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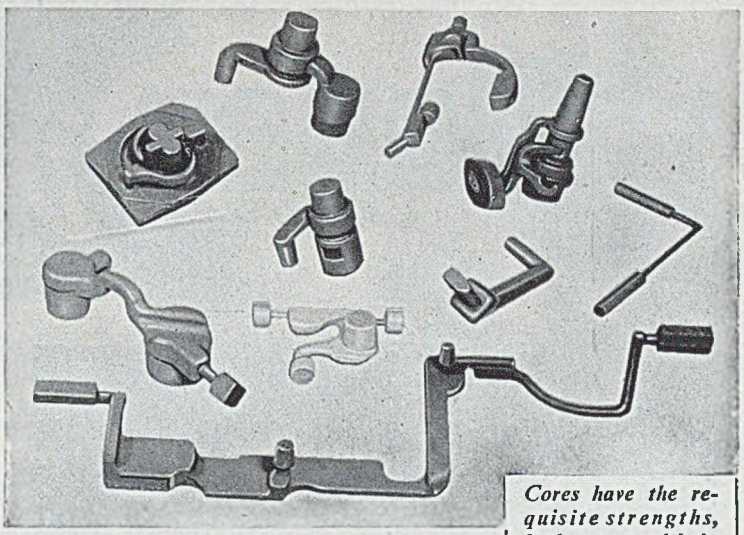

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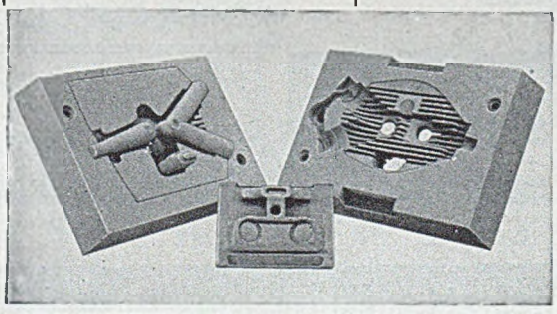

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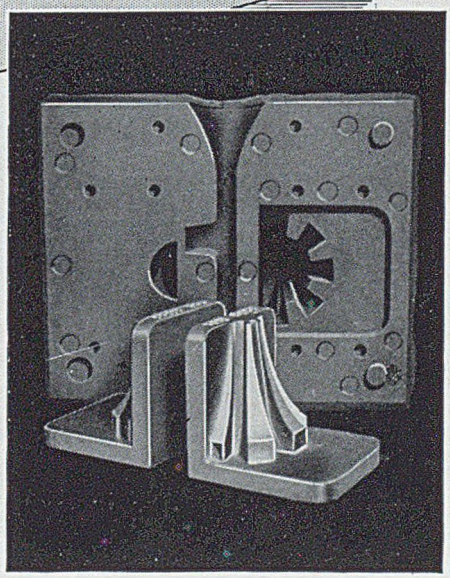

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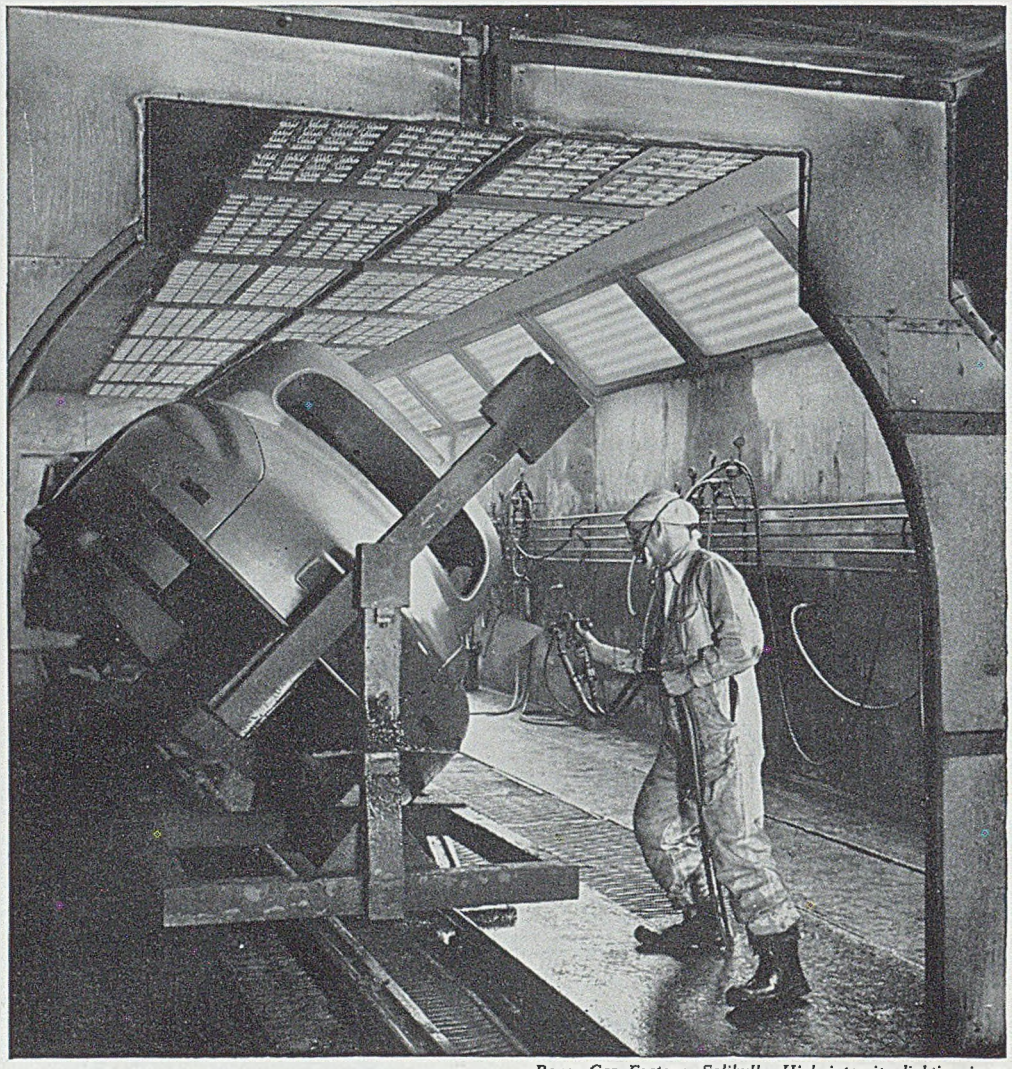

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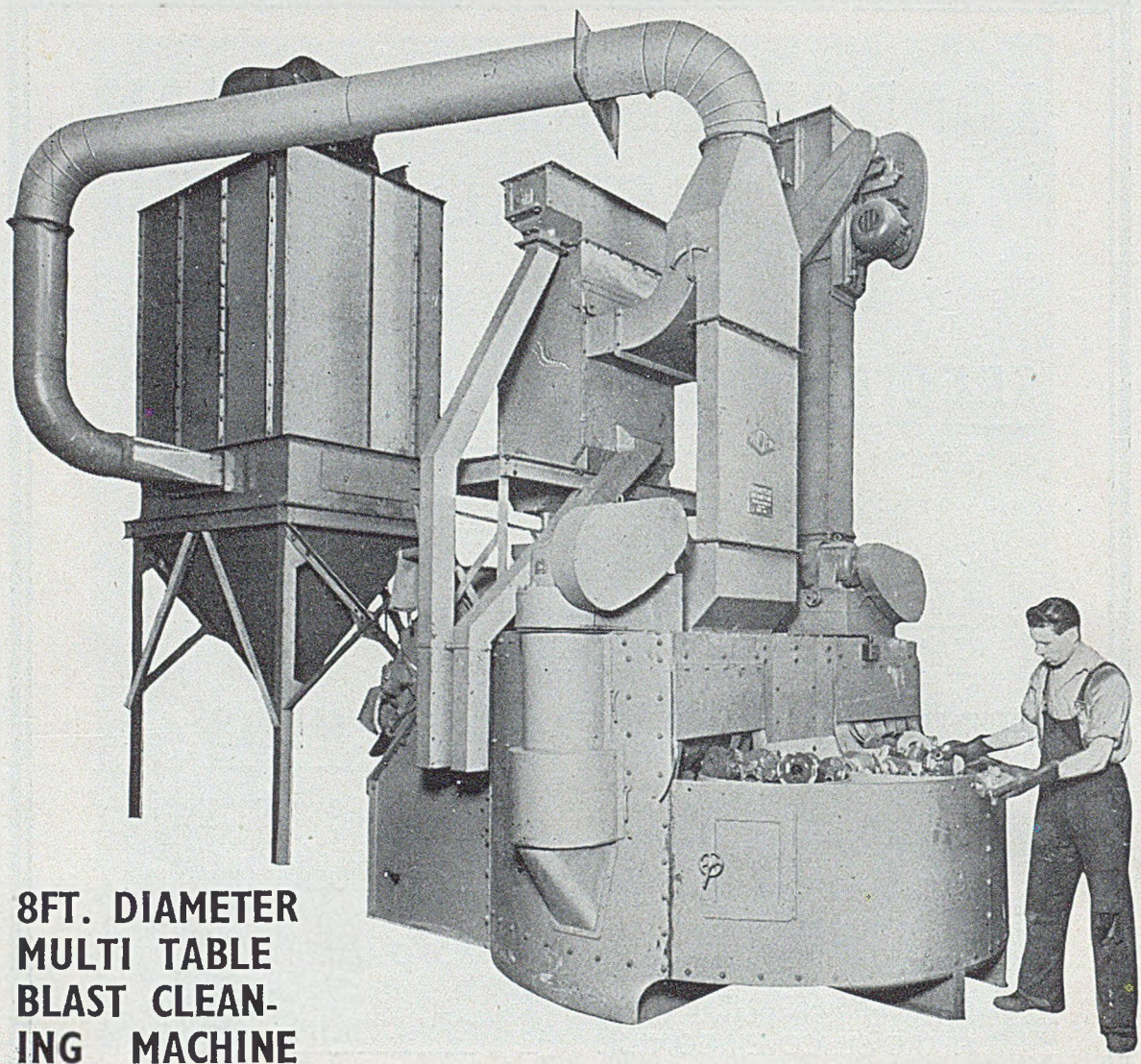

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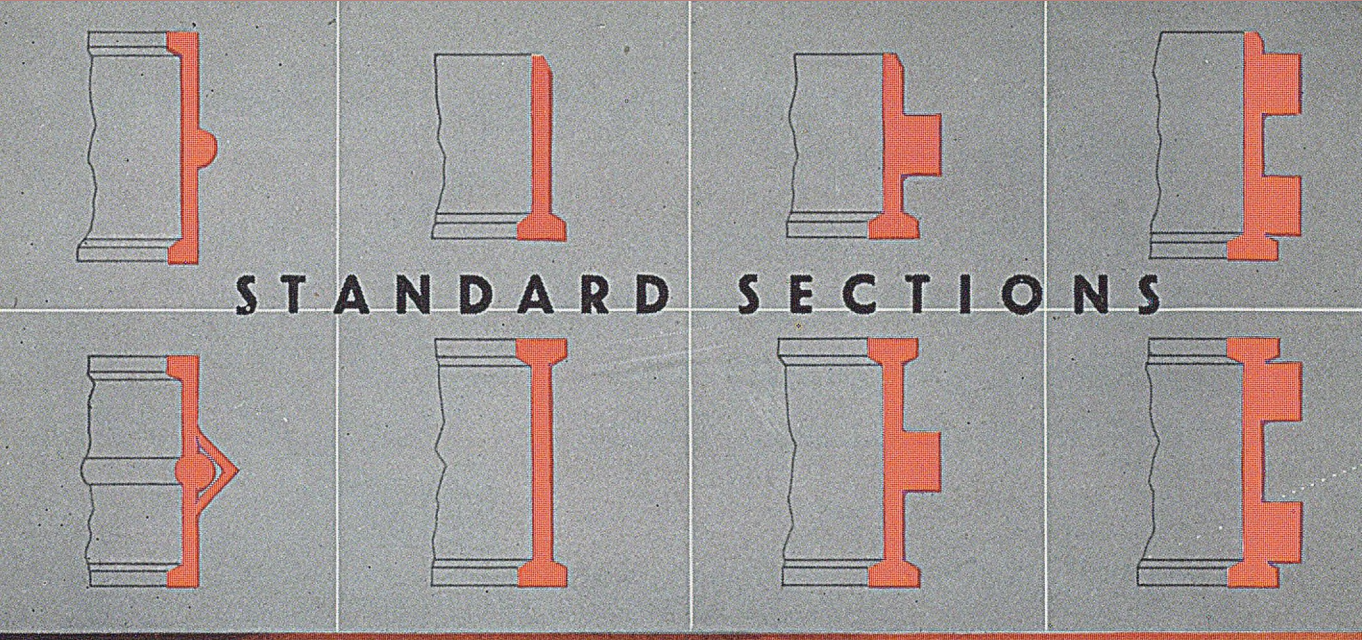

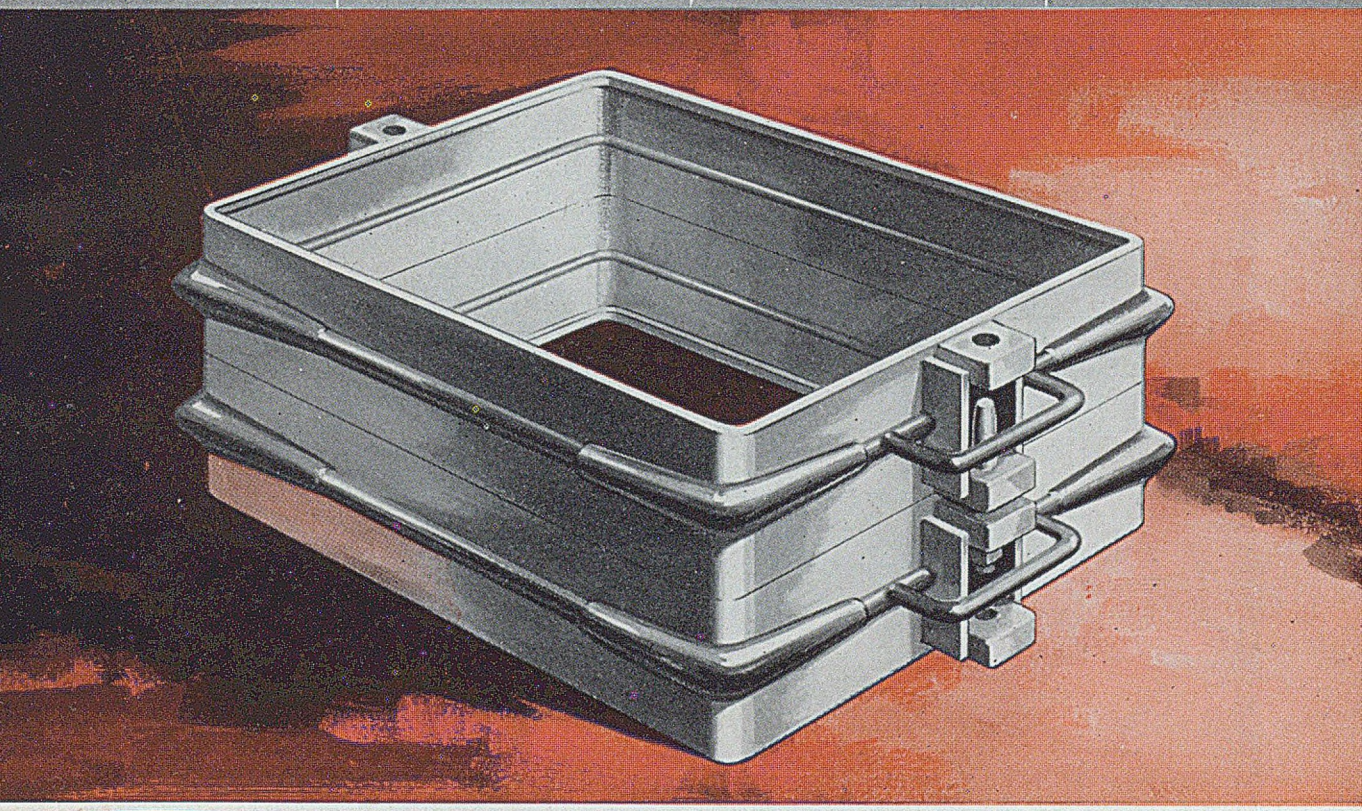

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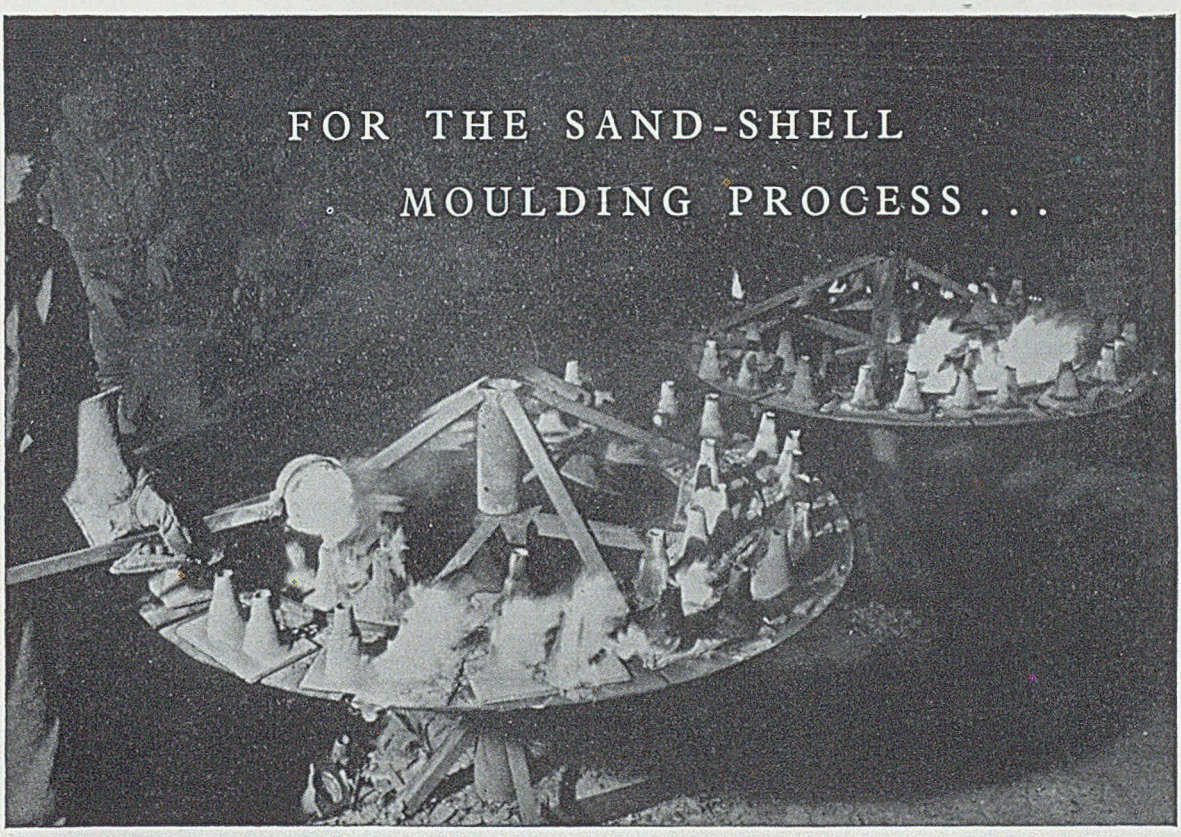

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A Master Patternmakers' Association?

Patternmaking as an external service to the foundry industry is becoming of ever-increasing importance, yet as a trade it is wholly inarticulate, for it possesses no employers' association. Such a body could have been of considerable use during the recent war in an advisory capacity to the Timber Control, and thereby have deflected some of the quality woods to where they were an essential factor in the production of munitions. After the war, there was a revision of the specification for pattern colours; this was done without any co-operation from a patternmaking employers' organization.

In Sweden, a proposal for the classification of castings has been drawn up, so as to facilitate the intelligent provision of patterns. The document issued first outlines the general conditions governing the design of patterns, followed by manufacturing details for four different classes of wooden patterns. Class I comprises simple patterns for a one-off job or only a few castings. Class II is intended "for ordinary patterns upon which one does not put too great a demand." Classes III and IV are destined to include patterns of the very best construction made with good wood and with metal reinforcements. The classification is eventually to be enlarged with Classes V, VI, etc., which will include metal patterns. In the Swedish article,* from which we have quoted, there is a footnote which cites that similar standards have been established in Belgium, France, Norway, Germany, and Austria. The existence in this country of such a classification as has been established in so many others would minimize misunderstandings and possibly go far to reduce unintentional price cutting and disappointed customers.

