the largest yet in Scotland and the second largest turned out in Britain. Each of the castings requires 210 tons of carbon steel and is 30 ft. in length. They have been ordered by an American firm working for the U.S. defence programme, and are for die-forging presses, presumably for the aircraft industry. The first two have already been shipped to America, and the third is expected to follow shortly. A special wagon was used to transport the castings to Finnieston Quay for loading, and they were moved from the foundry to the dock on Sundays to avoid any possible dislocation of normal traffic.

ELLIOTT BROTHERS (LONDON), LIMITED—Mr. Charles Marcus, Mr. J. G. Beevor, and Mr. E. O'Hanrahan have been appointed to the board.

News in Brief

PLANS have been drawn up by Seagers, Limited, Overy Street Ironworks, Dartford, Kent, to erect a new foundry and fettling shop.

LAST SATURDAY 1,400 employees travelled in 44 coaches from the works of Richard Sutcliffe, Limited, of Horbury, near Wakefield, on a visit to Skegness for the works outing.

ACCLES AND POLLOCK brigade won the principal trophy, the Captain Arthur Mitchell aggregate cup, in the 11th annual competitions of the Smethwick and District Industrial Fire Brigades Association on May 30.

IN MARKING its 25th anniversary, Aluminium, Limited, of Canada, reports that in the quarter-century its annual production has risen from 40.000 to about 500,000 short tons, and the total assets from $71 million to $972 million.

THE ANNUAL REVIEW of the Organization for the Interchange of Technical Publications in Sheffield reports a heavy demand for the research bibliography issued by Sheffield City Science and Commerce Library, dealing with the shell-moulding process.

GERALD WAKEHAM, LIMITED, sales and servicing agents for Beckmeter pumps, have moved from Blythwood Square to more commodious premises at 1, Clifton Street, Glasgow. The firm have recently been appointed Scottish agents for Weaver garage equipment.

UNDER A NEW TRADE PACT worth $10,000,000 Japan will include in her exports to Sweden iron and steel, shipbuilding materials, chemicals, and machinery in return for Swedish machinery, implements, iron and steel products, potassium, and other products.

MR. A. F. C. GARDNER, of Gibbons Brothers, Limited, has been appointed general manager (northern) and will conduct the business of the company from their north-eastern office, at "Cranbourne," Egglescliffe, nr. Stockton-on-Tees, Co. Durham.

STARTED AS A PARTNERSHIP in 1853 by two brothers, Greenwood and William Craven, who were working mechanical engineers in Manchester, Craven Bros. (Manchester), Limited, machine-tool makers, etc., of Reddish, near Stockport, celebrates its centenary this year.

FOUNDRYMEN of Israel have formed a technical association. At the preliminary meeting, Mr. Alexander Kremener occupied the chair and the president and officers are to be elected at a forthcoming general meeting. There are now 127 foundries of all types in the country.

THE GROUP TRADING PROFIT, after depreciation, of John Lysaght, Limited, the holding company in which Guest, Keen & Nettlefolds, Limited, holds a controlling interest, for the 53 weeks ended January 3, 1953, was £1,233,044 compared with £708,364 for the 52 weeks of the preceding year.

THE WORLD'S second aluminium alloy "movable parts" bridge has been completed and shipped to Aberdeen by Head Wrightson Aluminium, Limited, Thornaby-on-Tees, and will be used to span the 70-ft. wide entrance to the Victoria Dock. The first bridge of this type was built by the company five years ago.

BRITISH RESIN PRODUCTS, LIMITED, on stand B.2 at the British Plastics Exhibition which opened at Olympia, London, on June 8 (until June 18), includes Cellobond shell-moulding resins, and shell moulds and castings produced from them will be displayed on the stand. Another section will be devoted to core-binding resins.

PLANS for extending the Rutherglen steelworks of A. G. McFadden have been approved. The estimated cost is £11,000 for the first development and £30,000 for the whole scheme. It is proposed to demolish old buildings and erect three bays with an overhead gantry. The scheme will be tackled in stages, one or two years for each stage.

WILD-BARFIELD ELECTRIC FURNACES, LIMITED, announce that the address of their new Scottish office is 147, Bath Street, Glasgow, C.2 (phone Douglas 8839). The office is in charge of Mr. D. McDermott, who is also the sales and service engineer of an associate company, G.W.B. Electric Furnaces, Limited, and a subsidiary, Applied Heat Company, Limited.

THE GLASGOW FIRM of A. & W. Smith, Limited, makers of sugar-cane machinery, have secured a contract valued at £500,000 from the Pakistan Industrial Development Corporation for the machinery for a complete sugar factory capable of crushing 1,200 tons of cane per day. The firm, founded in Paisley in 1837, recently came under the control of the sugar-refining group headed by Tate & Lyle, Limited.

LEY'S MALLEABLE CASTINGS COMPANY, LIMITED, and the Ewart Chainbelt Company, Limited, Derby, will entertain more than 600 employees who have completed 21 yrs' service to a Coronation dinner in October. At the dinner, nine employees with 40 yrs' service will be presented with long-service certificates and a cash award. Employees with 21 yrs' service will receive clocks or watches according to their choice.

AT THE Combustion Engineering Association conference to be held on June 23, at the Engineers Club, Albert Square, Manchester, 2, the following papers will be read:—"The Available Fuel," by R. A. Howson; "Smokeless Firing in Domestic Premises," by W. C. Moss; "Smokless Firing in Commercial Premises," by E. Murphy and E. L. Tinley; "Smokeless Firing in Industrial Premises," by S. N. Duguid.

REYNOLDS TUBE COMPANY, LIMITED, Tyseley, Birmingham, made the lightweight aluminium-alloy cylinders in which the oxygen used by the men who conquered Everest was carried. A statement from the firm said that these cylinders showed considerable advantages over similar equipment in steel, affording a marked reduction in size and weight without a corresponding decrease in the amount of oxygen which could be carried.