The above gives some indication of the uses to which a patternmakers employers' association can be put, but they are by no means exhaustive. For instance, there is the question of education and apprentice training. The formation of an employers' association would permit proper representation on the various education authorities, both national and local. Again, there is the vexed question of unified conditions of sale, into which enter such factors as insurance, warranty, and so forth. Yet the greatest value of employer co-operation is the imponderable one of the friendships which are formed. This is probably the most important aspect, as the information, whether commercial or technical, gained from friends can often be turned into profitable channels. It will not be easy to operate an organization of master patternmakers, for there are but few really large concerns and, to-day, travelling expenses are high. Moreover, the trade is widely dispersed. Yet a quite small organization plus an annual congress at some pleasant centre should go far towards filling the present void in the scheme of foundry employer organizations. This JOURNAL would give all possible help in the initial stages, should there be any real desire for such co-operation.

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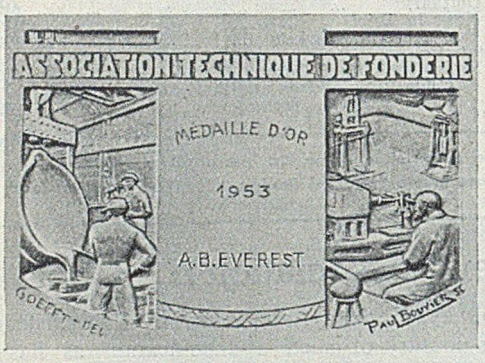
* *Gjuteriet* 43 (1953) No. 9.

Dr. A. B. Everest Honoured

As already briefly announced in the JOURNAL, at the International Foundry Congress held in Paris last month, Dr. A. B. Everest, junior vice-president of the Institute of British Foundrymen, was awarded the gold medal of the *Association Technique de Fonderie* for his services in the development of high-duty and alloy cast irons, and in particular, recognition of his contributions to the French *Association*. An illustration of the award is now available. Since 1939, Dr. Everest has presented five papers to the A.T.F. and other associated French bodies, and has contributed to the discussions at several meetings of engineers and foundrymen in France. It is now 25 years since Dr. Everest first gave a paper on nickel cast iron to an international foundry congress (at Barcelona in 1928). He is, incidentally, the second Englishman to be awarded the Gold Medal of the A.T.F.



Simplifying Foundry Operations

Ashorne Hill Conference, November 25 to 27

A conference on "Simplifying Foundry Operations," organized by the British Cast Iron Research Association in conjunction with the Council of Ironfoundry Associations, will be held from Wednesday afternoon, November 25, to Friday afternoon, November 27, at Ashorne Hill, near Leamington Spa. This conference is in some sense an extension of the one on foundry economy held last year, but is concerned with economy in human effort rather than economy in raw materials. Its aim is to demonstrate in practical terms improvements which can be achieved by a careful analysis of foundry operations. Such improvements are not necessarily dependent on large-scale expenditure on equipment and may frequently be made without any additional outlay. In fact, the intrinsic idea in work simplification is the ability to look at a familiar job from a new angle, and there is room for its application in the smallest as in the largest foundry. On this occasion, therefore, the Association is primarily anxious to attract the attendance of principals of member-firms or responsible executives, those who are in a position to carry out or recommend the adoption of new methods.

The total attendance at the conference is limited to 120 persons. Rooms will be allocated in order of application, the closing date for which will be November 6, or earlier if the accommodation is fully taken up. Application forms (obtainable from the B.C.I.R.A. headquarters at Alvechurch, near Birmingham) should therefore, be completed and returned to the Association as early as possible, together with the conference fee, which is £1 5s. 0d. per person.

Metal-sampling Development

The British Steel Castings Research Association announces the successful development of a rotary metal-sampling device that should have an important bearing upon productivity, not only in steel foundries, but in many iron foundries.

The device, which is based upon a design of the late Mr. S. Westberg, of Rotherham, enables furnace samples of steel or other molten metals to be produced in finely granulated or divided form directly from the liquid state and without the necessity for drilling operations. This is achieved by pouring the liquid sample on to a rotating copper disc, which centrifugally disperses the metal upon the internal periphery of a surrounding metal bowl. It is necessary to prevent oxidation of the metal during the sampling operation, and this is conveniently achieved by providing a high-purity nitrogen or inert-gas atmosphere in the dispersion cavity of the machine. The gas is admitted through a chambered cover-plate, as shown in Fig. 1.

Extended field trials upon the Westberg sampling device in its developed form have demonstrated that the method possesses the necessary degree of reliability and that there is correlation between analyses performed upon orthodox drilled samples and those taken using the new device, not only in respect of the normal elements —carbon, manganese, silicon, phosphorus, sulphur—but also in respect of nickel, chromium, molybdenum, and tungsten, over a relatively wide range. These field trials have been conducted by the British Steel Castings Research Association in conjunction with Westberg Developments, Limited, of Rotherham, England, who are now manufacturing and marketing the equipment under patents pending in the United Kingdom and oversea.

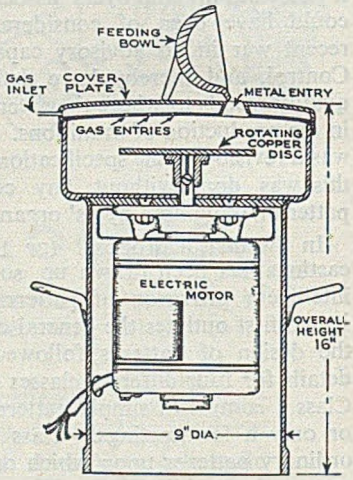


FIG. 1. — *Rotary Metal-sampling Machine developed by the British Steel Castings Research Association.*

I.V.E. Section Notes

The Midland section of the Institute of Vitreous Enamellers has organized a dinner and theatre party to be held at the Station Hotel and Hippodrome Theatre, Dudley, on Friday, November 20, dinner commencing at 6.15 p.m. Tickets for the double feature are 17s. each (theatre only 8s.) and as early booking is essential, applications for tickets should be sent immediately to Mr. D. Sleath, c/o Borax Consolidated, Limited, 87/89, Edmund Street, Birmingham, 3.

Quantity Production of Malleable Castings*

By H. Hayden

This paper is not intended to give a concise and comprehensive survey of the production of malleable castings, but rather to refer to some aspects which have been affected by quantity production. The main features involved are design, developments and controls, all of which have considerable influence on increasing production and reducing the risk of wasters. The experiences described are all in connection with the production of malleable castings, but it does not necessarily mean they are confined to that particular sphere of the founding industry, in fact practically the whole of what is recorded can be applied to ferrous and non-ferrous production, and it is hoped that some of the examples may be of value in all branches of the foundry industry.

According to the English dictionary, the words "quantity production" means the production of something in considerable amounts. It can be assumed, therefore, when speaking of quantity production, rapid production, mass production, production moulding or repetition moulding, that all are more or less one and the same thing. Over a long period, industries have developed end products which are of a repetitive nature, facilitated by the mass production of components which in turn has demanded from the foundry, techniques now showing a wide deviation from traditional methods.

The journeyman moulder, with his individual craftsmanship serving the industry so successfully in the past, has been superseded by technicians employing engineering skills who now make is possible for the production of moulds at ever-increasing speeds by semi-skilled and "green" labour. Such things a blow-bellows have been replaced by compressed-air guns, and permanent fixtures on pattern plates have now taken the place of tubes for forming downgates. The points mentioned are perhaps rather insignificant in themselves, but there are many other examples which could be described and it is by this improved technique and greater use of machines that this change has been wrought.

Design

With the type of labour employed and the high speed of production, it is more important than ever that founders educate still further the consumers of castings in the necessity for designs to be modified to assist moulding technique, without materially impairing the technical and practical value of the part. Certainly, present-day liaison between designer and producer exists in varying degrees. Careful investigation while development is in progress on the drawing board, opens a way to tremendous possibilities. Experience has revealed that there is a far greater chance of a major change in design of a part at that stage than after the working drawing has been finished and printed. At this point there is afforded the designer—draughtsman a much greater opportunity for incorporating an alteration. The inclusion of modifications put forward from a foundry viewpoint not only help to achieve the high standard of accuracy demanded by consumers on present-day production, and enable them to jig machine castings, but production can be increased, waste decreased and costs reduced, which is no small contribution to the national effort towards recovery of stability.

The illustrations (Figs. 1 to 4) presented and commented upon show four different types of hubs used on present day transport vehicles and show how the design of a casting can have a direct influence on its application to a fast moulding machine, the speed of production, and material and labour costs.

Fig. 1 shows two plain designs of hub casting which present little difficulty in producing moulds quickly from a moulding machine. In each instance, the joint line of the mould is made on the flange face and a centre core is used for forming the

* Paper read before the East Midlands branch of the Institute of British Foundrymen, Mr. J. Hill presiding.

FIG. 1.—*Two Designs of Malleable Hub Castings which present no Moulding Difficulties.*

FIG. 2.—*Hub Castings of Increased Design Complexity and, hence, Difficulty in Moulding.*

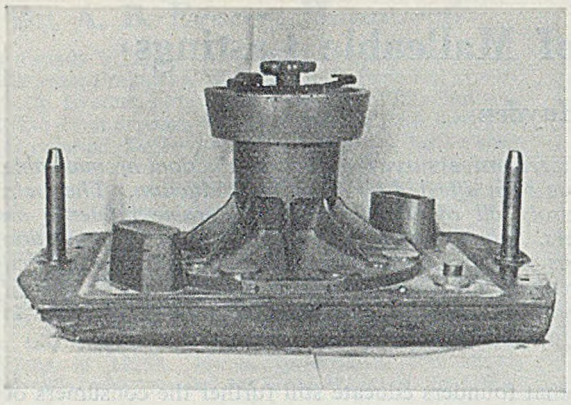


FIG. 3.—*Pattern Set-up for Production Moulding of the R.H.S. Casting in Fig. 2.*

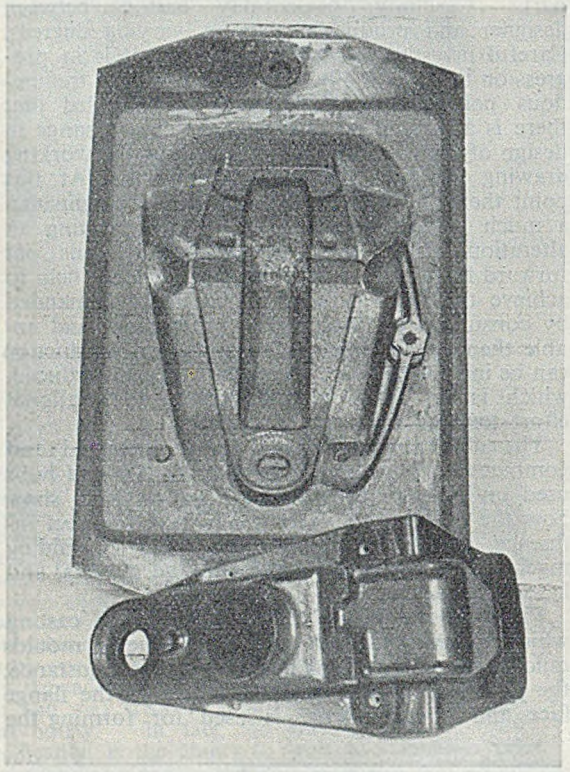


FIG. 4.—*Cast Plate Pattern for a Shock-absorber, the Original Design of which needed Modification to be suitable for Mass Production.*

interior bores and ball-race landings. An analysis of the moulding-machine operations would follow a normal course.

Taking the hub on the right-hand side (Fig. 2) as an example, the method employed for moulding would be as shown in Fig 3, with the use of a loose piece and a cover core. The joint of the loose piece can be seen where the ribs join the main profile.

In order to produce this type of hub, three extra operations are required in excess of the normal procedure, two of which, it could be said, are a reversion to hand-moulding practice. With a major change in design, however, the loose piece and cover core could be dispensed with, and the production rate would be comparable with that of the plain type. The elimination of cores and loose pieces has a direct bearing on the economics of any job, but the point to be emphasized is the necessity for ease of producing a mould from a moulding machine. It will readily be noted that the design of the casting has a decided influence on the ultimate hourly rate of production.

Fig. 4, showing a shock-absorber bracket, illustrates yet another vagary of the designer who had decided that the mould joint would be made through the centre-line of the casting. As can be seen, it would have been necessary to core-out the rectangular looking inside recess between the two ribs and the inside diameter. This matter was fully discussed at the drawing-board stage and resulted in an agreement to suggested modifications on boss design which facilitated the production of a cast plate pattern, with the irregular joint line, as shown, and all coring was therefore eliminated.

Developments

In the automobile and engineering factories of this country and the United States, a vast amount of time and expense is devoted to the preparation of prototype vehicles and machines. Personnel are employed to develop new projects and to study and improve on existing techniques. Similar departments have now inevitably found their way into the foundry industry. What it is intended to stress, however, is the necessity here for establishing actual experimental production conditions and proving methods and the institution of production aids.

To produce a malleable casting from a loose pattern is, and always will be, an art. The casting resulting from hand-moulding methods will, of course, show dimensional variations, with cleanliness and size of runners and feeders depending

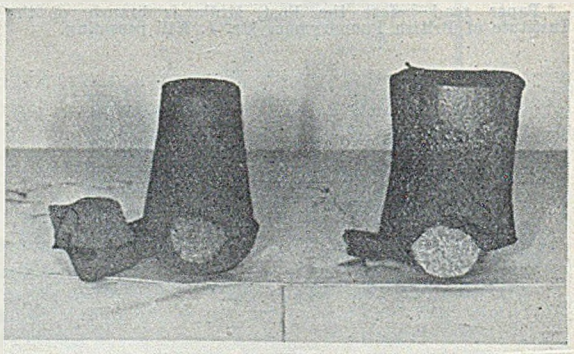


FIG. 5.—(*left*) *Feeder Head, the Pattern for which was an Integral Part of the Casting Pattern and* (*right*) *a Hand-cut Head for the Same Casting.*

largely on the human element. This latter point is a very important factor, for insufficiency of feeding metal results in a porous casting, and an excess represents not only so much waste metal but seriously affects costs.

When small numbers of castings are produced by hand-moulding methods, there is a tendency for feeding metal to be used in excess of the optimum amount, as a precautionary measure to ensure a sound casting. With quantity production of malleable castings, the same skill and knowledge is required although it is applied in a different and more scientific manner. The resultant casting from a mould produced on a machine shows more dimensional accuracy and is made with integral runners and feeders, which remain constant and are evolved through experimenting with the minimum amount of feeding metal consistent with freedom from porosity. Fig. 5 illustrates a hand-cut feeder on the right and a feeder integral with the pattern on the left, both for the same job.

New pattern equipment should be tried out for initial approval and not be released for production until it is established that it is satisfactory from a dimensional point of view. Though only minor faults exist, it is essential that these be removed to prevent loss of production and waster castings, for—to paraphrase a very famous saying of the Prime Minister—such a few men can make such a lot of waste in such a short time.

Services

The potential output of all moulding machines depends to a large extent on the supply services. In wartime, if the supply line of an army is interrupted, the advance is slowed down; so it is with moulding machines, if they are not constantly supplied with boxes, sand and cores, production is retarded. After all, if one gives a little thought as to the introduction of mechanical aids into the foundry, what does it accomplish? The conclusions must inevitably resolve the answer to

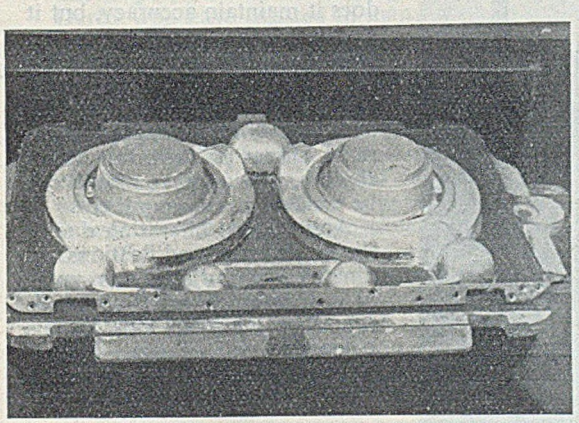


FIG. 6.—*Patternplate having its Edges protected by Steel Strips inserted flush with the Face; the one in the Front has been removed to show the Construction.*

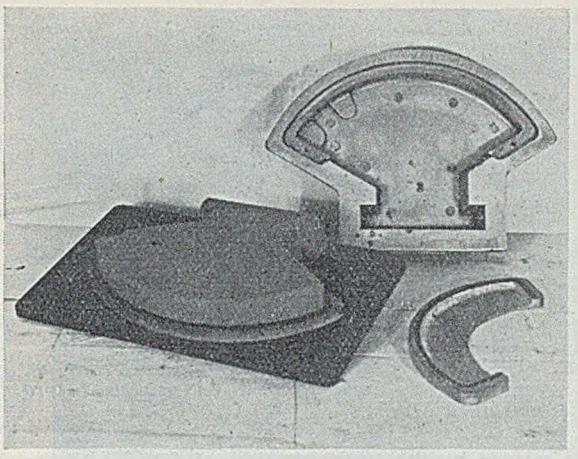


FIG. 7.—*Use of Inserts as a Combination of Core Carrier and part of the Corebox for a Brake-shoe Casting.*

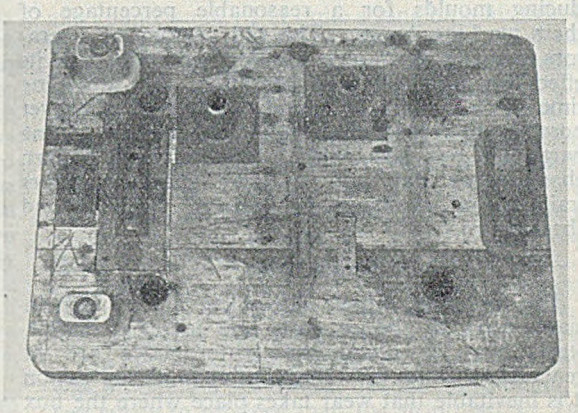


FIG. 8.—*Modification to the Squeeze-head Board of a Moulding Machine to incorporate Runner Caps, Flow-offs and Projections to ensure Even Ramming.*

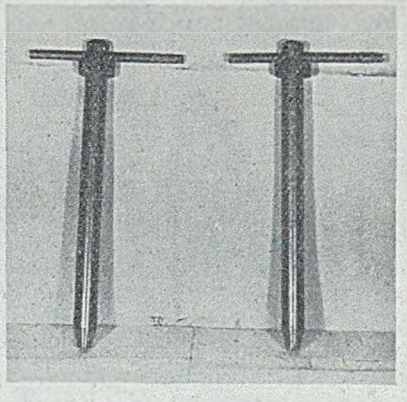


FIG. 9.—*Use of Rubber Washers on Mould Assembly Pins to prevent them binding.*

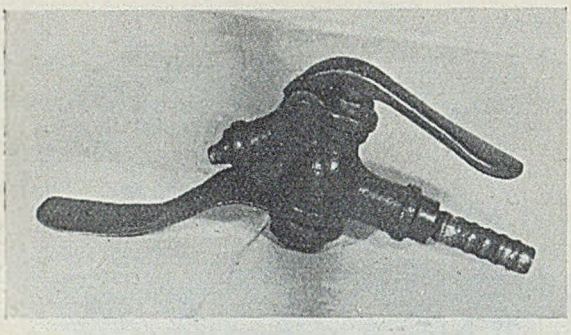


FIG. 10.—*Scraper Attachment to a Compressed Air Gun, for Removing Sand from a Patternplate before making a Mould.*

be service by the transportation of (1), moulds to metal; (2), metal to moulds; and (3), material to operators.

To achieve maximum output, a moulding machine and operator should be employed producing moulds for a reasonable percentage of their working hours. The old custom of operators pouring their own moulds, not only has its effect on their physical condition, but moulding time is lost. It is found advisable, whenever possible, to restrict each moulding machine to one particular box size, with a minimum of pattern changes per day and to have spare operators trained and available in case of sickness and absenteeism.

Simple Aids

The following simple introductions can help in many ways to reduce costs and increase output. Steel, iron or aluminium patternplates are in general use, and with the continual jolting action it is inevitable that wear takes place where the box part is in contact with the patternplate. In order to increase the life of the plate, recesses are machined in it to receive steel inserts which can be replaced very speedily when wear of them begins to have an effect on production. What actually happens, then, is that the box parts of the two half moulds when assembled meet edge to edge, but the sand faces are separated by the amount of wear on the patternplate. The dangers are burst moulds and castings which show "flash" on the joint of a thickness equal to the amount of wear. Fig. 6 shows a steel insert removed from the recess.

Fig. 7 shows the use of inserts as a combination of core carrier and part of the corebox. The illustration shows a core, corebox and inserts for a brake-shoe casting. A portion of the core requires supporting in the "green" state and time taken in removing an orthodox loose piece and in its substitution by a core carrier is saved.

Fig. 8 indicates how by the inclusion of pieces to form runner caps and flow-offs on squeeze-head boards, very little finishing of the mould has to be done after closing. Moreover, projecting pieces can be prepared and mounted on a board in order to obviate any soft-rammed areas in the mould which may be prevalent if a plain flat board be used.