FOUNDRY WORKERS employed by Joseph Bloomer & Sons, Limited, Cradley Heath, have succeeded in their claim that the company should implement the terms of the national agreement of last November when an increase of 7s. 4d. was granted to engineering operatives. The claim hinged on an adjustment to piecework rates on which the company said an arrangement was made with the works committee in June, 1952, because these rates were then very high, and because the firm was compelled to reduce prices to customers owing to keener competition resulting from the recession in the industry. The Tribunal made the award retrospective to last December.

THE WEST RIDING foundry and engineering firm of David Brown & Sons (Huddersfield), Limited, have secured through their Canadian associate, David Brown (Canada), Limited, Toronto, in face of keen American competition, an order worth £15,000 from the Aluminium Company of Canada, Limited, for 350 small gear units. The Aluminium Company of Canada are the world's largest producers of light metals, and the gear units are to be used in the vast Nechako-Litimat project in North-West British Columbia, in which region the natural water-power resources of an area covering 335 square miles are being harnessed for the production of aluminium.

Raw Material Markets

Iron and Steel

The Coronation holiday curtailed the production of castings, but this has not inconvenienced users in any way, as deliveries against orders in hand are generally well up to schedule. Some of the engineering and jobbing foundries are receiving more orders, but, generally speaking, foundries can easily meet requirements and would welcome a larger influx of business. The busiest foundries are those supplying steelworks, collieries, and machine-tool makers, and they are taking up good tonnages of low- and medium-phosphorus pig-iron and hematite.

Production of foundry grades is sufficient to meet requirements, but there is no appreciable surplus, even though consumption is at present restricted, and here, perhaps, is a warning for the future. A revival in the demands for castings could easily find supplies of common foundry irons short of requirements. At the moment, foundries are taking no more iron than is needed for immediate requirements. There is little buying for stock. It is for each foundry, according to individual circumstances, to decide how wise is this procedure. The view at the moment seems to be that there is no point in buying ahead. Yet there can be no immediate likelihood of a fall in prices of pig-iron. And as regards output, practically everything that can be produced is absorbed. The great demand at the moment is for basic-steel making pig-iron. A fall in the call for steel would make more iron available for foundry purposes. On the other hand, if the demand for steel is upheld, and concurrently there is an increased demand for foundry iron, it is difficult to see how the latter could be met.

Supplies of semi-finished steel are now causing less concern to the re-rollers, partly due to better deliveries from home and Continental sources, but more particularly to a decline in orders from abroad for bars and sections. Sheet re-rollers also are looking for orders, particularly for thin sheets.

The call for heavy finished steel products is still ahead of the supply, but makers are reducing their arrears of orders and, if the present rate of output is maintained, producers may soon overtake them. Demand for plates is still far in excess of the production.

Non-ferrous Metals

The afternoon trading session on the London Metal Exchange was cancelled on the day preceding the Coronation and on Tuesday the exchange was, of course, closed. In the shortened week trading was fairly active, however, and all the markets were lively and interesting. Tin, although it shared in the upward movement during the first half of the week, turned weak last Friday and on balance cash closed lower by £7 10s. and three months by £10. Consumption of this metal has shown some signs of declining and April was a particularly poor month, the tonnage used being only about 1,400 tons. At one time last week zinc touched £73, rather surprisingly, for demand is far from good in this country at present. But the close was £71 7s. 6d. for sellers of June and £70 17s. 6d. for September, showing gains of £2 7s. 6d. and £1 12s. 6d., respectively. Why a backwardation of 10s. should have arisen is a complete puzzle. Lead also closed better, but well below the best level reached during the week's trading. June gained £3 15s. and September £2 10s., the backwardation on Friday last being £4. It looks as if a condition of permanent scarcity on the London market were developing, and a premium for the current month has, unfortunately, come to be accepted almost as inevitable. This is not as it should be, and as a hedging medium the London lead market is next door to useless.

The British Bureau of Non-ferrous Metal Statistics has issued its figures for the month of April. Consumption of copper in the United Kingdom was no more than 16,108 tons of virgin and 18,651 tons of scrap, the total of 34,759 tons comparing with 39,359 tons in the previous month. Stocks again increased—from 149,177 tons at March 31 to 165,385 tons at April 30. Stocks of lead were 17,144 tons, against 13,781 tons a month earlier, while usage of this metal, including scrap and remelted, amounted to 24,869 tons, compared with 25,226 tons. Consumption of zinc dropped to 20,421 tons from the March total of 21,662 tons, these figures including virgin, remelted zinc, and scrap. Our stock of virgin zinc at April 30 was 30,821 tons, a considerable advance on the March figure of 23,783 tons. Usage of tin was very poor at 397 tons, which was in sharp contrast to 1,726 tons during the previous month. Stocks at April 30 were 3,335 tons.

The following official tin prices were recorded:—

Cash—June 4, £725 to £727 10s.; June 5, £710 to £712 10s.; June 8, £682 10s. to £685; June 9, £685 to £687 10s.; June 10, £690 to £692 10s.

Three Months—June 4, £725 to £727 10s.; June 5, £710 to £712 10s.; June 8, £682 10s. to £685; June 9, £685 to £687 10s.; June 10, £690 to £692 10s.

Official prices of refined pig-lead were:—

June—June 4, £88 5s. to £88 10s.; June 5, £87 to £87 10s.; June 8, £84 10s. to £85; June 9, £85 to £85 10s.; June 10, £84 10s. to £85.

September—June 4, £84 5s. to £84 10s.; June 5, £83 to £83 10s.; June 8, £80 10s. to £81; June 9, £81 5s. to £81 10s.; June 10, £80 15s. to £81.