Fig. 9 shows the use of rubber washers on mould assembly pins to prevent binding and to permit easy removal.

Fig. 10 shows how a compressed-air gun has been fitted with a scraper, which is used simultaneously with blowing to remove sand from a patternplate.

Pattern Equipment

It cannot be stressed too strongly that a first-class patternshop or the availability of pattern equipment of the highest standard is an essential for rapid production moulding. Another important asset is a really smooth polished finish on all patterns, which can be obtained by the use of worn emery cloth and a little machine oil. Not only does it maintain accuracy, but it prevents the production of faulty moulds from moulding machines. In many cases for small work it is hardly worth the time to patch a damaged mould, as it slows production, upsets rhythm, and another mould can be produced just as quickly.

Any pattern alteration due to slight design modifications or dimensional adjustments must be a high-grade job. Second-rate or patched-up jobs in this category will cause trouble through machine vibration, or sand working into the joints.

FIG. 11.—*View of a Traditional-type of Coreshop engaged on Small Bench-type Work.*

The construction and finish of runners and feeders should be treated on similar lines as the pattern and executed with equal seriousness.

The expansion of mould-production rates has meant that the coreshop has had to match up with the demands of the foundry. Figs. 11 and 12 show the once-familiar hand bench section of a coreshop which is now being equipped with bench-type core-blowers. Cores, small and tedious to make on the bench are now very simple and easy propositions and can be blown in a matter of seconds.

Inspection of Cores

All cores before being supplied to the foundry should be trimmed, inspected and gauged. A considerable amount of moulding time is saved by serving the moulder with cores which only require placing in the mould, and Fig. 13 illustrates a jig for checking and trimming a worm-case core.

Controls

Due to the abrasive action of sand and the continual pounding and vibration of certain equipment, and to prevent castings being rejected by damage resulting, it is essential to make periodic checks at fairly frequent intervals. Some typical examples of defective moulding equipment are:—(1) Pattern offset; (2) worn plate pins; (3) faulty assembly pins; (4) worn pin holes on box parts; (5) worn gauges used on cores, and (6) work strickles. Fig. 14 shows a gauge with a micrometer thimble at one end used to ascertain that the plate pins, after fixing in the patternplate, are at 90 deg. to the plate and the pin centres are correct. The small round gauge shown in the same illustration is for checking assembly and patternplate pin diameters and the T-gauge is used for checking the pin holes of box parts. All boxes and pins showing 0.010 in. wear are considered unfit for further use and are, therefore, scrapped.

In conclusion, the Author records his thanks to the directors of Ley's Malleable Castings Company, Limited, for the facilities and permission to present this Paper, and to all colleagues at Lincoln and Derby who have assisted in many ways to make its presentation possible.

DISCUSSION

MR. RADFORD, after congratulating Mr. Hayden on his Paper, referred to the saving of cores in moulding and said this did not always apply to the use of a moulding machine, as it could very often be a cost-reducing matter to enclose a pattern in block cores. It was as well wherever possible to save cores, but this did not always apply for intricate castings, which would otherwise have to be hand moulded.

MR. HAYDEN replied that he did not agree, although probably for larger castings there might sometimes be applications, but he thought the introduction of cores was an uneconomical practice to use in overcoming difficulties.

Prevention of Wear

MR. BUTTERS, speaking with regard to the wear plates fitted to patternplates, considered it a fairly expensive job, as they had to be machined, drilled and countersunk. For quite a long time his firm had used hardened and ground steel inserts which could be tapped into position. They were easily replaceable. In America founders used aluminium plates with steel inserts tapered both ways. As to the press-head which was fitted with various shaped blocks, Mr. Butters said it appeared to be made of wood and he wondered why it was not of metal. Another point was the accuracy of patternplate pin-centres and that of pins. It was all very well to check within fine limits on pattern equipment, but moulding equipment, too, suffered by the normal knocking out it received. One could, of course, use one elongated hole instead of two round holes.

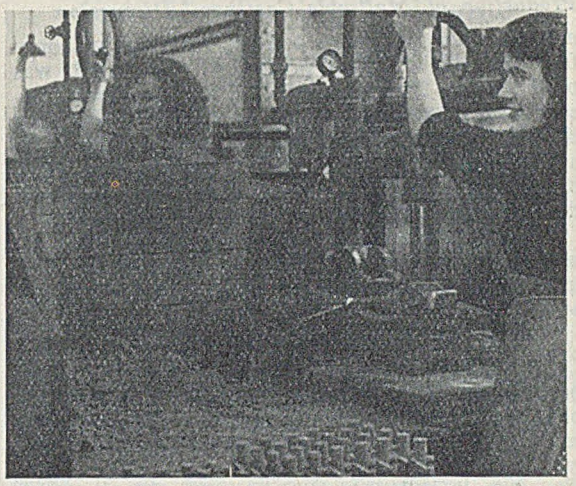


FIG. 12.—*Section of a Modern Coreshop serviced by Cartridge-type Core-blowers.*

MR. HAYDEN said the use of round steel inserts was probably a good idea, but not, he thought, any less costly to produce than the strip inserts. To recess a patternplate for receiving the strip inserts was

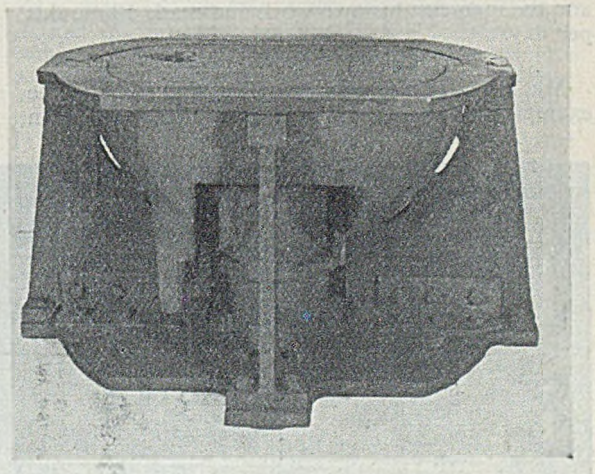


FIG. 13.—*Jig for checking and trimming in Worm-case Core.*

not a lengthy operation and the material was only 0.25 in. thick. The press-head illustrated was of the swing type with wooden squeeze-block fastened to a metal top. As to pin centres, it was very difficult to maintain accuracy, but it should be appreciated that, on a normal mechanized plant, boxes were subjected to much less severe conditions than was the case where boxes were man-handled.

MR. SANDERS, in contrasting the use of round inserts and those framing the box, said his firm had tried both and got as much wear on the round inserts.

Comparative Output

MR. DUNLEAVY said the question of co-operation between the foundry and the designer had been debated as long as he could remember, and asked the lecturer if he would agree that it contributed to the well-being of the foundry and the customer. In the Paper there were many points and suggestions that made production easier and helped to eliminate scrap. He requested the size of the moulding box for which the squeeze board was used, and what the average production speed was.

MR. HAYDEN said many advantages, resulting in increased efficiency and economical practices, could be gained if liaison between producer and consumer was utilized to its fullest extent. The box size was 30 by 20 by 10 in., and the speed of production on the job was 100 moulds per hr.

MR. BUTTERS asked how many men and how many machines were engaged on this job. He was assuming it was a fully-mechanized one.

MR. HAYDEN replied that there were two machines with three men on each machine. Other personnel were placing cores and taking moulds away.

MR. BUTTERS said he could only give a figure of his own firm's production, which was not comparable in lay-out to Mr. Hayden's. It was not mechanized apart from there being a moulding machine for the operator. On a similar type of job, 30 by 22 in., there was one operator per machine, and the man cast his own work and made 50 moulds per day.

Minor Improvements Valuable

MR. HILL (branch-president) said that some of the examples which Mr. Hayden had quoted, whilst in themselves appearing to be somewhat elementary, had proved real labour-savers and had materially assisted in increasing output. They had not been developed without much study, and he suggested that efficiency could often be greatly improved by applying one's thoughts to the making of similar modifications to existing equipment. He asked Mr. Hayden to give a more detailed explanation of the runner-cup arrangement which was fixed to the squeeze board. He also asked if, on the core shown in Fig. 13, an allowance was deliberately made on the base to be rubbed off whilst in the jig. Referring to the cylindrical gauge used for checking pin wear, he could not understand how it could be effective, as it would only check the largest diameter and not the smallest one. He supported Mr. Hayden's views regarding keeping coring to a minimum, but agreed that there were some jobs where it was cheaper to use block cores. There appeared to be a tendency in the industry to cover up deficiencies in sand-moulding practice by using cores, resulting in a very costly method of ensuring a sound casting.

MR. HAYDEN, in reply, said a metal fixture was fastened to the squeeze board and formed the runner-cup profile. The downgate pin was secured to the patternplate and, when the squeeze jolt operation was applied, the downgate pin entered a hole in the metal fixture, forming the complete downgate and cup. A $\frac{1}{16}$-in. rubbing allowance was made on the base of the core illustrated in the jig. He agreed with Mr. Hill that the pin gauge only checked the largest diameter. There had since been made available, he understood, a type of gauge which measured one portion of the pin at a time and would give greater control.

MR. HOLLAND asked Mr. Hayden if he had any scrap figures available for the 100 moulds per hr. job.

MR. HAYDEN replied that the scrap figure was usually 8 per cent. and sometimes less than that. A portion of this waste was due to faults other than those caused by the moulding-machine operators.

A MEMBER asked if Mr. Hayden had much trouble in training labour to perform the casting operation.

MR. HAYDEN said little difficulty was experienced in training personnel to be pourers.

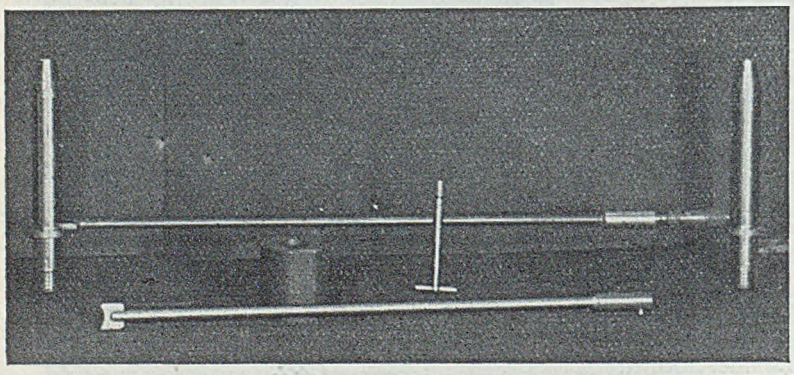


FIG. 14.—*Special Gauges used for testing the Trueness of Plate Pins and for Similar Purposes.*

Stopping-off Pieces

By "Tramp"

Stopping-off in the foundry can be of two kinds: first, when a casting differing from the available pattern is required, and second, when the pattern construction is such that pieces are required to stiffen the pattern during ramming, or storing, to prevent distortion from the force of ramming or the changing atmospheric conditions of the foundry and pattern store.

In the writer's opinion, much of the work thrown on the moulder by the latter type of stopping-off could be avoided by careful consideration being given to pattern construction. For instance, a particularly bad example was recently encountered. A flange, as shown in Fig. 1, was built up of four pieces of timber and the portions A and B were formed of segments. These segments were insufficient to prevent the plate from buckling and consequently portions C to be "stopped-off" were placed on either side across the timbers.

Due to the presence of the stopping-off pieces, it was difficult to get a clean draw from the mould and much time was expended in patching as well as in the actual stopping-off, resulting in the production of rather second-rate castings.

A better method would have been to have constructed the pattern from a number of radial segments secured by a groove and tongue joint as Fig. 2, and then turning a recess for the circumferential segment to form the rings A and B in Fig. 1. Such a construction, although entailing extra work in the patternshop, pays ample dividends in the foundry.

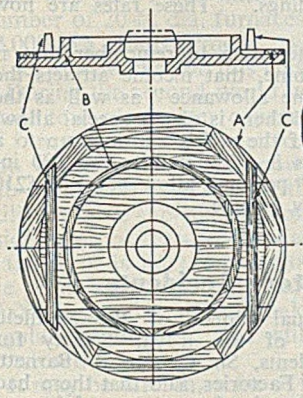


FIG. 1 (LEFT)

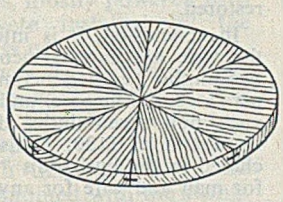


FIG. 2 (ABOVE)

FIG. 1.—*Flange Pattern constructed of Four Pieces of Timber with Portions A and B made as Segments. Battens, C, were added to strengthen the Job.*

FIG. 2.—*Improved Basic Construction for the Type of Pattern shown in Fig. 1, where the Sections are Tongued and Grooved.*

operations." "They have other land on which they can carry out these operations," he declared. He was hopeful, however, that if the suppressors did not prove effective, the Council would be able to go to the Minister and get something done about it. Personally he did not place much faith in effective suppressors. If it were possible it would have been done before now. If the suppressors did achieve 90 per cent. efficiency, then every member of the Council would be very agreeably surprised, said Alderman Perry. He strongly deprecated, however, any suggestion that the inspector conducting the recent inquiry was not impartial.

Core Production by Frame and Template

By "Chip"

For repetition work, cores are invariably produced in well-made boxes, but for one-off jobs and occasional work, resort is often made to scraping by means of boards and frames.

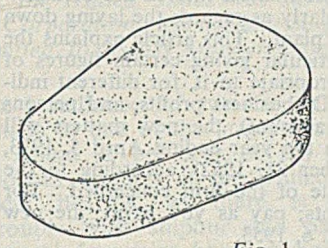


Fig. 1.

Fig. 1 shows a core, the overall sizes of which are 5 ft. by 3 ft. by 1 ft. 2 in. To produce this in a core-box would entail considerable work on the part of the patternmaker and, as only one casting was required, a minimum of pattern work was desired. A stock of plywood of various thicknesses is an asset to any patternshop and, in this case, two templates of thick plywood were produced with centre-lines well scribed on. A frame was made 5 ft. by 3 ft. and 1 ft. 2 in.—plus the thickness of the two templates—deep, also with the centre-lines distinctly marked. This frame was placed on a strong core-plate and the first template positioned inside the frame by means of the centre-lines. A layer of core sand was spread over the template and a suitably shaped core-grid was bedded into this. Continuing, core-sand was rammed in the frame to near the top and the second template was also positioned by means of the centre-lines and made up level with the top of the frame. Heavy weights placed on this kept it in place, while the frame was removed. The surplus sand, which filled the corners of the frame, was then cut away and the face of the core was finished by means of a straight-edge guided by the top and bottom template.

Midland Founders Win Appeal

The Midland Motor Cylinder Company, Limited, Smethwick, has won its appeal against the decision of Smethwick Borough Council not to allow it to build a £750,000 foundry in Dartmouth Road, Smethwick. At a public inquiry last June, the Borough Council resisted the proposed building of the foundry. A petition signed by 60 residents objecting to the proposal was also submitted. Now, the Minister of Housing and Local Government has ruled that the foundry is "clearly essential" to the operations of the firm. In a letter to Smethwick Council the Minister says he has allowed the appeal on condition the firm keeps a promise to fit two £5,000 smoke and dust suppressors to two cupolas at the proposed foundry.

Council Still Object

When this was reported to the meeting of the Council recently, protests were made about the Minister's decision. Doubts were expressed by Councillor J. Randle as to the efficiency of the suppressors the firm proposed to fit. He said they were an American invention as yet untested in this country and only 90 per cent. efficient.

Councillor C. Kirkham objected to "being dictated to" by the Ministry and Alderman F. W. Perry said he was surprised at the statement made by the Minister that the foundry "was clearly essential to the firm's

(*Continued at foot of Col.* 1.)

Income-tax Information

By F. J. Tebbutt

The Ways and Means resolutions concerning the Budget, now embodied in the Finance Act, 1953, are advantageous to every income-tax payer, as the tax poundages are all reduced, and other matters altered are of assistance to industry, particularly as regards the laying down of fresh machinery and plant. This article explains the chief alterations, in particular giving certain figures of income and the tax appropriate to it, for different individuals. For Schedule D (business profits, and persons working on their own account), the new matters will apply against income in the year ending April 5, 1953, or earlier (*e.g.*, December 31, 1952), according to the financial-year-ending date of the firm concerned. For Schedule E (employments; pay as you earn), the new figures apply from April 6, 1953.

Tax Poundage Allowances

Speakers often refer to income-tax matters as if everyone pays tax at standard rate, which is the highest, but of course this is not so, as there are reduced rates, which first come " into the picture." Until the 1952 Finance Act, there were two " reduced rates," but that Act introduced another one, so there are now three, applying according to the amount of " taxable income " (*e.g.*, " taxable income " is total " income " less " personal allowances," of which more anon). By this year's Finance Act the different poundages have been lowered, and so apply as follows. The lowest rate applies to the first £100 of " taxable income," and this is now 2s. 6d. (reduced from 3s.); on an additional £150, the rate is now 5s. (reduced from 5s. 6d.); on the next £150 being 7s. (reduced from 7s. 6d.). This third " reduced rate " (now 7s.) is the new one introduced last year. Only above that does a taxpayer pay standard rate, which is now 9s. (reduced from 9s. 6d.). This means that the standard rate at 9s. applies to anything over £400 of taxable income.

The personal allowances are " earned-income allowance," two-ninths, applying to earnings up to £2,025 (a maximum of £450); for each individual, £120; for a wife, £90 (an allowance of £210 for man and wife), and for each child, £85. A point to note is that, whether income is earned or from investment, up to £250 will attract the " two-ninths " allowance, being treated as earned income.

Rates Applicable

If income is all earned, a single person does not pay tax unless the total income exceeds £154; a married couple, £270; a man, wife, and one child, £379; a man, wife, and two children, £488; a man, wife, and three children, £597.

A single person does not pay standard rate unless his total income exceeds £668; a man and wife above £784; a man, wife, and one child, £893; a man, wife, and two children, £1,002; or a man, wife, and three children, above £1,112. If the incomes of the five classes in the foregoing were £475, £591, £700, £810, and £919 respectively, the tax payable would only be at the 2s. 6d. and 5s. rates, the taxable income with the relevant " personal allowances " deducted in each case being £250, so that the tax payable would amount to £50 for each class (£100 at 2s. 6d., £150 at 5s.). Last year those incomes would have attracted £56 5s. tax.

In the foregoing, only the " personal allowances " given earlier have been taken into consideration in working out the examples, but in some cases the taxpayer may be entitled to other allowances, to wit, housekeeper or/and dependent relatives (the Finance Act, 1953, has increased these allowances from £50 to £60 in each case), in which case the figures given would vary, to the taxpayer's advantage, as the " taxable income " would work out at a lower figure, and the limits of income given be correspondingly higher. There are also wear-and-tear allowances for machinery and plant (the term being a wide one, including motor vehicles and fittings and fixtures), for which the taxpayer may be eligible to his advantage.

Initial Allowances

Under the Income Tax Act, 1945, there were " initial allowances " introduced where fresh machinery or plant (whether new or second-hand) was installed, but by the Finance Act, 1951, such " initial allowances " in connection with any expenditure incurred on or after April 6, 1952, was not to apply for tax-deduction purposes, the provision being suspended until such date as Parliament might determine. There were also " initial allowances " on new industrial buildings of 10 per cent., but these allowances were also similarly suspended. In connection with industrial buildings, there was also an annual allowance of 2 per cent. which applied to both new buildings and under-50-year-old buildings, each year up to a life of 50 years. This was not interfered with. Now, by the present Finance Act, 1953, the initial allowances in both the foregoing instances are to be restored on expenditure incurred after April 14, 1953. The original initial allowances given by the Income Tax, 1945, mentioned earlier, were at the rate of 20 per cent. for machinery and plant and 10 per cent. for industrial buildings. These rates are now restored.

In conclusion, it is interesting to remember that if the wife has earned income, that income attracts the two-ninths " earned-income allowance " as well as the man's earned income, and there is also a special allowance, now seven-ninths of the wife's earnings up to a maximum of £120. This is additional to the £90 included in the husband's " personal allowance " of £210 for man and wife for any income.

Fewer Factory Accidents

Speaking at the annual dinner of the Sheffield Area Industrial Group of the Royal Society for the Prevention of Accidents, Sir George P. Barnett, H.M. Chief Inspector of Factories, said that there had been a progressive decrease in the number of factory accidents. There had been a drop of about 10,000 in 1951, compared with 1950, and he expected the figures for 1952 to show a drop of another 5,000. Much of the credit for the drop, he felt sure, was due to the efforts of the society and industrialists. However, these decreases did not give any grounds for complacency.

Sir Harold West (Newton, Chambers) spoke of the need for complete honesty in matters relating to industrial accidents, and said that the man who refused to give evidence of an accident he witnessed was harming the industry.