Official zinc quotations were as follow:—

June—June 4, £72 15s. to £73; June 5, £71 5s. to £71 10s.; June 8, £69 15s. to £70; June 9, £69 15s. to £70; June 10, £69 15s. to £70.

September—June 4, £72 5s. to £72 10s.; June 5, £71 to £71 10s.; June 8, £69 15s. to £70; June 9, £69 10s. to £70; June 10, £69 10s. to £69 15s.

Institute of Physics

At the annual general meeting of the Institute of Physics held on May 29, Dr. C. Sykes, F.R.S. (managing director, Thos. Firth & John Brown, Limited, Sheffield) was re-elected *president*. Prof. F. A. Vick was elected a *vice-president*, Dr. S. Whitehead was re-elected *honorary treasurer* and Dr. B. P. Dudding *honorary secretary*. The two new ordinary members of the Board elected were Mr. A. T. Pickles and Dr. P. S. H. Henry.

Prof. A. M. Tyndall, C.B.E., F.R.S., was elected to honorary Fellowship, the highest honour which the Institute can bestow. Prof. Tyndall was Professor of Physics in the University of Bristol for many years and is known for his distinguished fundamental work on the mobility of ions and for his services to science and education. He is a founder Fellow of the Institute and a past president.

WHEN 171 long-service employees of N. Hingley & Sons, Netherton, were entertained by the company to a dinner and concert on June 6, it was revealed that their aggregate service totalled 8,208 yrs., an average of 48 yrs. each. The record was held by Mr. Joseph Morgan, who has worked for the firm for 67 yrs., while Mr. Walter Coley and Mr. Edward Dunn each had 63 yrs.' service. The guests were welcomed by Mr. C. E. Lloyd, chairman of the firm.

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

(Delivered unless otherwise stated)

June 10, 1953

PIG-IRON

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

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

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

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

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

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

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

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered).

Ferro-silicon (6-ton lots).—40/55 per cent., £57 10s., basis 45 per cent. Si, scale 21s. 6d. per unit; 70/84 per cent., £86, basis 75 per cent. Si, scale 23s. per unit.

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

Ferro-molybdenum.—65/75 per cent., carbon-free, 10s. to 11s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £204 to £210 per ton; 38/40 per cent., £235 to £265 per ton.

Ferro-tungsten.—80/85 per cent., 22s. 10d. to 23s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 25s. 9d. to 28s. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent. C, £85 4s., basis 60 per cent. Cr, scale 28s. 3d. per unit: 6/8 per cent. C, £80 17s., basis 60 per cent. Cr, scale 26s. 9d. per unit; max. 2 per cent. C, 2s. per lb. Cr; max. 1 per cent. C, 2s. 2½d. per lb. Cr; max. 0.15 per cent. C, 2s. 3½d. per lb. Cr; max. 0.10 per cent. C, 2s. 3¾d. per lb. Cr; max. 0.06 per cent. C, 2s. 4d. per lb. Cr.

Cobalt.—98/99 per cent., 20s. per lb.

Metallic Chromium.—98/99 per cent., 6s. 5d. to 7s. 6d. per lb.

Metallic Manganese.—93/95 per cent., carbon-free, £262 to £275 per ton; 96/98 per cent., £280 to £295 per ton.

Ferro-columbium.—60/75 per cent., Nb + Ta, 40s. to 70s. per lb., Nb + Ta.

SEMI-FINISHED STEEL

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

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

Sheet and Tinplate Bars.—£25 11s. 6d.

FINISHED STEEL

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

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £32 4s. 6d.; flats, 5 in. wide and under, £32 4s. 6d.; hoop and strip, £32 19s. 6d.; black sheets, 17/20 g., £41 6s.; galvanized corrugated sheets, 24 g., £50 13s. 6d.

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

Tinplates.—57s. 9d. per basis box.

NON-FERROUS METALS

Copper.—Electrolytic, £252; high-grade fire-refined, £251 10s.; fire-refined of not less than 99.7 per cent., £251; ditto, 99.2 per cent., £250 10s.; black hot-rolled wire rods, £261 12s. 6d.

Tin.—Cash, £690 to £692 10s.; three months, £690 to £692 10s.; settlement, £692 10s.

Zinc.—June, £84 10s. to £85; September, £80 15s. to £81.

Refined Pig-lead—June, £69 15s. to £70; September, £69 10s. to £69 15s.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £98 10s.; rolled zinc (boiler plates), all English destinations, £96 10s.; zinc oxide (Red Seal), d/d buyers' premises, £90.

Other Metals.—Aluminium, ingots, £161; magnesium, ingots, 2s. 10½d. per lb.; antimony, English, 99 per cent., £225; quicksilver, ex warehouse, £70 5s. to £70 10s. (nom.); nickel, £483.

Brass.—Solid-drawn tubes, 23¼d. per lb.; rods, drawn, 32⅜d.: sheets to 10 w.g., 257s. 3d. per cwt.; wire, 30¼d.; rolled metal, 244s. per cwt.

Copper Tubes, etc.—Solid-drawn tubes, 28⅞d. per lb.; wire, 282s. 9d. per cwt. basis; 20 s.w.g., 311s. 9d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £160 to £218; BS. 1400—LG3—1 (86/7/5/2), £172 to £238; BS. 1400—G1—1 (88/10/2), £254 to £275; Admiralty GM (88/10/2), virgin quality, £254 to £300 per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £275 to £305; L.P.Bl, £215 to £275 per ton.

Phosphor Bronze.—Strip, 368s. per cwt.; sheets to 10 w.g., 389s. 9d. per cwt.; wire, 45⅝d. per lb.; rods, 40¼d.; tubes, 38½d.; chill cast bars: solids 3s. 3d., cored 3s. 4d. (C. Clifford & Son, Limited.)

Nickel Silver, etc.—Ingots for raising, 2s. 5¾d. per lb. (7 per cent.) to 3s. 8¾d. (30 per cent.); rolled metal, 3 in. to 9 in. wide × .056, 2s. 11¾d. (7 per cent.) to 4s. 2¾d. (30 per cent.); to 12 in. wide × .056, 3s. to 4s. 3d.; to 25 in. wide × .056, 3s. 2d. to 4s. 5d. Spoon and fork metal, unsheared, 2s. 8¾d. to 3s. 11¾d. Wire, 10 g., in coils, 3s. 6½d. (10 per cent.) to 4s. 8¾d. (30 per cent.). Special quality turning rod, 10 per cent., 3s. 5½d.; 15 per cent., 3s. 11¼d.; 18 per cent., 4s. 4d. All prices are net.

Obituary

Mr. Robert Walter Swinburne, formerly stainless steel department engineer, of Samuel Fox & Company, Limited, steel makers and rollers, of Stocksbridge, near Sheffield, has died.

Mr. F. S. Towle, a director of Wm. Doxford & Sons, Limited, engineers and shipbuilders, of Sunderland, and of Adams & Benson, Limited, iron and steel stockholders, of West Bromwich, died last month.

Mr. Percy Stapleton, secretary of John Baker & Sons, Limited, crucible steel and file makers, of Sheffield, died recently. Formerly he had been secretary of Yorkshire Amalgamated Products, Limited, quarry owners, moulding sand and fireclay producers, of Doncaster, for 31 years.

The first of 34 refrigerator wagons built by Cravens Railway Carriage & Wagon Company, Limited, Sheffield, for Rhodesian railways, has been shipped.

Richard Haughton, Limited, precision engineers and ironfounders, of Nelson (Lancs), has purchased the Bankhouse Ironworks of George Keighley, Limited, Burnley.

Goulds Foundries, Limited, have intimated that their works will be closed for the despatch and receipt of goods from 4 p.m., Friday, July 24, to 7.30 a.m., Monday, August 10, for the annual works holiday.

Following a scheme for an exchange of technical information on similar products manufactured in the United States, Mr. R. R. Richards, of the Koehler Manufacturing Company, Marlboro', Massachusetts, has visited Oldham & Son, Limited, storage battery and safety lamp manufacturers, etc., of Denton, Manchester, for technical discussions.

B.I.C.C. Profit Record

"It may well be claimed that the group during 1952 has worked seven months for the Inland Revenue," says the chairman of British Insulated Callender's Cables, Limited, London, W.C.1, in his statement with the annual report. Reviewing the activities of the group, Sir Alexander Roger says that the total profits were a record at £9,423,182. After making various charges and provisions the amount left available was £8,333,581, out of which £4,869,146, or 58 per cent., was absorbed by taxation. The world-wide turnover of the group for the year under review was approximately £85,000,000. Trading profits of the parent company for 1952 were £6,020,851—an increase of £1,435,183 over the figure for 1951.

There are now 39 companies in the group. Direct exports by them in 1952 were worth approximately £20,000,000, an increase of £3,000,000 over 1951. A $12\frac{1}{2}$ per cent. increase in the overall volume of output is attributed to the improvement in copper supplies. The increase was spread, but an all-time record throughout in the rolling mills of almost 80,000 tons of copper and aluminium, is worthy of particular mention.

At an exhibition of commerce and industry recently opened at India House, London, heavy industry is mainly represented by photographs of industrial projects organized under the five-year plan which started in 1951.

Alteration to Iron and Steel Board. When discussing the change in the composition of the Iron and Steel Board the name of the resigning member was incorrectly given in a few copies of the Journal of May 28 (page 29) as Mr. Weaver—it should, of course, have been Mr. Beard.

CLASSIFIED ADVERTISEMENTS

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

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

SITUATIONS WANTED

YOUNG Assistant Foundry FOREMAN (24) (H.N.C. and City and Guilds) desires change. Laboratory trained; excellent works experience. Willing to undergo further training, if necessary. Any similar post with prospects will appeal. Yorks area preferred.—Box 3528, FOUNDRY TRADE JOURNAL.

WANTED: position of Foreman-Manager, ferrous or non-ferrous; take full responsibility of small Foundry; life experience; prospective accommodation.—Box 3503, FOUNDRY TRADE JOURNAL.

PRACTICAL FOUNDRYMAN, thirty years' experience, seeks post with small Foundry; willing to build up foundry if run down; capable of training labour; Managerial qualifications. — Box 3504, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN / MANAGER wants position full charge small foundry Midlands; 44; M.I.B.F.; fully practical, rates, costs, sales; not afraid work, responsibility.—Box 3520, FOUNDRY TRADE JOURNAL.

GENERAL / FOUNDRY MANAGER, M.I.B.F., A.M.I.P.E., Inter. B.Sc. (Eng.); 45; greatly interested in position offering prospects, security; life experience High Duty, Grey, Malleable (Whiteheart), Non-ferrous; specialist economic production, administration, sales, costs, commercial; practical foundryman, metallurgist; wide knowledge modern methods, contacts: small foundry Midlands preferred; immediate salary secondary, prove ability salary/results basis.—Box 3521, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

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

EXPERIENCED WORKING FOREMAN required for Aluminium Gravity Diecastings Department, Lancashire.—RANGEMASTER (BLACKBURN) Co., Blakewater Street, Blackburn, Lancs.

REPRESENTATIVE required by well-known bronze foundry, manufacturing all types sand castings, maximum 2 tons. For area London including Home Counties. Salary and commission. Great opportunity for experienced man with live connections among buyers of sand and chill castings. Existing accounts will be handed over and the appointment carries remuneration at present worth four figures per annum. — Write in confidence: Managing Director, CHARLES CARR LTD., Grove Lane, Smethwick, 40, Staffordshire.