The president of Sheffield Chamber of Commerce, Mr. Geoffrey M. Flather, said that one of the drawbacks of accident prevention in factories was the difficulty of persuading workers to wear goggles and other protective apparatus.

An appeal was made by the group chairman, Mr. J. Ruffe-Williams, for more of the smaller firms to join the group, which now consisted of 130 companies.

American Arc-furnace Practice

By W. B. Wallis

[SLIGHTLY ABRIDGED]

The trend of development of the electric-arc furnace in the United States was surveyed by Mr. W. B. Wallis, president of the Pittsburgh Lectromelt Furnace Corporation, when addressing British steelmakers in Sheffield recently. He had been invited by Birlec, Limited, to discuss American conditions and methods.

The United States is indebted to Europe for the electric furnace—not only for its invention, but for most of the major developments of the original design of Héroult. Its application to the steel industry began in 1906 at the Halcomb works of the Crucible Steel Company in Syracuse, New York. Well into the World War I period, the electric furnace was looked upon as a piece of equipment for the production of tool steels. It was applied, for the most part, to replace crucible operations. Its progress can be gauged by the fact that U.S. crucible-steel production fell from 100,000 tons in 1918 to 2,500 tons in 1930, while to-day it is nil. (All tonnages in this article refer to the U.S. ton of 2,000 lb.)

During the first world war the electric-arc furnace in the States made its first strides towards producing alloy steels and several units of 30 tons capacity, powered with 7,500 kva, were installed. Steady progress was then made until, during World War II, a number of 20-ft. dia. furnaces, mostly powered with 12,000-kva transformers, were installed by the larger steelworks for this class of product.

During the second world war, the first steps were made towards greater capacity with the installation of furnaces making 90 net ton heats for the production of mild steels and powered from 20,000 kva sub-stations (Fig. 1). With that beginning, and utilizing large sub-stations combined with the swing-aside top-roof feature, the electric furnace started to make inroads on the common-quality steel field to the point where there are now 22-ft. furnaces with 36,000-kva sub-stations, making 125-ton heats, in regular production and still larger units under construction.

It may be said, in so far as the U.S.A. is concerned and with the power rates available there, that a properly designed top-charge electric furnace, on basic, single-slag practice, can produce common-quality steel from 100 per cent. scrap charges at a lower cost than in the open-hearth furnace.

Steelfoundry Work

The electric furnace was used in the foundry industry a few years after the beginning made on ingots at Halcomb in 1906. Much more rapid progress was made in the foundry industry, so that to-day the majority of U.S. steel foundries is equipped with arc furnaces, the open-hearth being restricted to the making of very large castings. The largest electric furnace at present in operation in foundry work in America makes 20-ton heats. The author looks forward to the not-too-far-distant future when an installation of two 50-ton "electrics" will be made in one of the larger foundries.

About 90 per cent. of the steelfoundry production in castings of the United States has been on acid hearths, as there is comparatively little trouble with sulphur and phosphorus. Recently, several foundries have changed over on straight-carbon castings to basic practice. In general, however, the position of the steelfounder is that he will not go to basic operation unless he has to, for the very simple reason that the costs are usually higher on basic operation than on acid. The other 10 per cent. capacity is on basic production making high-alloy castings and Hadfield manganese steel (Fig. 2).

In the grey- and malleable-iron field, electric-furnace production has been primarily limited to the automotive trade where repetitive castings are required. In many instances this work is carried on by the duplex method, utilizing the cupola as the primary melting unit.

Trends in Electric-furnace Use

Comparing the different methods of steelmaking, it is noted that the percentage of total steel

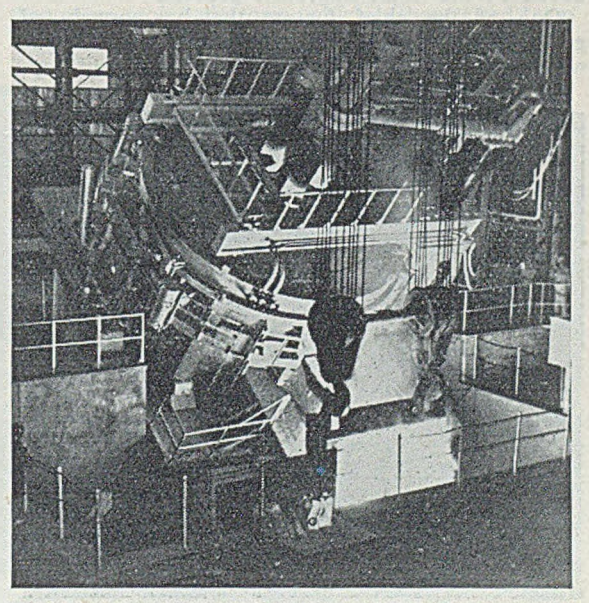


FIG. 1.—*Tapping a Model "H" Lectromelt Furnace (20 ft. dia. Shell, 80-85 tons Capacity).*

production in the electric furnace in the U.S.A. has climbed at a relatively steady rate from 1.8 per cent. in 1932 to approximately 7.3 per cent. in 1952. Bessemer production has been gradually falling, the electric furnace first passing it in 1948. Present indications are that the electric furnace will continue to widen the lead as time goes on. As to the open-hearth furnace, it reached its peak in percentage production in 1940 at about 92 per cent., dropping to around 89 per cent. in 1952. This means a fall of about 3 million tons.

When dealing with a steel production of 100 million tons per year, the above percentages are somewhat misleading. If, however, one examines the installed capacity and growth in installed capacity of open-hearth and electric furnaces, it is interesting to note that in the past 15 yrs., the installed capacity of open-hearth furnaces in the United States has increased by 43 per cent., while in the same period the installed capacity of electric furnaces has been increased by 580 per cent.

In comparing the status of the electric furnace on percentage production, the U.S.A. has reached beyond 7 per cent. of the total production of 1952, whereas Germany has been as high at 11 per cent., Italy 46 per cent. and Sweden 41 per cent. Assuming the possibility of developing electric-furnace production to a ratio comparable to that obtained in other countries, there is a wide gap to be filled. Present indications are that the electric furnace has started to replace open-hearth capacity. It is interesting to note that in the first half of 1953, 52 per cent. of the electric steel ingots produced in the United States were of common quality steel produced by the single-slag basic process.

One of the chief factors that has contributed greatly to the increase in electric furnace output was the introduction of the swing-aside roof top-charge furnace in 1926. The maximum capacity of the door-charge furnace has remained constant at 100 tons since 1927, when a six-electrode furnace was installed at Timken Roller Bearing Company. The top-charge furnace increased gradually in size up through 1948, but since the war has taken a remarkable spurt, rising from 70 tons to 125 tons in 1952 with 150-ton furnaces now under construction. Fig. 3 shows the relation between the approximate shell diameter and metal holding capacity of electric furnaces and the transformer capacity.

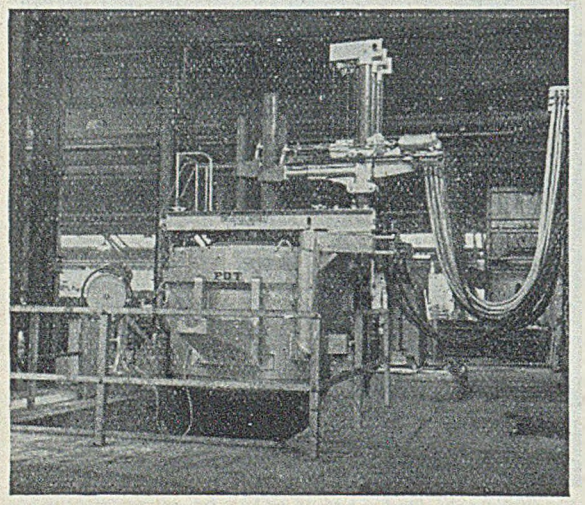


FIG. 2.—*Model "PQT" Birlec Lectromelt Furnace of 4 tons Capacity.*

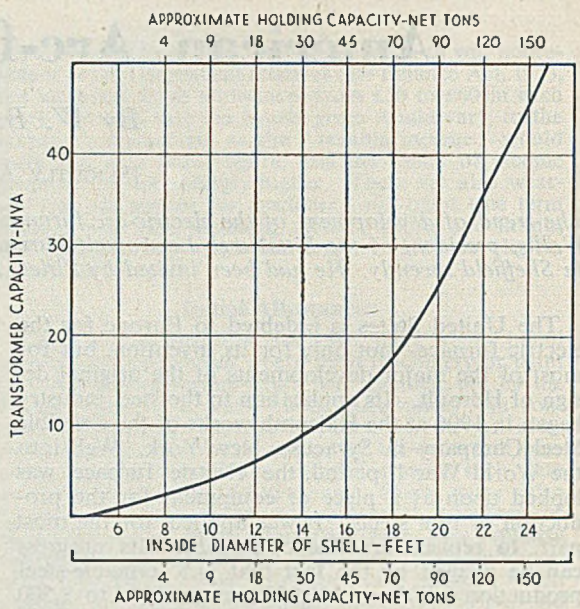


FIG. 3.— *Transformer Capacity* v. *Furnace Size for Electric-arc Furnaces.*

Method of Rating Output

Furnaces for acid foundrywork are rated in the U.S.A. on an hourly basis; that is, a furnace rated at 3 tons per hr. is another way of saying that it is a 6-ton holding capacity furnace and is powered to produce that 6-ton heat on an acid hearth in two hours, tap to tap. The ingot producers held the view that this was satisfactory for acid practice but, on basic practice, there was much skill involved (there is, of course, in both cases). There was the proper "turning" of slags and, they said, one could not rate a furnace on its hourly production; one must, of necessity, rate it on its heat capacity or hearth capacity. In other words, when making tool steel, the 3-ton acid casting furnace was reduced in rating, on basic operation, to a 5-ton furnace. The heat might last five hours, reducing output to 1 ton per hr. In recent years, the ingot maker has changed his viewpoint and to-day output is rated in ingot tons per hour based upon a 730-hr. month, *i.e.*, one-twelfth of a year.

Production; Specific Installations

To-day, maximum production is being obtained from a plant making mild and semi-killed steels in

two 22-ft. dia. furnaces operating on 125-ton heats. The average production from each furnace is 18,000 net tons of ingots per month, or at a rate based on a 730-hr. month, of 24.5 tons per hr. These two furnaces have been in operation for about a year and confidence is felt that before another 12 months pass, an average production of 28 tons per hr. is expected from each of these units. This production is based upon full-time operation (Fig. 4).

Another installation, using a 20-ft. dia. furnace powered with a 25,000-kvo. sub-station, is being operated on a five-day week, 24 hrs. per day. The power demand is 16,000 kw. The average production per heat is 96.44 tons of ingots; monthly production, 10,608 tons; net tons produced per hr. (this based upon the hours of operation just outlined), 21.54; per cent. recovery, 95.57; kw-hrs. per net ton, 495; pounds of graphite electrodes per net ton, 9.62; average time, tap to tap, 4 hrs. 28 min.

In contrast to the production from furnaces of 20-ft. dia., it is interesting to note what is being done in an ingot shop making single-slag basic common-quality steels using three 11-ft. dia. top-charge furnaces each equipped with a 5,000-kva sub-station. The production per month is about 10,600 tons of ingots. The average size of heat is 21 tons and the rate of production is 5.2 tons per hr. per furnace.

Recently, an open-hearth shop making common-quality steels installed an 18-ft. dia. electric furnace equipped with an 18,750-kva. sub-station. The open-hearth superintendent read an interesting paper this year stating that they had been averaging 15.2 tons per hr., or 10,890 net tons in 718 operating hours in the month, making 75-ton heats with a power consumption of 495 kw-hrs. and an electrode consumption of 9 lb. per net ton of good ingots.

The electric furnace showed a 94 per cent. yield in good ingots, as against 89 per cent. for the open-hearth, and, he states, the comparison of furnace availability between the open-hearth shop and the electric shop during the past seven months showed that the electric operated 94.5 per cent. of all available hours and the three open-hearth furnaces 86.5 per cent. of all available hours. Comparison of repair cost per ton of steel produced shows that over the seven months' period the open hearth produced 100,603 net tons of ingots with an average repair cost of $3.35 per net ton. The electric furnace produced 65,438 net tons at an average repair cost of $2.65 per net ton. In this shop, the open-hearth furnace is favoured with the better grade of scrap.

Refractories

Furnaces in the U.S.A. are lined in general, with fireclay brick on the bottom followed by magnesite brick and then with rammed magnesite mixtures of various trade names with a depth of rammed materials of from 6 to 12 in. Other operators put chrome brick next to the shell and then magnesite brick to a total brick depth of 21 in. and on top of this a maximum of 7 in. of "Ramset."

Sidewalls are usually made up of magnesite "Metal-case" brick and are, in the larger furnaces, of 13-in thickness. Roofs are usually of silica brick, although some fireclay and high-temperature refractories such as sillimanite have been used. Where silica is used, some operators prefer 9-in. bricks; others 12-in. with the maximum at 15-in.

It is natural to expect a wide variation in refractory practice in the various plants—everything depending upon the head melter. Furnace hearths last about a year unless some untoward accident occurs. In some instances, a plant will report an average of 300 heats to a sidewall and 75 heats to a roof. Another plant, making the same quality steel and using similar equipment, will report 125 heats per sidewall and 125 heats per roof. In the first instance, investigations have shown that the melter is patching sidewalls between heats and is changing roofs before there is, in many instances, a real need. In the second instance, very little, if any, sidewall patching is done and the operation is carried on to the end that the sidewall and roof are changed at the same time.

In considering the time required for a reline, some plants allow 12 hrs.' shut-down in order to do a complete reline. At another plant, using large furnaces, a water-cooled steel platform is lowered into the furnace after the roof has been swung off at the finish of the last tap. Four men enter the furnace and pull down the sidewalls, to the slag line, on to this water-cooled platform, which is then raised from the furnace. A second water-cooled platform, with

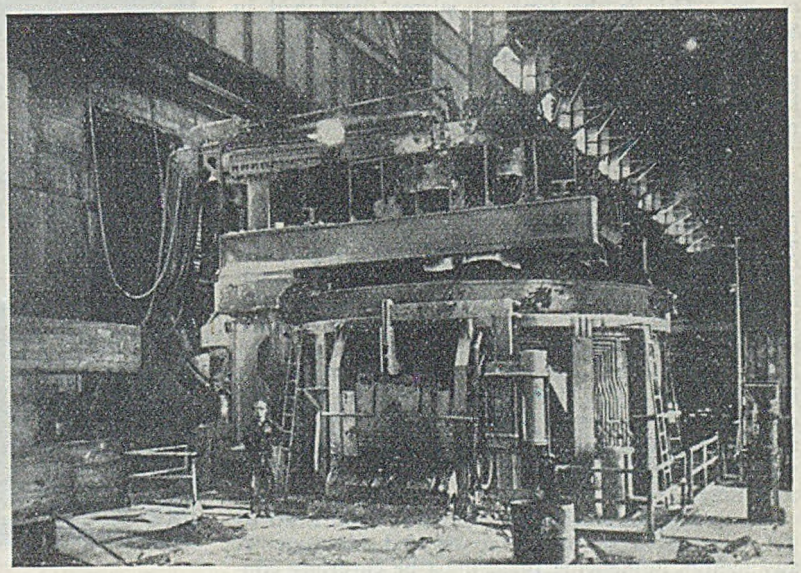


FIG. 4.—*A Model FT Lectromelt Furnace, 22-ft. Shell dia., of 100-110 tons Capacity.*

the new bricks stacked on it, is lowered into the furnace and the brick masons go to work putting in the new sidewall. This operation can be carried out on a 22-ft. dia. furnace in slightly under 4 hrs. from the tapping of the last heat to the turning on of power on the next succeeding heat.

Stirrer

An interesting development to steelmakers in the U.S.A. has been the installation of an induction stirrer on a 20-ft. dia. top-charge furnace equipped with a 20,000-kva sub-station. The stirrer has now been in operation for nine months. Officials of the company state that it is rather too soon to make positive statements as to all the results, but there were certain statements that could be made, based on the experience during the nine months, that indicated the following:—(1) A more homogeneous bath; (2) shipping yield was 2.5 per cent. better and on high-nickel steels, 15 per cent. better; (3) lower " sulphurs " are being obtained than previously and have been possible without much trouble; that is, on this furnace numerous heats are made with sulphur contents ranging from 0.005 to 0.01 per cent. (In comparison, duplicate furnaces without stirrers, on the same practice, were averaging around 0.015 per cent. S); (4) more representative samples of the bath were obtained to send to the laboratory; (5) closer temperature control; (6) closer chemical control, and (7) improved ingot surface.

The speed of motion, when the stirrer was first started up, was 4 ft. per sec. across the bottom of the furnace and 2 ft. per sec. at the surface. Since the stirrer has been put into operation, the speeds have been reduced to 2 ft. per sec. across the bottom of the furnace and 1 ft. per sec. at the surface, with no change having been noted in the metallurgical results. This is the type of stirrer developed in Sweden by the ASEA concern. The foregoing is a static type of stirrer attached to stainless-steel furnace hearth. A competitive type of stirrer is now being offered in the States, of the rotating type, but no installations have as yet been made.

Economics

It is apparent that, on tons produced, the electric furnace has just " scraped the surface " with only 7.3 per cent. on the ingot production in the States. The expansion has been limited mostly to non-integrated plants and, until some practice of working hot metal in the electric furnace is developed, one cannot at present see hopes of making any really big increases in the common-quality steel production in the United States. Experiments have been carried out in some shops using up to 35 per cent. hot metal, and, on occasion, up to 50 per cent. hot metal, but no standardized practice has been developed that is repetitive.

All steelworks practice is ultimately influenced by the question of production costs and consequently any factors influencing these must be carefully considered.

In the case of non-integral plants, it has been possible, on cold-scrap charges, to produce with these larger units electric-furnace steels for less money than with the open hearth. Of course, one of the fundamental reasons is that the electric furnace is a highly efficient unit, with a thermal efficiency of over 70 per cent. Its competitor, the open-hearth, has to be satisfied with about 25 per cent. thermal efficiency.

There has recently been published in the United States by Bituminous Coal Research Inc., a report on the competitive economics of open-hearth and electric furnace for the production of low-carbon steels. This report, prepared by the Battelle Memorial Institute, shows that in the open-hearth process, 26 per cent. of the heat input is contained in the molten steel; from 20 to 27 per cent. is lost in stack gases and 28 to 32 per cent. is lost through furnace walls, radiation, etc.

For the electric furnace the following percentage figures are given:—Heat content in steel, 70.5; heat content of slag, 4.2; refining reactions, 1.2; heat content of waste gases, 2.3; heat extracted by cooling water, 3.8; electrical losses, 7.6; losses through walls, radiation, etc., 10.4.

There has been some discussion as to why, with swing-aside roof furnaces it would not be possible to work the furnace as an oxygen " blow " converter, with the roof swung to one side, then swing the superstructure back on and finish the heat. So far this has reached the " talking stage " and no experiments have been conducted.

Development of Large Electric Furnaces

In so far as size of furnace is concerned, as stated, there are two 22-ft. dia. furnaces making 125-ton

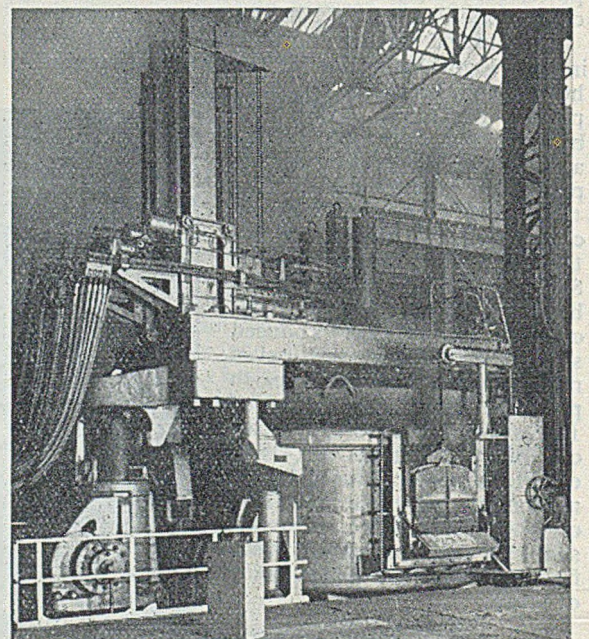


FIG. 5.—*Working Door of Model " MNT " Birlec Furnace of 25 tons Capacity, recently installed in Sheffield.*

heats in operation. A 24-ft. dia. unit is being built for a customer on the Continent and a contract has also been placed for two 24-ft. 6-in. furnaces in the United States.

One of the controlling factors in this matter of furnace size is bad scrap. There are two capacities to an arc furnace. One is the hearth capacity and the other is the volumetric capacity. With scrap weighing 25 lb. per cub. ft., the volumetric capacity becomes the controlling factor. The European buyer of the 24-ft. furnace, which has a hearth capacity of 143 metric tons, plans on operating the furnace on 100 metric ton heats. The volumetric capacity of the lined furnace is 3,700 cub. ft. and, with scrap running 25 lb. per cub. ft., the volumetric capacity becomes the controlling factor. Only 45 tons can be handled at one charge, so that, even with this large furnace, two back charges would have to be made. With scrap weighing 35 lb. per cub. ft., the charge could be handled with on back charge.

In most of the plants in America it is necessary to use a minimum of two back charges, and in some instances three back charges are required after the initial charge is melted down.

Future

In the foregoing, some of the more important factors which have influenced electric-furnace developments in the States have been discussed. For both foundrywork and alloy-steel production, the electric-arc furnace has proved superior to any fuel-fired unit, both technically and economically. With the common-quality steels produced by non-integrated works, a good case has been made out for the electric furnace in many instances and fully proved in practice. The points to remember here are that a modern top-charge electric furnace will out-produce by 100 per cent. or more an open-hearth furnace of equivalent size; will handle pretty nearly any kind of scrap and has a thermal efficiency sufficiently high as to more than offset the lower cost per B.Th.U. produced by coal or oil.

As regards the British steel industry, it will be readily conceded that many operating conditions are quite different from those in the United States. For instance, the phosphorus and sulphur problem has to be contended with. Nevertheless, it is considered that the British steelmaker, with the present "grid" system, is now in a fair position to consider electric furnaces of much larger capacity than have heretofore been standard in Britain. In fact, there is now under construction a 70-ton furnace which is about twice as large in capacity as has previously been considered for the U.K., and it will be interesting indeed to see the results with this unit. A 25-ton furnace recently installed in Sheffield is shown in Fig. 5. In the opinion of Mr. Wallis, there is every reason for the British steelmaker putting into operation large furnaces of similar capacity to those in the States.

MINWORTH METALS, LIMITED—Mr. M. A. Nelson has been appointed a director.

Publications Received

British Ironfounding Industry 1946-1952—A Statistical Review. Published by the Joint Iron Council for the Council of Iron Producers and the Council of Ironfoundry Associations.

The preface states that the booklet is designed to serve as a reference book for basic data and as an exposition of salient developments. *Force majeure* it covers only the years from 1946 to 1952, because earlier statistics are non-existent. Rightly, the Joint Iron Council considers this to be a distinct period in the history of British ironfounding—"a record of achievement in the face of shortages in production facilities." The magnitude of the post-war achievement of the ironfounder is certainly brought out in this booklet, either when judged by the absolute standards of tonnages produced and numbers employed, or by comparison with the general expansion of the country's economy. This is the main lesson to be learnt from the several aspects of the industry which are studied in the booklet, and it is emphasized by the inclusion of numerous two-colour graphs and diagrams.

Only the beginnings of the difficult conditions which now affect many ironfounders come within the period covered by the booklet, but such figures as these help to put present trade recession into proper perspective: The output of iron castings in 1946 was 2,537,300 tons and in 1952, 3,830,700 tons; average numbers at work in ironfoundries in 1946, 119,115 and 1952, 153,932 persons. Apart from the main theme of expansion, the booklet devotes a great deal of its space to analysing the ever-changing structure of the industry. Many facets of this are revealed; expansion of output and labour force is shown to be unevenly distributed between the various regions; considerable changes have occurred in the balance between various types of labour skill, between the different types of castings produced, between pig-iron and scrap, and between particular qualities of those materials.

Interwoven with this explanatory material are many tables of basic statistics. There has been a wealth of facts and figures collected from ironfounders during and since the war, but the results have appeared only in piecemeal fashion, if at all, and their usefulness has thereby been reduced. The booklet under review has the merit of collecting important figures for a series of years under one cover. Ironfounders, not members of constituent associations of the C.F.A., to obtain a copy of this publication should apply to the secretary, the Council of Ironfoundry Associations, 14, Pall Mall, London, S.W.1. Copies have already been distributed to all C.F.A. members.

Journal of Research and Development Vol. 5, No. 1, August. Published by the British Cast Iron Research Association.

This issue contains four Research Reports. The first one by Mr. K. B. Palmer and Mr. G. N. J. Gilberts on the fatigue properties of nodular cast iron, confirms earlier work to the effect that whilst an increase in silicon content improves the static tensile properties and the unnotched fatigue properties of ferritic nodular irons, it has a harmful effect on the impact properties. There are two Reports by Mr. E. R. Evans on two aspects of enamelled cast iron. The first deals with the microstructure of the enamel iron interfaces and the second covers the incidence of blistering in cast iron enamels and the major conclusion reached is that the casting skin is not necessarily responsible for the production of blistered enamel surfaces. Finally a report from Mr. S. W. Palmer has shown that in very general terms atmospheres containing hydrogen are detrimental to the properties of both white- and black-heart malleable cast iron.

Personal

DR. F. W. COPE has been appointed Professor of Geology at the University College of North Staffordshire.

MR. R. B. POTTER, chairman of Simon-Carves, Limited, has joined the board of Davy & United Engineering Company, Limited, Sheffield. Mr. E. J. Fox has resigned.

MR. C. W. PERRY and MR. L. CIVVAL have been appointed to the Board of Deritend Stamping Company, Limited, and its subsidiary, Deritend Precision Castings, Limited.

MR. WILLIAM B. HUTCHINSON, the new president of Peterborough Engineering Society, of which he has been secretary for four years, is on the staff of Peter Brotherhood, Limited.

MR. G. PARKIN was, on October 15, inducted as president of the Birmingham Metallurgical Society for its golden jubilee year. He is chief metallurgist of J. B. & S. Lees, Limited, West Bromwich.

MR. JAMES H. BARRETT, foundry manager of Sir W. G. Armstrong Whitworth & Company (Ironfounders), Limited, Gateshead, has retired after 30 years' service. Previously he was works manager for 25 years.

MR. M. W. SHORTER, a director of Westinghouse Brake and Signal Company, Limited, has been appointed managing director of the company. He is also on the Boards of several of the company's subsidiaries.

MR. ANDREW WILSON, who celebrated the diamond wedding anniversary last week, is a retired moulder, employed for 20 yrs. at Sunnyside Foundry, Camelon. He is 82. Among many telegrams received was one from the Queen.

MR. E. C. B. ROWLEY who, from 1945 until this year, was chairman of the Midlands Area Council of the Royal Metal Trades' Pension and Benevolent Society, was presented with a silver salver in recognition of his work at the Society's annual ball in Birmingham on October 15.

MR. H. PEAKE, having been advised to curtail his business commitments, has resigned his directorship of Westinghouse Brake & Signal Company. Mr. Peake also holds a number of other important company directorships, including a seat on the Board of Rolls-Royce, Limited.

MR. N. C. BLYTHE has been appointed director of the Midland Electric Manufacturing Company, Limited. Mr. Blythe joined the firm in 1931 as foundry manager and subsequently held office as assistant works manager, becoming works manager in 1946. He is a past president of the Birmingham branch of the Institute of British Foundrymen.

MR. R. C. EDMUNDS of Foundry Services Limited delivered a paper—of which he is the co-author with Dr. D. V. Atterton—on "The Exothermic Feeding of Castings" to the Eastern Canada Chapter of the American Foundryman's Society at their last meeting. Mr. Edmonds is staying on in Canada for the next few months to assist the Canadian subsidiary of the company.

SIX EMPLOYEES of G. & J. Weir, Limited, engineers, Glasgow, have completed 50 yrs., service with the firm and have been presented with long-service certificates and gold watches from the directors. They are Mr. S. Kerry (foundry), Mr. J. Couper and Mr. G. Alexander (machine department), Mr. I. McKillop (machine-shop), Mr. W. Wilson (heat-exchange-department), and Mr. R. Whiteshaw (maintenance department).

SIR PATRICK HANNON and SIR LEONARD BROWETT retired last week from presidency and directorship respectively of the National Union of Manufacturers. the new president is LORD ROCHDALE, who is chairman of the Rochdale (Lancs) firm of Kelsall & Kemp, Limited, and the new director is MR. CHARLES F. V. WILLIAMS, who became Sir Leonard Browett's assistant five years ago. He was later appointed deputy director.

Obituary

THE DEATH is announced of MR. RAYMOND LINDSAY BRADLEY, of Bradley & Turton, Limited, ironfounders, of Kidderminster (Worcs).

The death has occurred of MR. G. KIBBLE, formerly assistant blast-furnace manager of the Partington Steel & Iron Company, Limited, Manchester.

MR. HERBERT REDMAYNE DARRAH, managing director of Baxendale & Company, Limited, lead manufacturers, etc., of Manchester, died on October 11. He was 84.

MR. JOHN FORD, manager of Parsons Marine Steam Turbine Company, Limited, Wallsend, for 25 years until his retirement about 20 years ago, has died at the age of 84.

MR. LAWSON CYRIL WILLIAMS, secretary of R. & J. Dempster, Limited, gas and chemical engineers, ironfounders, etc., of Manchester, died early this month, at the age of 57.

MR. TOM MILNER, works and production director of Richard Sutcliffe, Limited, manufacturers of mechanical handling plant, of Wakefield (Yorks), died on October 6 at the age of 66. He had been associated with the company since 1906.

MR. JAMES HENDERSON, who died last week at the age of 77, served most of his lifetime as a commercial representative and traveller with Cruickshank & Company, Limited, Denny Iron Works, where his record of service extended over 60 years.

ON THE EVE of going to Press, news was received of the death of DR.-ING. EUGEN PIWOWARSKY, director of the German Foundry Technical High School at Aachen, and long prominent in international foundry circles. A fuller obituary will be recorded in next week's issue.

THE DEATH OCCURRED on October 16 of MR. CHARLES HENRY DEWHIRST, of Keighley, at the age of 88. He was a past-president of the Keighley Association of Engineers, and although he retired from business 15 years ago he still maintained his interest in the Association. He was one of the men who helped to make Keighley widely known as an engineering centre, and was responsible for introducing to the town the manufacture of the internal combustion engines.

MR. LOUIS RIPLEY, who was formerly chief metallurgical expert for Lloyd's Register of Shipping, which he served for 27 years, has died at the age of 73. Mr. Ripley began his career with Wm. Jessop & Sons, Limited, the Sheffield steelmakers, and continued with the company until he joined Lloyd's Register. After his retirement from Lloyd's in 1947 he joined Blackett, Hutton & Company, Limited, steelfounders, of Guiseborough (Yorks), and was a director of the company until he retired recently. He was awarded the O.B.E. for his services to the country during the second world war.

Economic Utilization of Copper-base Alloys*

Discussion of I.B.F. Sub-committee T.S.38 Report

Opening the discussion at the Blackpool conference of the report of sub-committee T.S.38 of the Institute of British Foundrymen—"Economic Utilization of Copper-base Alloys"—MR. DEARDEN said he was very pleased to see the paragraph referring to British Railways, because it revealed that one of the advantages of nationalization had been a reduction of their non-ferrous casting alloys from 37 to 5. It had not been an easy task for the committee concerned, on which the metallurgical, foundry, design and user interests of the railways had been represented.

There was some criticism of the B.R. report that the reduction had been overdone and that, for example, alloy LG2 (85/5/5/5) had been completely omitted. The railways had used that alloy, especially during the war, and although the foundries had liked it, the users had not been particularly keen on it. It did not stand up well to pounding and to abrasion, and resistance to these stresses was required in quite a number of railway castings. Therefore, in the interests of simplification, alloy LG2 had been omitted and replaced by LG3 (86/7/5/2). The latter also replaced the Railway Clearing House specification (82/3.5/11.5/4), which incidentally had only been used to a very small extent for wagon bearings and not at all for locomotive work—which required the largest tonnage—so it would be seen that it was not a big factor in the railway non-ferrous castings position. The scheme should result in a saving of about £80,000 per year, so that the apparent increase in tin content was certainly well worth while. Actually, the increased tin required for LG3 should come from the surplus 12 or 14 per cent. tin alloys which had been used by some of the pre-nationalization railways, so that practically no virgin tin would be needed.

In his opinion, the railway authorities had done quite well in getting at least three of their five alloys accepted as British Standards. Actually LG3 was the one most used; it represented about 75 per cent. of the railways' own production of non-ferrous castings, so that from the production point of view probably 90 per cent. of their total production was in British Standard alloys. One alloy (Y.M.2), which they had standardized and which was not in the British Standard list, contained 26 per cent. of lead. It had been found to be very suitable for the slide valves of saturated-steam locomotives; it had been tried by the former L.M. & S. railway and had proved to have better wear resistance under those conditions than phosphor-bronzes containing 10 or 13 per cent. tin.

Representation Requested in Vain

MR. FRANK HUDSON, F.I.M., who presented the Report at the conference, said he was glad, on behalf of sub-committee T.S.38, to have Mr. Dearden's remarks. It was a particular regret to him that British Railways were not represented on that sub-committee. They had been aware of the work done by the railways on standardization through the paper given by Mr. C. Dinsdale to the Institute of Metals 18 months previously, and when T.S.38 was formed, an invitation was sent to British Railways for a representative to serve on their sub-committee. The Institute members had particularly desired such representation in order to obtain information of the type that Mr. Dearden had just supplied, but the British Railways executive had decided that it would be a waste of time for any representative to attend, as the railway authorities had already dealt with the matter and were quite satisfied with the results. The I.B.F. sub-committee, however, had wanted that co-operation so that further progress might have been made, and Mr. Dearden's present remarks had thrown a considerable light on some things the sub-committee had been compelled to guess at, owing to British Railways' refusal to be represented on the sub-committee.

Specification Marking Advocated

MR. STOKOWIEC said that replacement of the high-tin alloy (88/10/2) by (85/5/5/5) was taking place slowly and he believed that, if there was a chance to suggest it, 99 per cent. of customers would accept the change. As far as standardization was concerned, the British Standard Specifications covered a number of alloys, but he agreed with the previous speaker that the 26 per cent. leaded bronze should be included, because a great many customers were using that type of alloy.

Scrap Utilization

The subject of scrap utilization had not been mentioned, but Mr. Hudson had advocated aluminium-bronze and manganese-bronze to replace tin-bronze, and a result was that castings such as crown wheels were coming back to foundries through scrap merchants, some of whom were not aware that they might be of different alloys. It was then possible to spoil two tons of good phosphor-bronze metal because of aluminium contamination. Instead of using high-quality scrap directly, it was now necessary to re-melt it in order to find out its composition, and Mr. Stokowiec wondered whether it would be possible to have a type of castings alloy identity stamp by which all manufacturers could mark their finished products. Some of them could be segregated even now, since David Brown Foundries, the Phosphor-Bronze Company and Holroyd's were using stamps to distinguish their own products.

Proper scrap utilization would automatically lead to cheaper castings, because it would mean a reduction of the amounts of virgin metal such as tin and copper now being used. but it was no good

* Report printed in the JOURNAL, July 9, 1953.

concentrating solely on the small foundries and users; what was needed was that scrap merchants should buy from the users and sell to the foundries and be responsible for the proper segregation of scrap. Being himself of Continental origin, he could remember that before the war, in most European countries, there was very careful scrap segregation before it reached the scrap merchants and in Germany, in particular, scrap of very high quality was directly utilized in high-value products.

As far as British Railways were concerned, they had done very well in cutting down to five alloys, although he believed that they were actually using more than five. The railway authorities, perhaps, did not want to produce castings in more than five alloys themselves, but they were sending orders to other foundries calling for aluminium-bronze or manganese-bronze castings.

MR. W. G. MOCHRIE said that Mr. Dearden, in referring to 85/5/5/5 (B.S. 1400-LG2), pointed out that it was an alloy introduced as a war emergency measure. He (the speaker) presumed this qualification pertained to British Railways practice, as there could be little doubt in the minds of the audience that the alloy was probably the most popular leaded gunmetal in use. Its " castability " and performance had long since been established and, as Table II on page 6 of the preprint indicated, it still ranked high in popular demand.

That the British Railways' executive should have by-passed this alloy when seeking a substitute for the Railway Clearing House specification and chosen 86/7/5/2 (B.S. 1400-LG3) was difficult to conceive. So far as he knew, the physical properties of the R.C.H. alloy would still have been met by LG2, without recourse to the much more expensive LG3—a matter of from £10 to £15 per ton. As a fare-paying passenger on the railways, and at the same time having a watchful eye on his income-tax returns, the speaker would be glad to hear what justification there was for spending £45 more per ton, representing the difference between R.C.H. value and quotations for L.G.3 at the present time. Mr. Dearden mentioned that the R.C.H. specification was used only for wagon bearings, if heard correctly, but he submitted that even this limited use accounted for very substantial tonnages each year. The change-over from one specification to the other might be explained by some simple consideration. If this explanation was mechanical or metallurgical, foundrymen would still be very glad to have the reason for such a sudden and apparently drastic change in policy.

Expensive Contamination

He hoped Mr. Stokowiec had not had to pay too dearly for the experience attached to the " saving " by using outside scrap. Foundrymen in this country, although perhaps more reluctant to discard old practices than their American colleagues, had for a good many years become resolved to the discontinuation of scrap charges in their furnaces. The reason was the very one mentioned by Mr. Stokowiec, and conditions were becoming worse every day so far as this matter was concerned. One had only to read Mr. Stokowiec's excellent paper, given earlier in that day's session, to realize the extent to which similar shapes were being produced from fundamentally different alloys. Some form of marking arrangement in the foundry to distinguish different alloys might be a commendable idea, but he did not think it would be very practicable. The particular shape to which he referred must have undergone machining operations which had obliterated all cast surfaces. (He would like to know what marking principle might have been involved to denote the outcome of the mixed phosphor-bronze/aluminium-bronze charge in the furnace!) Moreover, the bulk of secondary metal destined eventually for foundry use was of the " collected " variety, so that segregation at source would not be completely satisfactory.

Mr. Hudson had indicated the whole crux of the matter—the non-ferrous ingot industry was more essential to-day than it ever had been. Its paramount service in the economical utilization of copper-base alloys from a national standpoint in the conservation of imported virgin metal and the rehabilitation of the country's available secondary resources, in effect went hand in hand with the economies of the individual foundryman. There could be no doubt of the need for this Report, although it was perhaps necessary to relate it to the shortages of metals at the time the sub-committee was constituted. In its present form it was of permanent use for designers and foundrymen alike.

Scrap for Smaller Firms

MR. FRANK HUDSON said he appreciated the remarks of the last speaker because they were so very pertinent to the present position, and it was discussion of this nature which helped them to finally bring out a fully-balanced Report. The sub-committee had tried to look upon the whole subject in a general way, and whilst he fully appreciated the need for scrap segregation in the manner indicated, the use of scrap should be a function of the larger foundries operating fully-equipped chemical laboratories. In his view, it was foolish for the small founder to try to use miscellaneous scrap, especially when its composition was guessed at, and the founder did not make a point of having full analysis of the finished castings. Smaller foundries should use ingots from an approved source, of certified analysis, and should use only domestic scrap. That method put their melting-shop practice on a standardized and simple basis, and although it might cost a little more, it did guarantee the compositional quality of the final castings. The sub-committee felt that the American practice of using nothing but pre-alloyed ingots, plus domestic scrap, was of advantage to the small founder. Personally, he would prefer to leave the larger concerns and the ingot manufacturers to cope with the scrap position.

The CHAIRMAN (Mr. E. Longden) proposed a hearty vote of thanks to Mr. Hudson, which was carried with acclamation.

(*Continued on page 516 at foot of column two*)

Notes from the Branches

London—East Anglian Section

The East Anglian section of the London branch of the Institute of British Foundrymen visited the Ford Motor Company, Limited, Dagenham, on September 30. Approximately 25 members were conducted round the works, special attention being paid to the foundry department where arrangements had been made for the reception and segregation of the party from the normal flow of visitors. At the conclusion of the visit, a vote of thanks to the company was proposed by Mr. H. S. Ward, president of the section.

Lancashire—Presidential Address

Giving his impressions of Lancashire foundries during the past 20 yrs., with "a peep into the future," Mr. F. A. Harper, delivering his presidential address to the Lancashire branch of the Institute of British Foundrymen, on October 10, said that if he were asked to state the most outstanding foundry achievement of the past 20 years he would point to the advance of the fully-mechanized shop, of which there were 30 or more in the Lancashire area. Moreover, they excelled in efficiency and output, having plant equal to any in the country.

He quoted a rough estimate of 450 foundries in the north-west, to include the 30 which were fully mechanized. The total was made up by 270 general ironfounders (making a total of 300 on grey iron); the non-ferrous foundries totalled 135, mostly small "family" units, but there were perhaps 25 of larger proportion. Add to these six making die-castings, six steelfounders and four malleable founders, and that would give a fair picture. Slight inaccuracies there must be in any list because it was difficult to classify them, for in several cases there were non-ferrous and iron foundries operating under one roof. The figures, however, clearly showed the extraordinary concentration of firms on grey iron; and the very small proportion of the whole devoted to steel or malleable. Lancashire was obviously a cast iron area, and obviously the salvation of the industry during the next 20 yrs. must be largely in the hands of those 270 general ironfounders.