SITUATIONS VACANT—*Contd.*

FURNACE MAN, experienced, required for light alloy diecasting foundry; Croydon area.—Box 3513, FOUNDRY TRADE JOURNAL.

DIRECTOR of Small Iron Foundry in North-Western Area would like to represent Malleable (Blackheart and Whiteheart) Iron Foundry in this area on Agency or Representative basis.—Box 3525, FOUNDRY TRADE JOURNAL.

REPRESENTATIVE wanted by established Foundry Suppliers. Applicants should state age, experience, and salary expected. Must be able to drive car.—Box 3526, FOUNDRY TRADE JOURNAL.

YOUNG Man required, with Foundry and Metallurgical experience, to train as JUNIOR REPRESENTATIVE. State age, experience, and salary required. —Box 3527, FOUNDRY TRADE JOURNAL.

MELTING SUPERINTENDENT required for Melting and Casting Shops at Metal Works near London. Sound engineering knowledge a condition, previous experience an asset.—Write Box B.827, WILLING'S, 362, Grays Inn Road, London, W.C.1.

WANTED.—FOUNDRY ENGINEER, to be responsible for Maintenance, New Plant and Layouts in Mechanised Foundry. General engineering, drawing office and foundry experience desirable.—HENRY WALLWORK & CO., LTD., Red Bank, Manchester.

ASSISTANT required for Metallurgical Laboratory. Applications, which will be treated as confidential, stating age, details of career and salary expected, are invited from those with experience in metallurgical analysis, cupola operation, and sand control.—DAVEY, PAXMAN & CO., LTD., Colchester.

FOUNDRY FOREMAN required for small jobbing foundry (iron and non-ferrous), Liverpool area. Excellent possibilities and remuneration to right man, who will be solely responsible for control of both Foundry and Pattern Shop.—Full details of age, experience, and salary required should be sent to Box 3524, FOUNDRY TRADE JOURNAL.

ELECTRICAL ENGINEER required for Integrated Iron and Steel Works. Applications are invited from Electrical Engineers who have had full practical training and experience in the operation and maintenance of large electrical installations, including generation, E.H.T. and L.T. distribution and heavy machinery.

Apply by letter, with full particulars of age, training, qualifications, experience and salary required, to THE CHIEF ENGINEER, Workington Iron & Steel Company, Workington, Cumberland.

SITUATIONS VACANT—*Contd.*

FOUNDRY METALLURGIST for Modern Mechanised Non-Ferrous Foundry required to take charge of Physical and Chemical Laboratories and maintain high standard of production control at all stages of process. Analytical experience essential. Must be a man with definite initiative and leadership. Excellent prospects, salary according to qualifications and experience.—Box 3510, FOUNDRY TRADE JOURNAL.

N.W. LONDON. — Non - ferrous Foundry, wishing to expand, requires REPRESENTATION or AGENT (full- or part-time), with good connections and ideas. Lucrative inducements offered to right person. Strict confidence observed.—Box 3519, FOUNDRY TRADE JOURNAL.

LARGE IRON FOUNDRY, West Birmingham, requires a LABORATORY ASSISTANT. Knowledge of sand control and cast iron analysis preferred, but not essential.—Please state experience and salary expected to Box 3518, FOUNDRY TRADE JOURNAL.

ALLIED IRONFOUNDERS, LTD., invite applications for the posts of PLANT ENGINEER and PRODUCTION ENGINEER, for their new factory in Melbourne, Australia. The posts carry considerable responsibility and technical training, and Industrial experience in highly mechanised Foundry Maintenance and general Works Planning and Production Control are essential.—Applications to the SECRETARY, Allied Ironfounders, Ltd., 28, Brook Street, London, W.1.

FOUNDRY FOREMAN required for small Iron foundry in West Riding, engaged on Machine Tool castings up to 7 tons. Must be capable administrator and experienced in control of labour.—State age, experience, and salary required to Box 3511, FOUNDRY TRADE JOURNAL.

REQUIRED, by old-established firm, YOUNG TECHNICIAN, qualified as enamelling chemist, but also with some experience of foundry work. Position holds prospect of appointment abroad in administrative capacity.—Apply, in confidence, with full particulars of training and experience, to Box 3515, FOUNDRY TRADE JOURNAL.

PATENT

THE proprietors of British Patent No. 633986 are prepared to sell the patent or to licence British manufacturers to work thereunder. It relates to "Improved Method of Making Rotors for Electric Motors." Address: BOULT WADE & TENNANT, 112, Hatton Garden, London, E.C.1.

MACHINERY WANTED

PNEULEC ROYER; 1 cwt. Core Sand Mixer; 2 BMM.HPL.1 Machines or similar; Bench Type Core Blower; Drawer Type Core Oven (Coke or Gas). Must be in good condition.—Box 3522, FOUNDRY TRADE JOURNAL.

WANTED.—SKLENAR FURNACE, oil fired. 2 to 4 tons capacity brass; in good condition.—Price and details to Box 3514, FOUNDRY TRADE JOURNAL.