Future Progress

These foundries were mainly engaged in the production of heavy specialized castings, or of smaller parts in infinite variety for the jobbing trade. It would benefit very few of them to emulate the 30 fully-mechanized plants, indeed is was true to say that the production of real repetition lines had already outstripped demand. Nor would it pay to convert all types of plate moulding to mechanization. He had the greatest admiration for the present output of many seemingly "old-fashioned" plate-moulding shops.

Whereas in 1930 skilled moulders were plentiful, the position to-day was completely reversed and he believed that during the next 20 yrs. there would be a revolution amongst the general ironfounders, each of whom would add mechanical aids not even contemplated 20 yrs. ago. It would be advancement on a par with that of the repetition casting firms in the 1930's.

Some general ironfounders had indeed already shown the way, and the industry was indebted to them for some excellent papers in recent years describing various ways of overcoming the growing shortage of floor moulders by the application of many forms of mechanical assistance. Scores of foundries were constantly adding large jolters, impellor rammers, improved sand plants, better lifting tackle, or developing core-assembly methods and eliminating loose patterns where possible. Noteworthy, too, was the co-operation which now existed between foundryman and pattern-maker—the latter had a much more important rôle to play in the future. "One-offs" castings there will always be, but even "one-offs" can be power rammed, and in the vast majority of Lancashire foundries, inevitable improvements can be foreseen, with "mechanical aids" doing all the "donkey-work," thus leaving the native skill of the craftsman, and—he sincerely hoped—the apprentice, to develop the more interesting side of the craft.

Australian—Victoria

The September meeting of the Australian—Victoria branch of the Institute of British Foundrymen took the form of an evening visit to the works of Vickers Ruwolt Pty., Limited, Richmond. All departments were toured under competent guidance from members of the staff, and much interest was shown. At the close, supper was provided in the works canteen by courtesy of the management. Members were reminded of the dates—November 12 to 14—on which the Victoria Foundrymen's Convention will be held.

Newcastle-upon-Tyne

Between 60 and 70 members of the Newcastle and district branch of the Institute of British Foundrymen visited the extensive works of Richardsons Westgarth & Company, Limited, Hartlepool, on October 10. The invitation, which was obtained from the management through the good offices of Mr. Colin Gresty, was greatly appreciated and the visit was thoroughly enjoyed.

Richardsons Westgarth's was established at Hartlepool many years ago—as marine engineers—in the early days, but considerable development has taken place in more recent years and in addition to marine engineering the firm is well established as turbine, electrical, and general engineers, boilermakers and ironfounders, so that the visit offered an opportunity of viewing a considerable variety of work.

Although the visit was primarily concerned with the iron foundry, the interest of members was greatly increased by a visit to various departments. In the electrical department, for instance, turbines and rotors for land power-plants were in various stages of construction, and in the marine section much interest was shown in a 6,000-h.p. Doxford engine in course of erection for testing. In both these departments many comments were made on the extent to which weldings are displacing castings, a welded turbine casing being an outstanding example. It was generally acknowledged that both castings and weldings are needed in industry and, while there is no well-defined demarcation line when components should be made as castings or weldings, the greater the progress in one or the other method will cause overlapping, either to the disadvantage of the fabricated product or the foundry industry, according to the degree of progress made. It was noticeable that welding fabrication is making headway in the manufacture of turbine rotors for power plants.

Iron Foundry

The iron foundry proved to be a typical marine engineering foundry, which, apart from a machine for making toothed-wheel moulds or cores, was devoid of moulding or core-making machinery; but there was much to interest members attending the visit. The foundry is housed in an old building and the method of using the floor for bedding-in work prevails to a considerable extent, even for the smaller castings, while pits are

Notes from the Branches

invariably used for large work. Much interest was shown in the mould for a large cylindrical casting and arranged for splitting, particularly in the method employed to ease the job after casting to reduce distortion. The running method for a large stern tube was also inspected—a job which required unusual thickness of metal at each end and had proved awkward. Running on an incline, with the metal entering the thinnest part of the tube at the centre, had proved successful. Loam moulding plays an important part in the construction of many large moulds and especially in building up some of the complex cores.

The foundry is equipped with four cupolas, the three larger ones each being capable of producing 6 tons per hr., and composition of charges is controlled from the laboratory of an associated firm, the North Eastern Marine Engineering Company, Limited, under the direction of Mr. Gresty.

An excellent tea was provided at the conclusion of the visit, and Prof. A. Preece, president of the branch, expressed thanks on behalf of the members to the management for their courteous invitation, to the various officials, who had devoted their Saturday afternoon to be hosts, and to the ladies who looked after the refreshments. Mr. Gresty made suitable acknowledgment.

September's Steel Output Record

Steel production in September averaged 346,500 tons a week, which is the highest September figure ever recorded. It shows a marked recovery from the August level, which was affected by holidays, and it was also well above the weekly average of 329,800 tons recorded in September, 1952.

The rate of steel production in the third quarter of the year was a record for any September quarter at 308,100 tons a week, compared with 292,800 tons last year. For the first nine months of this year steel production has averaged 334,400 tons a week, which is more than 10 per cent. higher than the average of 303,300 tons for the corresponding period of 1952.

Pig-iron output in September, which was also a record for that month, averaged 213,900 tons a week, compared with 208,600 tons a week in September of last year. Output of pig-iron in the third quarter of the year was at an annual level of 10,787,000 tons. This compares with a level of 10,599,000 tons a year ago.

Latest steel and pig-iron output figures (in tons) compare as follow with earlier returns:—

—	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1953—August ..	204,400	10,629,000	291,400	15,155,000
September ..	213,900	11,123,000	346,500	18,019,000
Third qtr. ..	207,400	10,787,000	308,100	16,019,000
1952—August ..	201,900	10,498,000	279,500	14,535,000
September ..	208,600	10,845,000	329,800	17,149,000
Third qtr. ..	203,800	10,599,000	292,800	15,224,000

AMERICAN TECHNICAL ASSISTANCE is being given in the working of rich mineral-bearing areas near the Kenya coast, north of Mombasa, where tests have shown the existence of monazite and columbium.

LEEDS FIRECLAY COMPANY, LIMITED, are raising their ordinary and preferred ordinary dividends by 1 per cent. by paying 5 per cent. and 7 per cent. (both less tax) respectively for the year ended June 30, 1953.

New Equipment

Vibrating Materials

A simple and compact vibrator is being marketed in this country by Owl Engineering Supplies, Limited, 16, South Parade, Doncaster; it is claimed to have proved its efficiency for loosening and effecting a free flow of materials through chutes, screens, bunkers, and sand hoppers. It can be used in the foundry industry for compacting sand in moulds. The standard types available are from 0.17 to 5 h.p., with a variation of vibrations from 1,500 up to 2,000 per min.

Industrial Instrumentation

To illustrate the achievements and potentialities of intrumentation and control, the British Industrial Measuring and Control Apparatus Manufacturers' Association, 21, Tothill Street, London, S.W.1, has produced its first handbook. It first indicates the various sections of industry served by instrumentation, together with photographs of typical installations.

"Oldbury Minor" Chain-grate Stoker

A new departure in the manufacture of automatic stokers has been the development of a still smaller unit, the Oldbury "Minor," by Edwin Danks & Company (Oldbury), Limited, Birmingham, for the firing of sectional boilers (either steel or cast iron) for industrial and commercial space-heating systems. In general principles the "Minor' resembles the firm's larger models. It utilizes the same die-cast links with fine air spacing and negligible riddling losses, and has the some patented arrangement of secondary air supply.

Compressed-air Gun for Applying Refractories

A useful appliance for applying granular refractory materials by means of compressed air is to be found in the BRI gun, which is a mobile machine of proved construction for the repair and maintenance of furnaces. It is simple to operate and control, and enables furnaces to be repaired while they are "hot" and in production, it is claimed.

The gun is available in two sizes, with hopper capacities of 5 cub. ft. and 10 cub. ft. respectively. It was developed by Basic Refractories, Inc., Cleveland, Ohio, and the manufacturing and sales rights in Great Britain, throughout the Commonwealth and in most parts of Europe are held by Steel Plant Auxiliaries, Limited, 180, Attercliffe Road, Sheffield, 4.

Utilization of Copper-base Alloys—Discussion

(*Continued from page* 514)

WRITTEN COMMENT

MR. R. W. FIRTH quoted from the report: "Aluminium-bronze, B.S.1400 AB2, can be die-cast but it causes rapid deterioration of the die and, unless the properties of this alloy particularly are required, it should not be specified"; and said that in the interests of manufacturers and users of aluminium-bronze die-castings, attention should be drawn to this statement, which was completely incorrect. With the latest die materials now in use, the die "life" obtainable when making castings in the AB2 alloy was very nearly equal to that obtained with the AB1 material. There was thus no reason why the AB2 alloy should not be called for if desired.

Effect of Heat on Clays and its Bearing on the "Life" of Clay Bonds*

Discussion of the Paper by J. White, D.Sc., and S. Davison, B.Sc.

The salent feature of the discussion reported was the need to develop indigenous as compared with imported bonding clays, and mixing of grades to secure optimum properties was proposed. Other points concerned the effect of calcium compounds in moulding sand—deriving from "hard" water, which was evaporated during use; suitable alternatives to bentonites; knock-out and refractory properties and the possibility of clay reclamation.

MR. J. J. SHEEHAN (past-president), in complimenting the Authors on the Paper, said, in his view, the approach was good but he was not too certain of the conclusions. He deprecated the fact that insufficient attention had been given to the kaolinite clays, which were quite abundant in this country and it was very necessary to both the national and foundry economy for them to be used. Was it possible that the Paper might ultimately be extended to embrace a further consideration of British kaolinite deposits?

Had the Authors included the Cyprus bentonites with the Greek bentonites, or had the former not been investigated at all? The Paper had stimulated him to consider a mixture of bentonites in order to get a better mean quality—had any work been done on that? He was not a great believer in averages, but in many foundries an average of conditions had to be met, and in practice founders used a mixture of bentonites and the kaolinite clays, with great advantage in economy and performance. His natural inclination was to eliminate as far as possible the bentonites because they were all obtained from overseas and freight had to be considered. He had no personal success with the calcium montmorillonites or with the montmorillonites which had been treated on base exchange with sodium. This was due to the fact that, apart altogether from examining the natural material, when there was used a mixture of very fine sand, sodium molecules and calcium molecules, along with the very hard water of the Staffordshire area, the exchange condition was being added to very considerably and as a consequence those montmorillonites degenerated much more rapidly than the kaolinites.

DR. J. WHITE, who presented the Paper at the conference, thanked Mr. Sheehan for his remarks, which were based on very sound experience and with which he agreed. During the course of preparing the Paper he and his co-Author had started off to do a few tests on kaolinites but as they progressed they had decided that conditions at that time justified them in concentrating on the bentonites. They were working primarily for the steel-foundry industry rather than ironfounders, but since that time much more interest had been taken in the non-bentonite types of clay in the steel industry and they would probably now shortly be investigating ball clays, if not china clays.

Cyprus bentonite they were unable to discuss at the moment, although they had received a sample some time ago, for the ordinary assessment of green-strength and dry-strength.

It had been found in several cases in the laboratory that it should be possible to obtain improvements in all-round properties by mixing bentonites, and it had also been found that if china clay was mixed with a bentonite a very rapid rise in dry-strength resulted for the first additions of bentonite—up to some 20 or 30 per cent. addition. The effect on green-strength was not so spectacular and was, generally, roughly additive. At present he was unable to say anything about the life of such mixtures. Sodium-treated bentonites were fairly common nowadays. In most cases they seemed to be perfectly satisfactory, but he could imagine that there might well be trouble due to base exchange with calcium, when hard water was used. He would have thought, however, that the same base-exchange reaction would take place with a natural sodium bentonite.

Calcium from Water

MR. SHEEHAN pointed out that moisture was being evaporated continuously from the sand and calcium accumulated at a considerable rate. Making 200 tons of castings a week at his foundry necessitated an addition of nearly 500 tons of water, and even if there was only 1 per cent. of calcium in that it was easy to see the advantage of calcium-free sands, and in his view this question should be investigated, if possible. He felt that kaolinites were free from that disadvantage, and the degenerated kaolinites in the ball clay particularly.

DR. WHITE thanked Mr. Sheehan for drawing his attention to the problem, though a practical solution might be difficult to find.

MR. A. AUGSTEIN asked whether the refractoriness of the clay had any influence on the knock-out properties, when the clay was added to the core sand. Referring to Mr. Sheehan's question with regard to the mixture of bentonite and clays, he knew that such a mixture was used in America in order to get the combined properties of high moisture-absorption and high dry-strength.

DR. WHITE, in reply, said he could not answer the question categorically but wondered whether some of the staff from the British Steel Castings Research Association, who were present and had been working in a field which was more closely related, could answer it.

* Paper presented to the annual conference of the Institute of British Foundrymen and printed in the JOURNAL, August 6 and 20, 1953.

Effect of Heat on Clays

Refractoriness

MR. AUGSTEIN remarked that it would seem at least theoretically probable that a ball clay, having a high fusion point of, say, 1,700 deg. C., which equalled a refractoriness of about 34 S.K., should give an easier knock-out than bentonites, the fusion points of which were below 1,380 deg. C., a refractoriness below 14 S.K.

DR. WHITE replied that they had been asked a short time previously to investigate a mixture based on ball clay, from the point of view of sintering. An arbitrary test had been used and they had been rather surprised to find that the mixture sintered quite appreciably in spite of the really high refractoriness of the clay. At the moment it did not seem possible to generalize on the relationship between refractoriness and sintering tendencies.

MR. ARMITAGE, speaking for the British Steel Castings Research Association, confirmed that work on ball clays was in hand and that it was intended to conduct a series of examinations along similar lines to that made recently on bentonites. The Association had issued a report based upon the examination by Dr. White of some forty bonding clays from all parts of the world; it was a very interesting document and was available on request.

Possibilities of Reclamation

MR. GREAVES referred to the fact that Dr. White had said that in the layer of sand which came into close contact with the molten metal the clay was totally destroyed and behind that layer the clay was partially destroyed. It was normal practice to try to reclaim sand from fettling shops and to bring it back into the moulding shops, but it had been said that this was a waste of time, as the sand was useless for moulding; he wished to know if such a statement was supported by Dr. White's work.

DR. WHITE replied that the whole business of sand reclamation was being very actively considered by the B.S.C.R.A. What had been stated in the Paper was that the clay was destroyed as far as its bonding properties were concerned.

MR. SHEEHAN said that he was personally most interested in a combination of china clay, bentonite and ball clays. Literature on that subject was very extensive in the ceramic industry, and he thought should be followed up keenly. He would like the maximum of china and ball clays and the minimum of bentonites, because it was all a matter of economics. It was only through the work now being done by the Authors that it would be possible to arrive at the sort of conclusions desired.

DR. WHITE replied that he was in complete agreement. At Sheffield they had one foot, as it were, in the ceramic field, but in general the ceramic literature had not been such a help as might perhaps have been expected. The ceramic industry was certainly making up mixtures of that type but they were mainly interested in what happened during vitrification or fusion, whereas the foundry interest was in what happened long before the bond started to fuse.

Alternatives to Bentonite

MR. J. L. FRANCIS asked whether, at the present stage of the investigations, Dr. White could make any recommendation as to what should be used if one could not get bentonite.

DR. WHITE pointed out that the British Fullers' Earth was not classed as a bentonite and he believed iron founders used treated Fullers' Earth quite extensively, although it was possibly not used so much in a steel foundry. He had never been altogether clear on the reason. It was known that probably the life was lower, and also that the green-strength tended to be rather lower. It was always, however, possible to get a good green-strength by increasing the clay addition sufficiently, and in using ball clays it was necessary to use more clay. One could probably even raise the dry-strength in that way, but the question remaining was how much clay it was economic to use and what would happen to the permeability if one kept on adding clay?

There was one clay which had not been mentioned in the Paper, which was characterized by high dry-strength, namely the so-called secondary mica-type of clay. Some of those clays had fairly good bonding properties, although it could not be said that they were equal to bentonite, weight for weight.

DR. D. V. ATTERTON, referring to Fig. 11 of the Paper, said he had noticed that the Italian bentonite was shown as having a higher green- and dry-strength than the Wyoming bentonite, whereas he had always been under the impression that the latter were supposed to be the best. The difference seemed to be appreciable, particularly in regard to the dry-strength.

DR. WHITE, in reply, expressed surprise, because he and his co-Author had always found that with that particular bentonite the green-strength was higher, but the dry-strength slightly lower than with Wyoming bentonite. They had tested quite a large number of samples and they had always found this to hold. Due to this relation, the dry-strength for a given green-strength was generally higher for the Italian bentonite, but this was not the case when dry-strengths were compared at a given moisture content. At the moment he could not remember what was the reason for the apparent discrepancy in the present results, but he would look into the matter when he got back to Sheffield.*

MR. SHEEHAN gave a warning that founders should be very careful with regard to procuring supplies of named bentonites, and should insist on knowing the geographical location as far as possible. Otherwise there was no guarantee that in December they would be supplied from the same source as in January.

THE CHAIRMAN (Dr. A. B. Everest) proposed a hearty vote of thanks to Dr. White and Mr. Davison, which was carried with acclamation.

* Dr. White has since written that he has checked the results to which Dr. Atterton referred, and the reason for the apparent discrepancy was in their having to change to a new batch of silica sand during the work. Normally, when this happened, care was taken to indicate it in the Paper, but in the case raised the change-over was unfortunately overlooked, mainly because they were concerned more in examining the change in properties of a given clay with heat rather than in making any absolute comparison of different clays.

News in Brief

SOUTHERN FOUNDRIES, LIMITED, have planned to extend their storage facilities at Purley Way, Croydon, Surrey.

IT IS PROPOSED by the Aluminium Castings Company, Limited, to raise their capital from £500,000 to £575,000.

METAL ALLOYS & SMELTING WORKS, LIMITED, have prepared plans to extend their factory on Eley's Estate, Edmonton, London.

W. ADAM & SONS, LIMITED, have had plans prepared to carry out extensions to their brassfoundry in Spon Lane, West Bromwich.

SPRAY BATHS and dressing accommodation are to be provided for employees of Southbank Ironworks, Kirkintilloch, at a cost of about £15,000.

THE INSTITUTION OF PRODUCTION ENGINEERS is holding a second conference on "Problems of Aircraft Production" at the University of Southampton on December 18 and 19.

LEICESTER, LOVELL & COMPANY, LIMITED, North Baddesley, Southampton, manufacturers of "Casco" synthetic resin and casein glues, announce that they are now in a position to supply a range of furane resins.

THE TENDER of Cowans, Sheldon & Company, Limited, Carlisle, for the supply of four electric travelling cranes for Newcastle quayside at a cost of some £63,000, has been accepted by Newcastle-upon-Tyne City Council.

VICKERS, LIMITED, and Cammell Laird & Company, Limited, have opened conversations with the Iron and Steel Holding and Realization Agency for the repurchase of interests in English Steel Corporation, Limited.

MR. THOMAS LUND WELLS, of Keighley, retired brass and malleable iron founder and director of Jonas Wells, Limited, brass founders, Greengate Works, Keighley, who died in August, left £69,261 (net £69,149, duty paid £27,714).

A FIRM which had been free of industrial accidents for 100 years, Withers (Walsall), Limited, manufacurers of brass and die castings, was fined £15 at Walsall Court recently for not securely fencing a dangerous part of a machine.

THE CANADIAN GOVERNMENT has ended its two-year control over the sale of primary nickel. It is now no longer necessary for consumers to get purchase orders approved by the Defence Production Department before obtaining nickel.

AN EXCHANGE OF GOODS to the equivalent value of £50,214,285 is provided for in a trade pact under which France will supply coal, manufactured goods, and iron and steel products in return for wool and other goods from the Argentine.

A FIELD SURVEY PARTY of the Geological Survey of Canada has discovered the occurrence of scheelite in Newfoundland. Manganese has been located at North Bathurst (New Brunswick), and tungsten deposits have been found on the shores of the Strait of Canso, Nova Scotia.

LIGHTALLOYS, LIMITED, are cutting their dividend by 2½ per cent. to 17½ per cent. less tax, by recommending a final of 12½ per cent. for the year ended June 30, 1953. Profit for the year, after charging depreciation of £12,228, compared with £10,311 last year, declined from £69,488 to £31,476.

AT the non-ferrous foundry of Francis W. Birkett & Sons, Limited, Cleckheaton, moulds on one roller conveyor leading from the moulding machines as well as those on a parallel conveyor from the hand-moulding section are filled out of one ladle suspended between them—according to the latest issue of *Target*.

MORE THAN 100 STRIKERS, including 20 girls, have now returned to work at the National Steel Foundry (1914), Limited, Leven (Fife), after a stoppage early last week because women were being employed on men's work. The management has agreed to take women off the job of setting up cores to facilitate negotiations.