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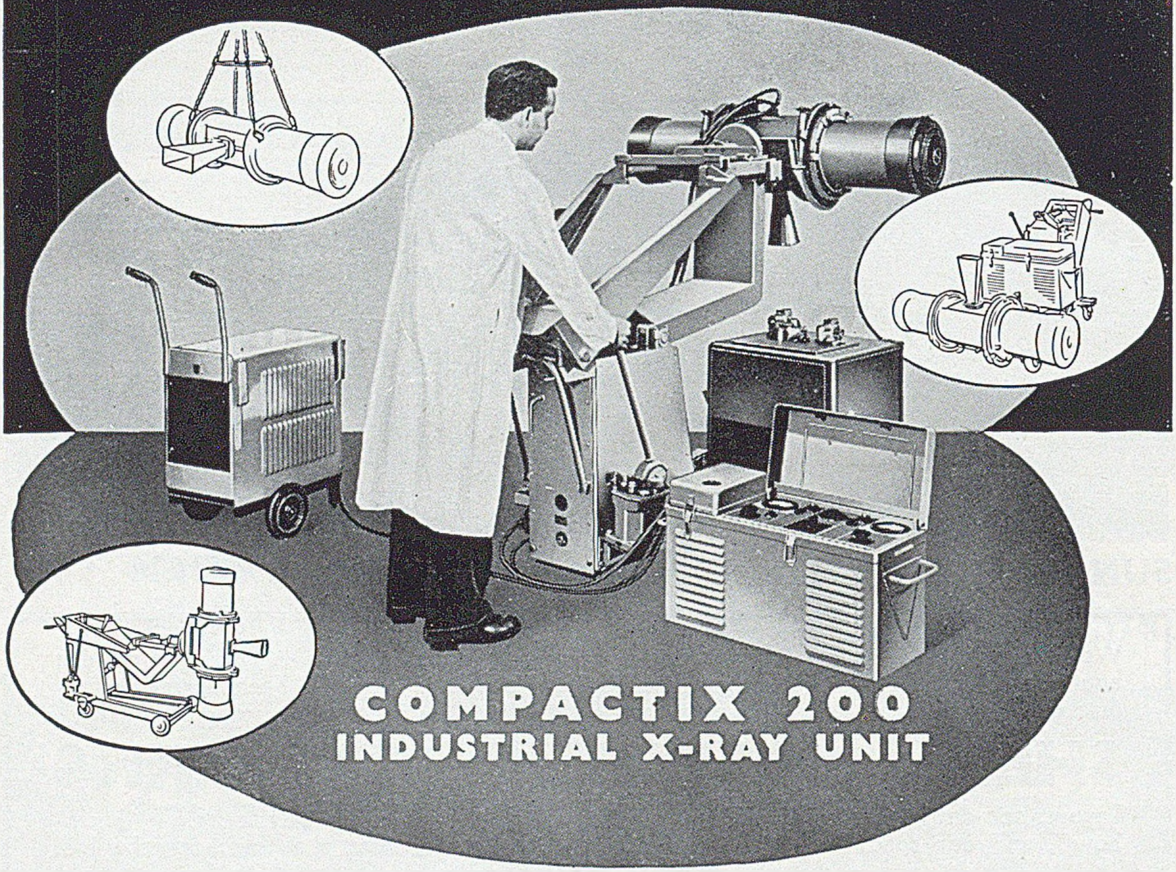

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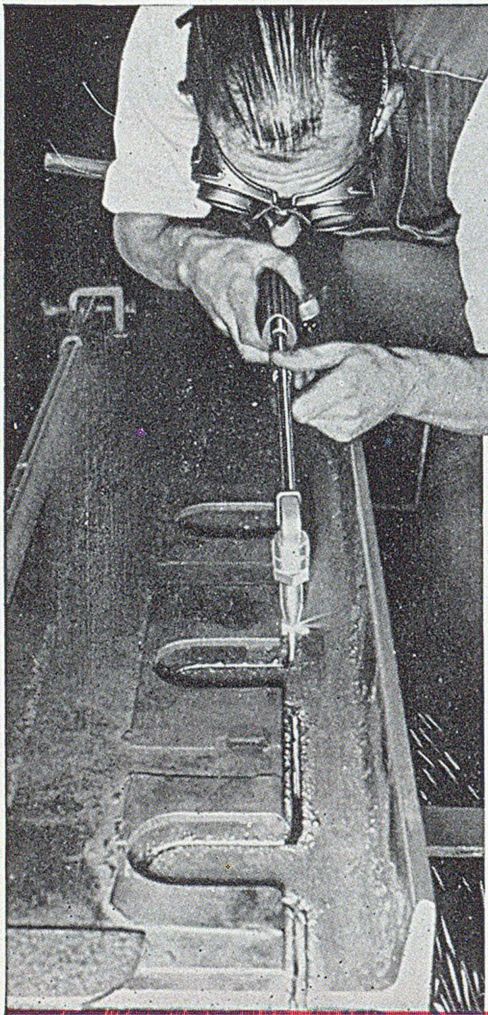

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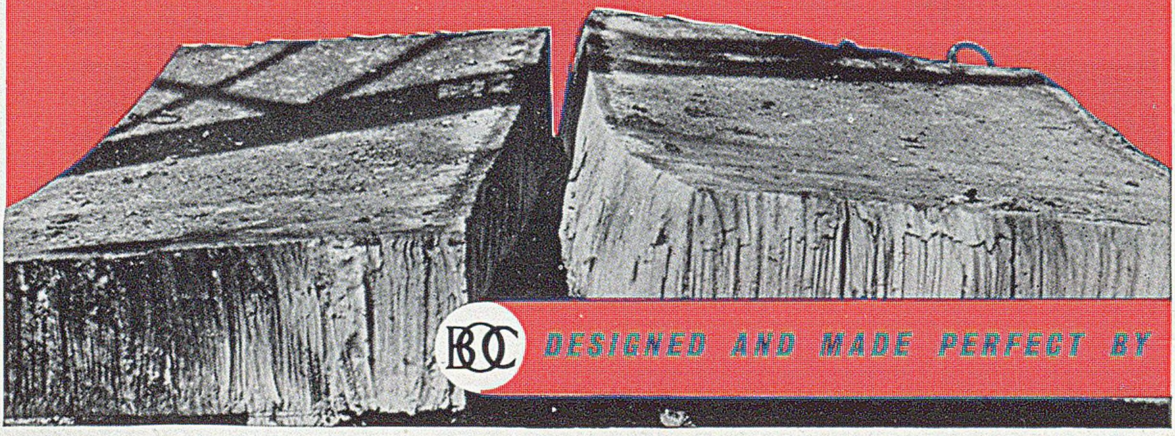