TO INCREASE the manufacturing capacity and to meet the demand for larger sets, the Fraser & Chalmers Engineering Works of the General Electric Company, Limited, are building a new heavy turbine shop at the Erith (Kent) works. The shop will be in two sections, the main bay 130 ft. by 360 ft. with an annexe 40 ft. by 280 ft.

THE MECHANICAL ENGINEERING DIVISION of Chamberlain Industries, Limited, Staffa Works, Staffa Road, Leyton, London, E.10, have appointed as their stockists and distributors for Yorkshire, Lavite, Limited, of Cawley's Mill, Cleckheaton, a subsidiary of John Rigby & Sons, Low Moor, who specialize in chain annealing, repairing and testing.

THE BIRMINGHAM electroplaters, silversmiths and copper refiners, Elkington & Company, Limited, who transferred the bulk of their work to Bloxwich, Walsall, as a result of the war, are doubling their "A" Ordinary capital. A meeting is to be held on October 30 to raise the authorized figure. Sir Louis Sterling is chairman of the company.

THE ESSO PETROLEUM COMPANY, LIMITED, have announced that, as from October 15, spot and contract prices of the following products have been reduced by 7s. per ton:—Esso marine Diesel medium; Esso marine Diesel; Esso fuel medium; Esso fuel heavy; and Esso bunker fuel. These price reductions apply to the bunker schedule only.

AT THE ANNUAL MEETING of the Wolverhampton and District Engineering Society on October 12, Mr. J. M. Boyd, chief switchgear engineer to the Electric Construction Company, Limited, was introduced as president. The meeting re-elected Mr. Nicol Robertson as secretary and Mr. A. J. Blackmore as treasurer. Membership of the society is now approximately 300.

BOULTON PAUL AIRCRAFT, LIMITED, Wolverhampton, has sold a number of their Balliol T.2 advanced training aircraft to Ceylon for use by the Singhalese Air Force. The planes are to be built at the Pendleford factory and then dismantled for export by sea. Mr. B. Hamer, a Boulton Paul service engineer, is to leave for Ceylon in a few week's time to supervise the reassembly.

EXHIBITS of Radiovisor Parent Limited, 1 Stanhope Street, London, N.W.1, at the Fuel Efficiency Exhibition, to be held in City Hall, Manchester, from November 18 to 28, will include the firm's industrial smoke indicator. This provides visual and audible alarm when the density of smoke emission exceeds a predetermined figure, and can operate in temperatures as high at 130 deg. F. without deterioration.

THE EMPLOYMENT of 600 men at the Coltness Foundries, Newmains, Lanarkshire, is seriously threatened by the decision of G. & J. Weir, Limited, engineers, Glasgow, to close down the foundries at the end of this year. In an official announcement at the weekend the firm stated that this action had been forced upon them because it was not possible to obtain a sufficient volume of orders beyond their own requirements to operate the foundries efficiently.

News in Brief

RESEARCH WORK on John Wilkinson the "father of the South Staffordshire iron trade" carried out by the Bilston Historical Society has resulted in the arranging of a visit in the New Year by Dr. W. H. Chaloner, of Manchester University. Dr. Chaloner, who is one of the leading authorities on Wilkinson, will go to Bilston to tell members of the society about a life of Wilkinson which he is writing.

A TREASURY ORDER increasing from 9d. to 1s. 3d. a gallon the amount by which the Excise duty on hydrocarbon oils is less than the corresponding Customs duty came into operation last Wednesday. The effect is to reduce by 6d. a gallon the Excise duty on such oils. The Order also has the effect of reducing by the same amount the Excise duty on petrol substitutes which is at the same rate as that on hydrocarbon oils.

THE "FRY 25" CLUB (members of which have all had over 25 years of service with Fry's Metal Foundries, Limited, or the Eyre Smelting Company, Limited, Tandem Works, Merton Abbey, London, S.W.19, and their associate companies) held its inaugural dinner on October 9th, at the Trocadero Restaurant, Shaftesbury Avenue. It is of interest to record that the service of the 48 members of the club totals 1,498 yrs.

ONE of the leading factors governing design in American engineering, according to a team of 11 British specialists who visited nearly 50 establishments in the United States early last year, is "producibility." The need for considering economy when deciding upon design is also emphasized in the team's report, "Design for Production," which was published on October 12 by the British Productivity Council (price 3s. 6d.).

THE MINISTRY OF LABOUR and National Insurance has just issued the first Report of an advisory committee on the Employment of Older Men and Women. It is available from H.M. Stationery Office, price 2s. 1½d., post free. It puts into words what is generally known about the employment of older people, such as the increasing percentage of the elderly, their reliability and good timekeeping. It is a wholly sensible report and deserves close consideration by all employers.

THE BIRMINGHAM BRANCH of the Institution of Works Managers, which two years ago formed two advisory panels to assist its members with advice on work simplification and incentives, has formed a third panel—on materials handling. The new panel is to consist of about 30 members of the branch who are experienced in the many aspects of the subject. Mr. W. R. P. King, works manager of the Birmingham Mint, has been elected chairman of the branch's study groups.

TRANSFER of the head office and London-area branch office establishments of Newton Victor, Limited, to larger premises at 132, Long Acre, London, W.C.2 (telephone, covent Garden 0861), is now completed. The move brings together again the various departments and activities formerly divided between the offices at Cavendish Place and Bolsover House and, it is believed, will make for improved efficiency and greater convenience for the company's customers, correspondents and suppliers.

ADIE BROTHERS, LIMITED, Birmingham, have made a silver cup for the *Federation Française de Football*, which is to be one of the major awards in French matches. Known as the "*Coupe Charles Drago*" Trophy, it is 25 in. high and weighs 160 oz. The handles of the cup are shaped like dragons and four miniature dragons support the base of the stem. The lip is surmounted by a decorative finial supported by four dolphins. France has lifted her silverware trade barrier to allow the import of the cup.

ADMIRAL SIR DENIS BOYD, principal of Ashridge College, gave the first James MacClaren Lecture at the Birmingham College of Technology last week. The lecture has been established as an annual event to commemorate Mr. MacClaren, a Birmingham industrialist who died two years ago at the age of 54. Mr. MacClaren served as Regional Controller of the Ministry of Supply during the war and became managing director of B.S.A. Tools Limited in 1946. He was especially admired for his flair in human relations.

WHEN THE LORD MAYOR OF BIRMINGHAM (Alderman G. H. W. Griffith), paid his civic visit to the Birmingham Mint on October 15 he watched the striking of bronze medals which will commemorate the forthcoming visit of the Queen to New Zealand. The Mint has contracted to produce 425,000 of these medals. The Lord Mayor also watched Uruguayan cupro-nickel two centesimo coins being pressed at the rate of 40,000 a day from each of eight machines. A silver medal commemorating the visit was presented to the Lord Mayor by the chairman, Mr. H. N. Sporborg.

BRITISH INDUSTRY must aim at increasing its export trade "by something like 20 per cent. in volume" and must not depend too much on "that easy home market," Mr. Derick Heathcoat-Amory, Minister of State, Board of Trade, said last week at the annual dinner of the National Federation of Engineers' Tool Manufacturers in Birmingham. Other speakers were Mr. F. W. Halliwell, of London, president of the Gauge and Tool Makers' Association; the Hon. R. A. Balfour, president of the National Federation of Engineers' Tool Manufacturers, who took the Chair: and Mr. S. J. Harley, vice-president of the Federation and chairman and managing director of the Coventry Gauge and Tool Company, Limited.

A WORCESTER AND DISTRICT Management Association was formed at a meeting in the city's Guildhall on October 12, attended by over 100 people, including managing directors and foremen. The new body is the result of discussions initiated a year ago, and it aims to meet the needs of increasing industrial activity and the necessity for having some co-ordinating body for work, sales management, personnel, costing and office administration. A feature of the Association's work will be to provide facilities for technical training and a special course in management has been started at the Worcester Technical College. Sir Hugh Chance was elected president of the Association and Mr. D. Powell chairman with Mr. A. F. Jones secretary.

THE BRITISH TRANSPORT COMMISSION announce that, as a result of the Transport Act, 1953, and with the approval of the Road Haulage Disposal Board, they will, as a first step, offer for sale about 1,500 road transport units comprising some 10,000 road haulage vehicles. These will be offered in three monthly schedules, comprising roughly 3,300 vehicles each, and the units in each schedule will be well spread geographically over different parts of England, Scotland and Wales. Over 2,000 of these vehicles will be offered for sale in small units of one, two, three and four vehicles without premises and no unit will include more than 50 vehicles. Nearly half of the units will include operational premises. Advertisements inviting tenders will appear in the Press and these will indicate where lists of units and tender forms can be obtained.

R.C.849 is a castable refractory that can be poured behind shuttering or placed in moulds in exactly the same way as ordinary concrete.
It is ready for service twenty-four hours after pouring. Setting, drying and firing shrinkage is practically nil. It has a high cold strength; which is increased by firing at 1350°C. It does not spall even under wide and rapid variations in temperature.

Physical Properties	
Maximum service temperature	1350°C
Density: Green	130 lb/cu. ft.
After firing at 1350°C	120 lb./cu. ft.
Cold crushing strength: Green	3360 lb/sq. in.
After firing at 1350°C	4480 lb/sq. in.
Refractoriness	Cone 19 (1520°C)
After-contraction ...	Not measurable after firing at 1350°C.

Other Morgan refractories include: M.R. PLASTIC MOULDABLE — a mouldable high-alumina refractory material for temperatures up to 1650°C (3002°F); M.I.22 INSULATING CONCRETE. The M.I.28 LOW-STORAGE INSULATING REFRACTORY for temperatures up to 2800°F (1538°C) and the M.R.I.—SUPER-DUTY REFRACTORY which is stable up to 1600°C (2912°F).
Literature will be sent on request.

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THE MORGAN CRUCIBLE COMPANY LTD

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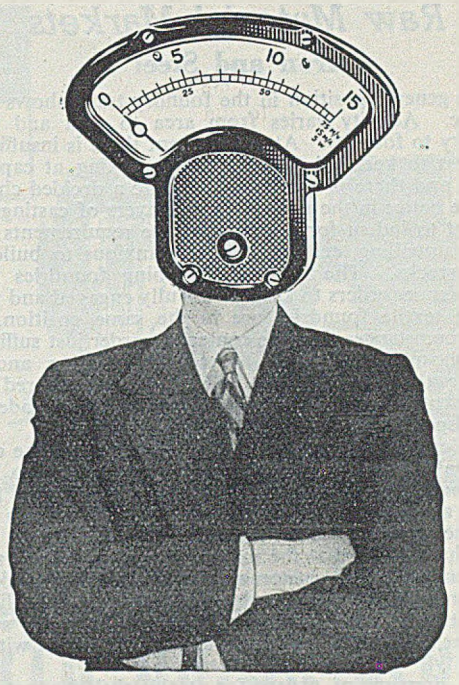

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Are you *measuring up to the effort required of all steel-users?* Do you realise that roughly half this country's supplies of new steel are made from scrap? That factories like yours are among the main sources of the raw material needed in the steelworks? It is vitally important that these sources should not be allowed to dry up.

Do not forget that scrap does not begin and end with the daily turnings in your machine shop. There are other forms of scrap. Obsolete machines and equipment, redundant buildings, in fact everything containing iron and steel which has outlived its effective purpose—all this is scrap and should be sent off to your local scrap merchant as soon as possible.

Search your works for it and turn it in. You will be doing yourselves a great service.

What is scrap?
All iron and steel that has outlived its effective purpose.

Where should it go?
To your local scrap merchant. He will be glad to help with the dismantling and removal of obsolete plant and machinery.

Issued for the STEEL SCRAP DRIVE by the British Iron and Steel Federation and the National Federation of Scrap Iron, Steel and Metal Merchants.

Raw Material Markets

Iron and Steel

The general position in the foundry trade shows little change. Activity varies from area to area and from foundry to foundry. At the moment there is insufficient business to keep all the foundries working at capacity levels, and there is nothing to indicate a decided change for the better in the near future. Buyers of castings are content to indent for their immediate requirements and, if not unwilling, certainly are not anxious to build up large stocks. The light and jobbing foundries need more export orders to keep them fully engaged and most of the textile foundries are in the same position. In the circumstances they are content to order just sufficient high-phosphorus pig-iron to keep them going, and the supplies they requisition show a big drop compared with past experience, so that producers of this grade are not disposing of the whole of their outputs.

The engineering and speciality foundries, on the other hand, are kept busy. They have good orders to fulfil for home users of castings and for engineering firms which are active in the export markets. They can take all the hematite and medium-phosphorus and low-phosphorus iron that the makers can provide, and some of them are good customers for the refined grades.

Foundry and furnace cokes are available in sufficient quantities to meet requirements and supplies of scrap, ganister, limestone, and firebricks are obtained without difficulty.

The pressure of orders for steelworks' products has tapered off, but there is still a heavy business in most departments. Output is maintained at a high level and the steelworks are absorbing large tonnages of basic pig-iron. Orders for heavy joists and angles are not coming in at the rate at which these products are being delivered, but the fact that steel-mill order-books now bear a more realistic appearance is perhaps all to the good. There is still heavy pressure for plates, and output is bespoken for months ahead. Re-rollers are less fortunate, and are in need of orders, especially for small angles. Demand for sheets has revived and some of the mills can now offer only extended delivery dates.

Non-ferrous Metals

The copper market was surprised, but apparently not disturbed, by the report to hand last Friday that the long drawn-out negotiations between Washington and Chile in regard to the sale of some 100,000 short tons of surplus copper had come to a standstill. It would appear that the resignation of the Chilean Cabinet has something to do with this breakdown in the talks, but whatever the cause the fact remains that things are back where they started, except that the amount of surplus copper overhanging the market is now, at a modest estimate, something approaching twice what it was when the talks were instituted. Judging by the fact that the market advanced to £240 on Friday, it would seem that the news was not interpreted in a bearish fashion. On the week the gain was £5 in cash and £4 in three months. Zinc, too, was firm, with closing prices 30s. higher for October and 23s. up for January. Lead gave a good account of itself, closing with gains of £2 10s. and £2 for the current and forward months. Tin seems to have taken a turn for the better and last week saw cash £14 10s. higher at £617 10s., while three months, at £599, was up by £8.

Details for August have been supplied by the British Bureau of Non-ferrous Metal Statistics and, as might be expected, consumption was lower than in July on account of the holidays. Usage of copper was 27,669 tons, of which 22,973 tons were refined and only 4,696 tons scrap; in July the total was 30,873 tons, but primary copper was 14,698 tons and 16,175 tons scrap. From this one must suppose that the long period of drawing on stocks has come to an end, although, of course, the 23,000 tons odd it a lot less than the 1952 average, which was in the region of 31,000 tons monthly. Stocks, which no longer include Government metal, were 27,422 tons at August 31. It looks as though consumers built up their reserves during the month. Stocks of zinc at August 31 were 33,348 tons, compared with 34,609 tons at the end of July, while consumption at 17,341 tons, all grades, compared with 19,226 tons in the previous month. In lead, also, there was a drop in usage, for the August figure was 20,599 tons, which included 5,732 tons of scrap and remelted, whereas in July the corresponding total was 23,455 tons. Stocks of refined lead at August 31 were 28,290 tons, against 25,820 tons at July 31. Consumption of tin in August was very low, no more than 1,177 tons.

Official metal prices were as follow:—

COPPER, Standard—*Cash*: October 15, £235 to £237 10s.; October 16, £235 to £240; October 19, £239 to £242 10s.; October 20, £245 to £247 10s.; October 21, £237 10s. to £240.

Three Months: October 15, £222 10s. to £223 10s.; October 16, £222 10s. to £223; October 19, £225 10s. to £226; October 20, £227 10s. to £228; October 21, £223 15s. to £224.

TIN, Standard—*Cash*: October 15, £607 10s. to £610; October 16, £610 to £615; October 19, £622 10s. to £627 10s.; October 20, £627 10s. to £630; October 21, £617 10s. to £620.

Three Months: October 15, £590 to £592 10s.; October 16, £595 to £597 10s.; October 19, £602 10s. to £605; October 20, £607 10s. to £610; October 21, £597 10s. to £600.

ZINC—*October*: October 15, £73 5s. to £73 10s.; October 16, £73 10s. to £73 15s.; October 19, £74 5s. to £74 10s.; October 20, £76 to £76 10s.; October 21, £76 to £76 5s.

January: October 15, £70 10s. to £70 15s.; October 16, £70 10s. to £70 15s.; October 19, £71 5s. to £71 10s.; October 20, £72 15s. to £73 5s.; October 21, £72 5s. to £72 10s.

LEAD—*October*: October 15, £91 15s. to £92; October 16, £91 15s. to £92; October 19, £92 15s. to £93; October 20, £92 15s. to £93; October 21, £92 15s. to £93.

January: October 15, £88 15s. to £89; October 16, £88 5s. to £88 15s.; October 19, £89 to £89 5s.; October 20, £89 15s. to £89 17s. 6d.; October 21, £89 5s. to £89 10s.

Important date.—The annual conference of the Institute of British Foundrymen next year will be held from June 22 to 25, with the annual general meeting on Wednesday, June 23. It will be held at the premises of the Institution of Engineers and Shipbuilders in Scotland, Elmbank Crescent, Glasgow. The Edward Williams Lecture on that occasion will be delivered by Professor A. W. Scott, B.SC., PH.D., A.R.T.C., M.I.MECH.E., of the Royal Technical College, Glasgow, his subject being "Engineering Research Methods and Casting Problems."

THE 227,671 TONS of iron ore carried by British Railways during the week ended September 26 made the highest weekly total since June. During the same week over 334,000 tons of iron and steel was conveyed from the principal steelworks.

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

(Delivered unless otherwise stated)

October 21, 1953

PIG-IRON

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

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

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

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

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

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

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

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered).

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

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

Ferro-molybdenum.—65/75 per cent., carbon-free, 10s. 0d. to 11s. 0d. per lb. of Mo.

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

Ferro-tungsten.—80/85 per cent., 20s. 0d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 23s. 3d. per lb. of W.

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

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

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

Ferro-columbium.—60/75 per cent., Nb + Ta, 40s. 0d. to 70s. 0d. per lb., Nb + Ta.

SEMI-FINISHED STEEL

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

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

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. 0d.; floor plates (N.-E. Coast), £31 15s. 6d.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £28 9s. 6d.

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

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

Tinplates.—57s. 9d. per basis box.

NON-FERROUS METALS

Copper.—Cash, £237 10s. 0d. to £240 0s. 0d.; three months, £223 15s. 0d. to £224 0s. 0d.; settelment, £240 0s. 0d.

Tin.—Cash, £617 10s. 0d. to £620 0s. 0d.; three months, £597 10s. 0d. to £600 0s. 0d.; settlement, £620 0s. 0d.

Zinc.—October, £76 0s. 0d. to £76 5s. 0d.; January, £72 5s. 0d. to £72 10s. 0d.

Refined Pig-lead.—October, £92 15s. 0d. to £93 0s. 0d.; January, £89 5s. 0d. to £89 10s. 0d.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £102 0s. 0d.; rolled zinc (boiler plates), all English destinations, £99 15s. 0d.; zinc oxide (Red Seal), d/d buyers premises, £87 0s. 0d.

Other Metals.—Aluminium, ingots, £150 0s. 0d.; magnesium, ingots, 2s. 10½d. per lb.; antimony, English, 99 per cent., £225 0s. 0d.; quicksilver, ex warehouse, £61 15s. 0d.; nickel, £483 0s. 0d.

Brass.—Solid-drawn tubes, 22½d. per lb.; rods, drawn, 32½d.; sheets to 10 w.g., 242s. 0d. per cwt.; wire, 30⅛d.; rolled metal, 238s. 9d. per cwt.

Copper Tubes, etc.—Solid-drawn tubes, 27½d. per lb.; wire, 269s. 9d per cwt. basis; 20 s.w.g., 298s. 9d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £175 0s. 0d. to £187 0s. 0d.; BS. 1400—LG3—1 (86/7/5/2), £185 0s. 0d. to £198 0s. 0d.; BS 1400—G1—1 (88/10/2), £252 0s. 0d. to £285 0s. 0d.; Admiralty GM (88/10/2), virgin quality, £252 0s. 0d. to £300 0s. 0d. per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £265 0s. 0d. to £295 0s. 0d.; L.P.Bl, £215 0s. 0d. to £240 0s. 0d. per ton.

Phosphor Bronze.—Strip, 353s. 3d. per cwt.; sheets to 10 w.g., 375s. 0d. per cwt.; wire, 44½d. per lb.; rods, 38½d.; tubes, 37d.; chill cast bars: solids 40d., cored 41d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × .056, 3s. 0¾d. per lb.; round wire, 10g., in coils (10 per cent.), 3s. 6d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 5d. All prices are net.