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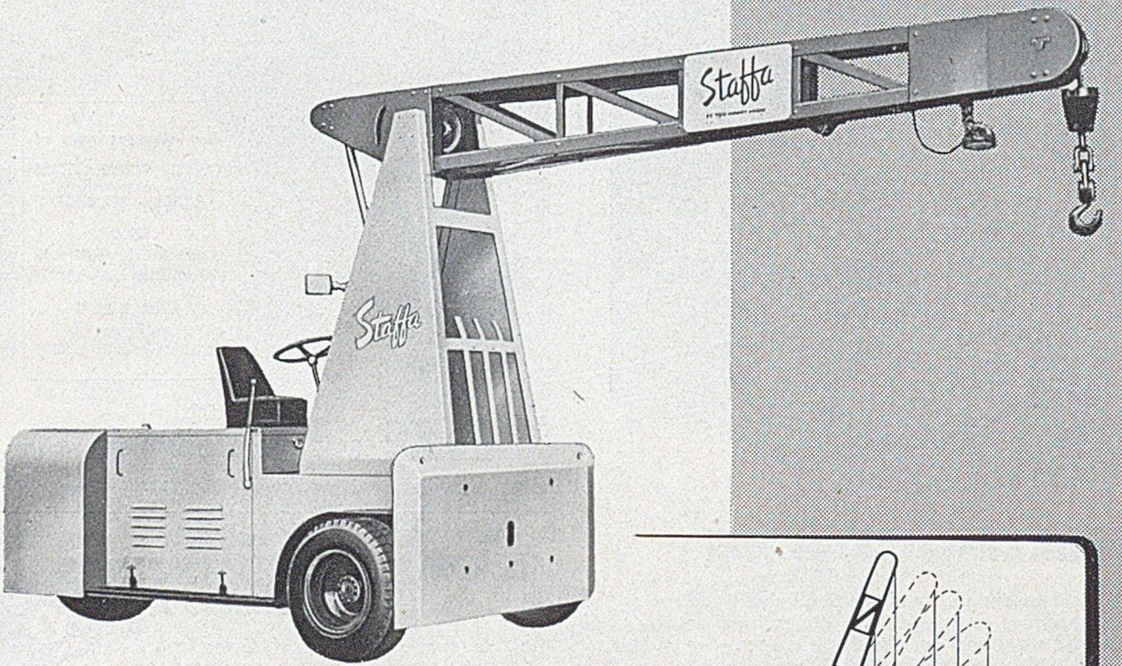

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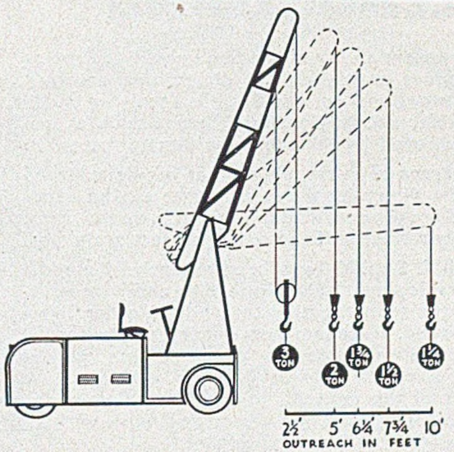

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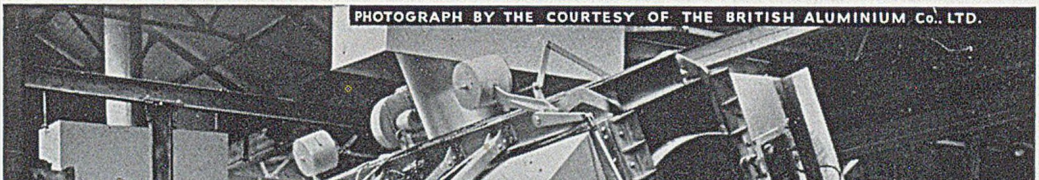
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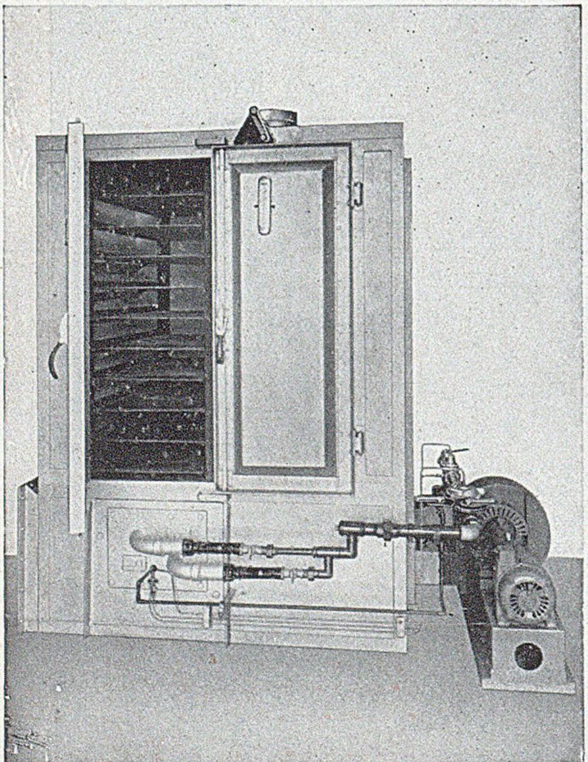

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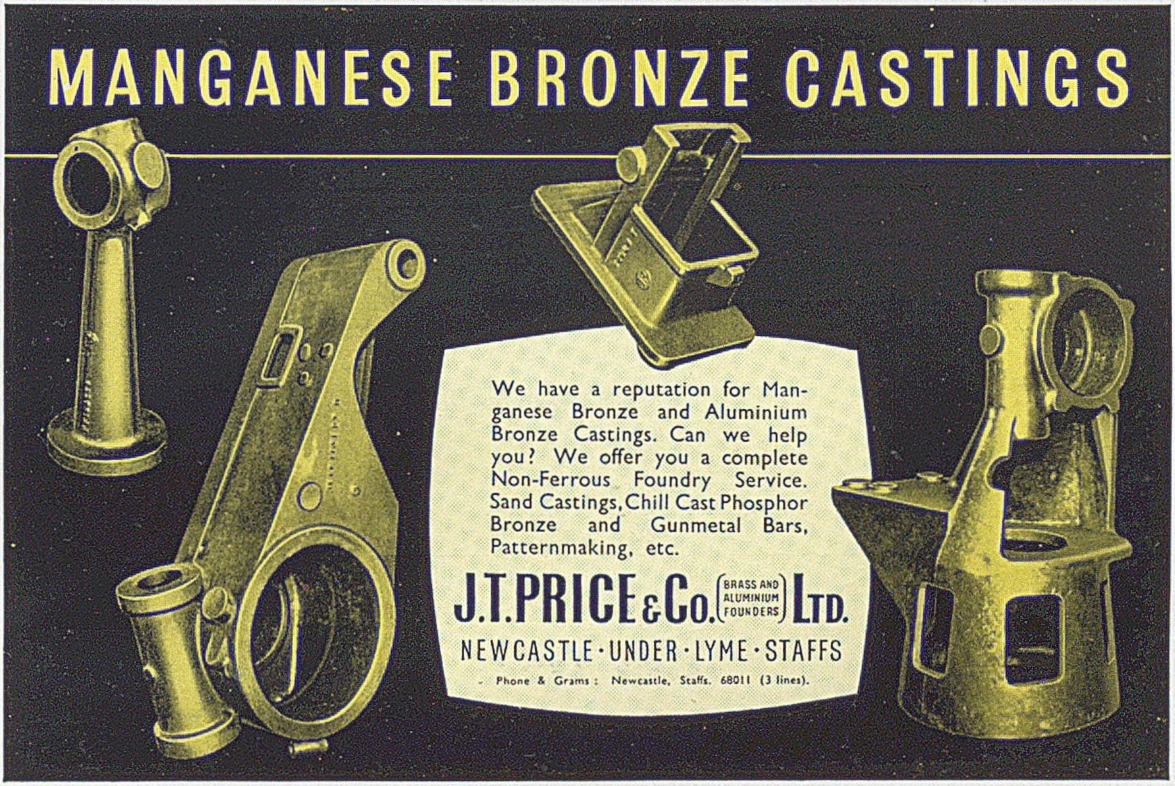
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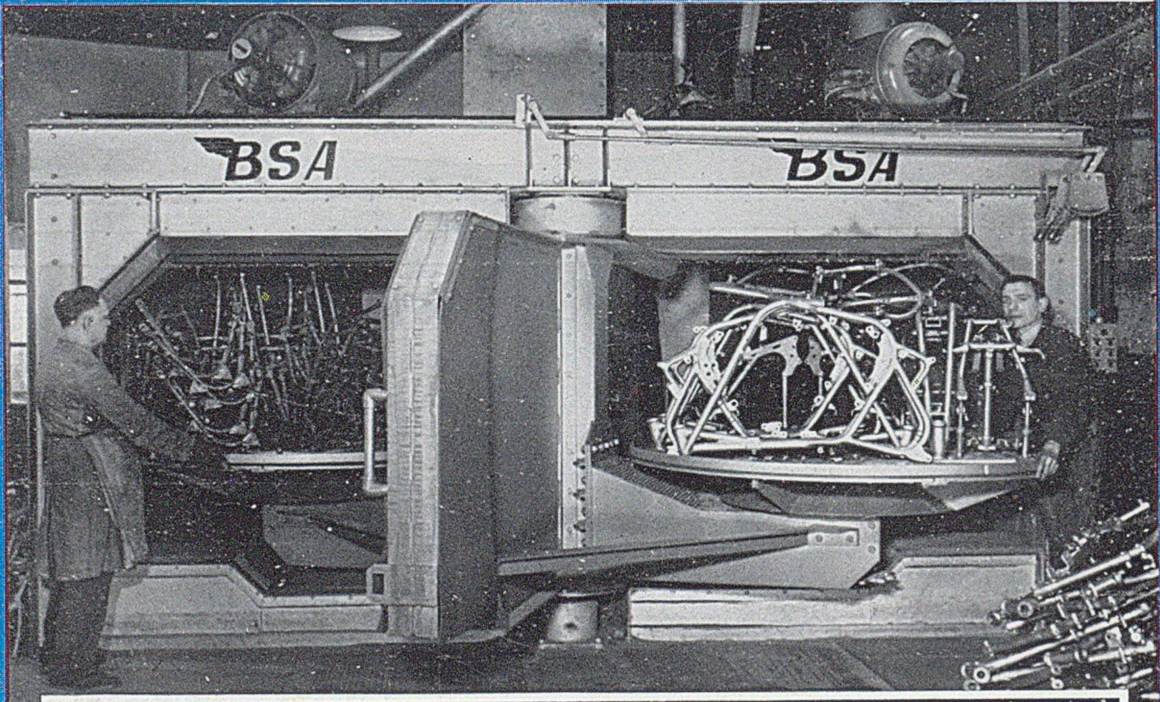

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