Forthcoming Events

OCTOBER 26

Institution of Works Managers

Glasgow branch:—"Electronics in Materials Handling," by L. Landon Goodman, 7.15 p.m., at the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, C.2.

OCTOBER 27

Purchasing Officers' Association

Oxfordshire and Buckinghamshire group:—"Timber—Its Sources of Supply and its Uses," by H. Richardson, 7.30 p.m., at the "Red Lion" Hotel, High Wycombe, Bucks.

OCTOBER 28

Institute of British Foundrymen

London branch:—"Shell Moulding of Cylinder Castings," by A. Emmerson, 7.30 p.m., at the Waldorf Hotel, Aldwych, W.C.2.

Birmingham, Coventry and West Midlands branch:—"Practical Application of some Modern Ideas in the Brass Foundry," by J. M. Douglas and W. S. Richardson, 7.15 p.m., in the James Watt Memorial Institute, Great Charles Street, Birmingham, 3.

OCTOBER 29

Birmingham and West Midlands Students' Section:—Questions to a Panel of Experts, 7.15 p.m., at the James Watt Memorial Institute, Great Charles Street, Birmingham, 3.

Southampton section:—"'C' Shell Moulding Process," by J. Fallows, 7 p.m., at the Southampton Technical College, St. Mary Street.

Institute of Vitreous Enamellers

Midland section:—"Threat of Competitive Finishes," a discussion evening, 7.15 p.m., at the Imperial Hotel, Birmingham.

Royal Statistical Society

Sheffield group, Industrial Applications section:—"Implications of Some Recent American Investigations into Work Measurement," by M. J. Moroney, 6.30 p.m., in the Cavendish Room, Grand Hotel.

OCTOBER 30

Institute of British Foundrymen

Falkirk section:—"Shell Moulding and the 'C' Process," by Mr. W. W. Soppet, 7.30 p.m., in Temperance Café, Lint Riggs.

Manchester Association of Engineers

"Water Turbines and their Applications," by G. M. Hardman, 6.45 p.m., Engineers' Club, Albert Square, Manchester, 2.

OCTOBER 31

Institute of British Foundrymen

East Midlands and Lincolnshire branches (Joint Meeting):—"Practical Application of some Modern Ideas in the Brass Foundry," by J. M. Douglas and W. S. Richardson, 6 p.m., at the Gas Showrooms, Nottingham.

Films on Foundry Practice

At this time of year, there is a heavy demand for copies of the fourteen training films on foundry practice which the Council of Ironfoundry Associations is prepared to lend free of charge for exhibition to apprentices and other learners. The titles of the films, which deal with bench moulding, floor moulding, machine moulding and cupola work, have been printed from time to time, and a synopsis of their contents and the running times can be obtained on application to the secretary. The films are all 16-mm. "sound" films and can only be shown on a "sound" projector of this size.

On the recommendation of the C.F.A., the Central Film Library intends shortly to provide for hire a number of films on patternmaking. There are 15 films in this set, and member firms who would like to have more information about them are requested to write in the first instance to the secretary of the C.F.A. at 14, Pall Mall, London, S.W.1.

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

GENTLEMAN, with good connections in Engineering Trades and long experience of Technical Sales and administration in Foundry trade is open to entertain offers affording scope for exercise of ability, knowledge and experience. Excellent credentials.—Box 3811, FOUNDRY TRADE JOURNAL.

TECHNICAL SALES EXECUTIVE post required with plant manufacturers or similar by Foundry Engineer. Comprehensive background of design, development, maintenance. Offers invited, requiring conscientious work with initiative and scope for advancement.—Box 3834, FOUNDRY TRADE JOURNAL.

FOUNDRY TECHNICIAN (25) seeks position as Assistant Foundry Manager, in a progressive organisation. National Foundry College diploma, H.N.C. (metallurgy), and an apprenticeship which included 3 years' general foundry work.—Box 3833, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN (49) requires position in Lancashire. Light and medium casting foundry. 35 years' experience ferrous and non-ferrous production. A.M.I.B.F.—Box 3849, FOUNDRY TRADE JOURNAL.

CONTROL CHEMIST desires supervisory appointment, Lancashire area. 18 years' experience vitreous enamelling of cast iron, wet process. Practical knowledge of frit making, control testing of frits and vitreous enamel research. Fully trained in chemical analysis of cast iron, steel, and all foundry raw materials. Experience includes cupola control, sand testing and mechanical founding. Accommodation preferred.—Box 3839, 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.

MAINTENANCE FITTER wanted. Must have thorough knowledge of modern Moulding Machines, with previous experience.—Write Box 3846, FOUNDRY TRADE JOURNAL.

PATTERNMAKER wanted for Australian Company specialising in Cooking and Heating Apparatus and Light Engineering. Must be experienced in wood, plaster and metal. House available. Good prospects for energetic man in an expanding company.—Apply, giving age and full particulars of experience, to Box 3847, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

DRAUGHTSMAN required, preferably with experience of Gravity Dies, Pressure Dies or Plastic Moulds.—Apply JOHN DALE, LTD., London Colney, Herts.

GENERAL MANAGER required for Heavy Ironfoundry, Sheffield district. Applicants must be below 40 and be thoroughly capable, experienced, well educated, and with agreeable personality. Good prospects of rapid promotion to suitable man.—Box 3845, FOUNDRY TRADE JOURNAL.

FOREMAN required for grey iron jobbing foundry in North Staffordshire. Applicants must be first-class men, between 35-50, with proven ability to control a foundry producing very high grade castings. Write in confidence giving full details of past experience and employers, together with salary required, to—Box 3812, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER or first-class FOREMAN required. He must be experienced in the production of chill-cast yellow metal rods and cored bars, for sole charge of existing foundry. This is an attractive and permanent position, for which good terms will be offered.—Please send full details of experience to CHAIRMAN, Metals & Alloys, Ltd., Minworth, Birmingham.

YOUNG Man required, with a view to training for an executive post, in large modern Steel, Iron and Non-ferrous Foundries in Yorkshire. Applicants must have had practical experience in various types of moulding, also a thorough training in theory and foundry practice. Excellent opportunity for young person with the necessary ability and knowledge.—Write, with full details of age, education, experience, and salary desired, to Box 3831, FOUNDRY TRADE JOURNAL.

ASSISTANT FOUNDRY FOREMAN required by South Wales Steel Foundry, engaged principally on carbon and special alloy steels. Excellent opportunity for a young man (age 25/30) with practical knowledge of Steel Foundry production, together with good technical training. Every assistance will be given in the matter of housing if required.—Applications, giving full particulars of apprenticeship, experience, and educational qualifications, to Box 3838, FOUNDRY TRADE JOURNAL.

PATTERN SHOP FOREMAN.—Owing to impending retirement, a vacancy occurs for a first-class Foreman, to take charge of Pattern Shop and extensive Pattern Store. Applicants should have had at least 5 years' supervisory experience and should preferably be capable of taking a leading part in the planning and equipment of a complete new Pattern Shop on modern lines.—Reply, stating age, experience and salary required, to PERSONNEL MANAGER, Harland Engineering Co., Ltd., Alloa.

SITUATIONS VACANT—*contd.*

REPRESENTATIVE required for London area by South-West Lancashire firm of engineers and iron founders. Applicants must state age and experience. Good salary and permanent job for the right man.—Box 3848, FOUNDRY TRADE JOURNAL.

FOREMAN required for up-to-date Foundry in South Midlands. To be fully conversant with costing, estimating and rate fixing.—Box 3840, FOUNDRY TRADE JOURNAL.

FOREMAN required for large Midland Malleable Ironfoundry. Must be competent. Apply stating age, experience and salary required to—Box 3842, FOUNDRY TRADE JOURNAL.

WELL-KNOWN Machine Tool Manufacturers require fully qualified Metallurgist for a position in a Lancashire Foundry. Applicant should have practical Foundry experience and a knowledge of costing and bonus incentive systems. Write—Box 3841, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required for Ironfounders in the Manchester area, producing 50/60 tons of Light Castings per week. Full knowledge of pattern making, metal, labour, and sand control. Floor, bench and small mechanisation methods employed. Canteen, baths, welfare facilities, pension scheme. State in confidence full details of experience, age, and salary required.—Box 3851, FOUNDRY TRADE JOURNAL.

FOREMAN/MANAGER.—A keen progressive man, not over 45, who is a good disciplinarian, wanted for small Developing Jobbing Iron Foundry, West of London, making Castings for Machine Tool and Engineering Industries. Must have experience of machine moulding and sand slingers, and have knowledge of and be willing to put into practice modern foundry technology. Experience of high duty irons an advantage.—Write in confidence, giving full details of history and experience, also starting salary required, to Box 3852, FOUNDRY TRADE JOURNAL.

JUNIOR FOREMAN required by large Foundry on North-East Coast. Experience in mechanised and semi-mechanised greensand work essential. Applications giving salary required, age, experience, etc., to.—COCHRANES (MIDDLESBRO') FOUNDRY, LIMITED, Ormesby Iron Works, Middlesbrough.

FOREMAN required by North-East Coast Iron Foundry. Experience in the manufacture of Cast Iron Pipe Specials in loam, greensand and drysand is required. Apply giving full details of previous experience and salary required to—COCHRANES (MIDDLESBRO') FOUNDRY LIMITED, Ormesby Iron Works, Middlesbrough.

SITUATIONS VACANT—*contd.*

SUPERINTENDENT required for Mechanised Foundry in West Midlands engaged on light castings production. Applicants should have experience in all sections of the above class of work, from Cupola to Dressing Shop, and be able to control labour and plan production. Age about 30-35.—Full particulars of training and experience to Box 3799, FOUNDRY TRADE JOURNAL.

A LARGE old established company manufacturing process oils for the Engineering Industry require the services of a first-class salesman and technical representative to develop their market in core compounds and annealing products.

The position requires a man of first class ability and knowledge of the Trade with an established sound connection with top level executives.

Only applicants with more than average reference and ability need apply.

The salary will be commensurate with the above and a car and full expenses will be provided.

Apply Box 3816, FOUNDRY TRADE JOURNAL.

ELECTRIC SMELTING FURNACE EXPERT wanted by a firm wishing to develop electro-thermic smelting of metal ores. Exceptionally favourable terms will be offered to one who really understands the technique, either to act as a consultant or join the firm to work out a pilot plant, leading on to full-scale production. Factory in the Midlands. Please write fully and in guaranteed complete confidence to the Chairman.—Box 3830, FOUNDRY TRADE JOURNAL.

GRAVITY DIECASTING.—FOUNDRY SUPERINTENDENT required, to accept responsibility for production and administration of shop. This is a new appointment and offers good prospects and salary to really capable man having thorough practical knowledge of the industry and experience in shop management. Would suit first-class foreman who is looking for advancement. Preferred age about 35. Applications in confidence to GENERAL MANAGER, William Mills, Ltd., Friar Park Road, Wednesbury, Staffs.

ASSISTANT METALLURGIST (age 21-25) required by Repetition Foundry and Engineering Works. Applicants should have a sound knowledge of metallurgical analysis. Experience in cupola and sand control an advantage, but not essential.—Applications, giving full details of experience and salary required, to SUFFOLK IRON FOUNDRY (1920), LTD., Stowmarket.

SENIOR CHEMIST required by K. & L. Steelfounders & Engineers, Ltd., Letchworth, Herts., for supervisory and special analytical duties in their chemical laboratory.—Applicants who must possess good ferrous analytical experience, should reply to the PERSONNEL SUPERINTENDENT at the above address, quoting pertinent details and an indication of salary desired.

A TECHNICAL REPRESENTATIVE is required by Bagshawe & Co., Ltd., Dunstable Works, Dunstable, to handle sales of malleable iron castings. Some practical foundry experience is considered essential. The foundry concerned is of a light repetition character, and previous experience of sales of this type would be an advantage. Applications, which will be treated in confidence, should be from men about 35, and must state full details of experience and salary required.

AGENCIES

WANTED — Outside Representatives on commission for small Iron Foundry. Suit salesmen with other connections. Apply, stating age and district, etc., to—BOX 3827, FOUNDRY TRADE JOURNAL.

REPRESENTATIVE for South of England required by reputable firm of Malleable and Grey Iron Casting Manufacturers. Must have established contacts in the area. Salary, expenses and Commission Basis. Apply—Box 3822, FOUNDRY TRADE JOURNAL.

FINANCIAL

CAPITAL required for small Grey Iron Foundry, with excellent prospects. Good order book, and well laid out Foundry.—Box 3844, FOUNDRY TRADE JOURNAL.

WANTED

WANTED, a Metallurgical Microscope, details to—Box 3826, FOUNDRY TRADE JOURNAL.

WANTED—Quantity of Steel Moulding Boxes about 12 in. × 15 in. internal 3 in.—4 in. deep.—Box 3828, FOUNDRY TRADE JOURNAL.

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8-IN. Belt and Bucket Sand Elevator—24 ft. high from ground level and complete with motor, starter, etc., and 5-ton capacity Storage Hopper with Discharge Gate and Swinging Chute. Offers to A. C. Bamlett, Ltd., Thirsk.

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ONE Core Stove, Gas Fired. Inside dimensions—4 ft. 7 in. high 3 ft. 6 in. deep 7 ft. 4 in. long.

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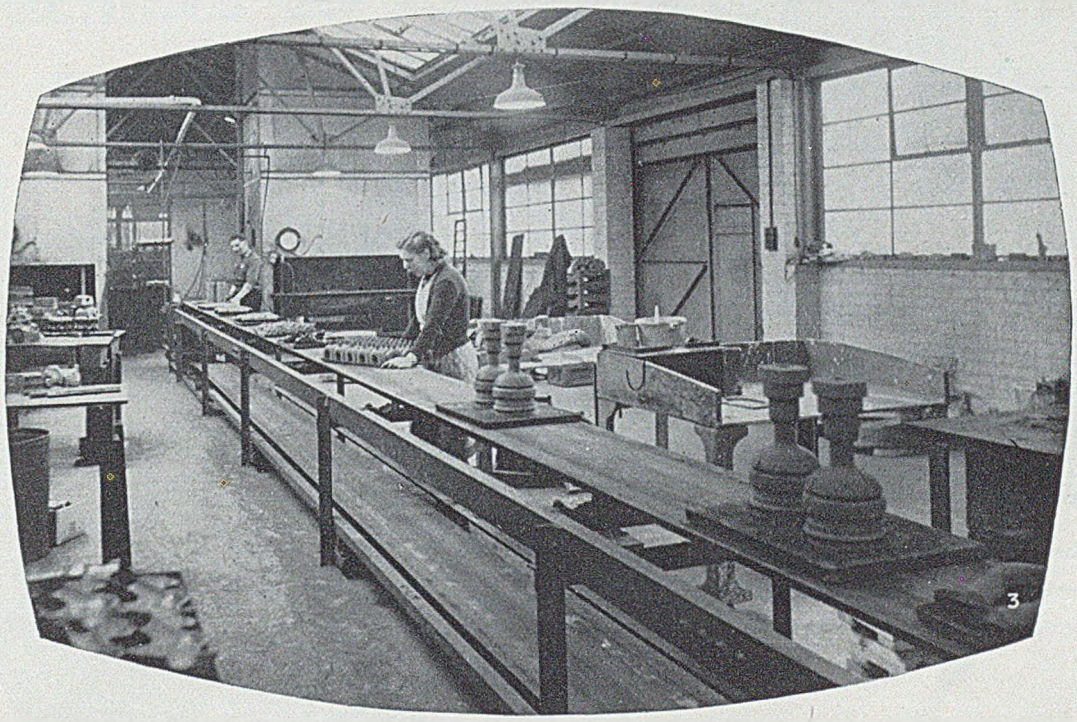
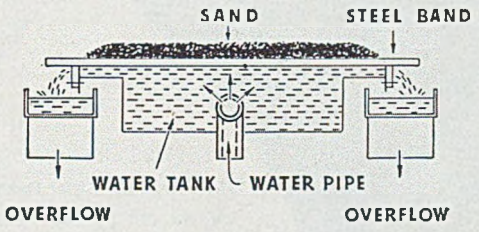
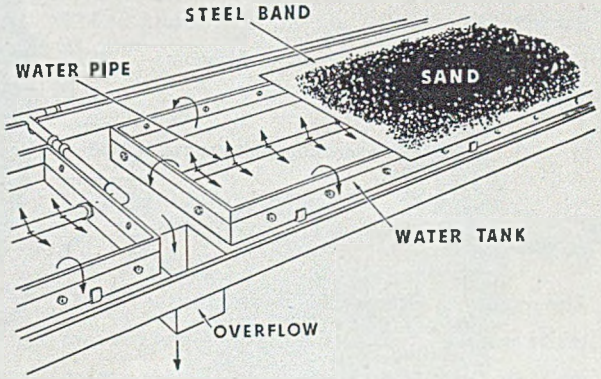


This photograph shows one of our many conveyors conveying cores from the benches to the drying stove.

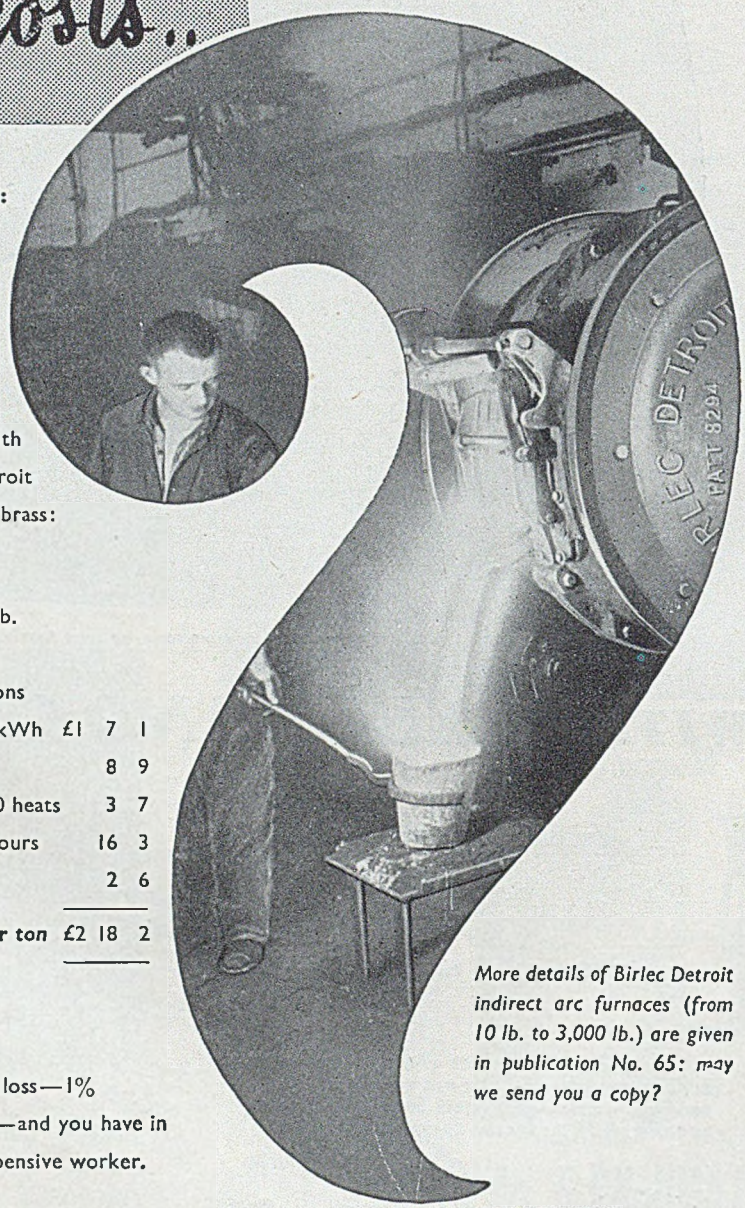
WITH STEEL BAND CONVEYORS





If you have difficulty with your warm sand adhering to patterns why not cool it on our patented water-cooled steel band conveyor as illustrated by diagrams above and on right.

What are your melting costs..



Some metal founders never find out: too few know in advance. BIRLEC DETROITS, however, give reliable, predictable melting performances, producing sound metal at low operating costs.

Compare your present melting figures with these typical costs on a 500 lb. Birlec Detroit furnace (model LFY), working on 70/30 brass:

Average size of heat	500 lb.			
Heats per 8 hours	11			
Average output per 8 hours ...	2½ tons			
Electricity per ton @ 1d. per kWh	325 kWh	£1	7	1
Electrodes per ton @ 1/9d. per lb.	5 lb.		8	9
Refractories per ton	1,500 heats		3	7
Labour per ton @ 5/- per hour	3¼ hours		16	3
Water and miscellaneous ...			2	6
Direct operating cost per ton		**£2**	**18**	**2**

More details of Birlec Detroit indirect arc furnaces (from 10 lb. to 3,000 lb.) are given in publication No. 65: may we send you a copy?

Also reckon the advantage of low metal loss—1% can be assumed for budgeting purposes—and you have in the Birlec Detroit a hard, reliable, inexpensive worker.

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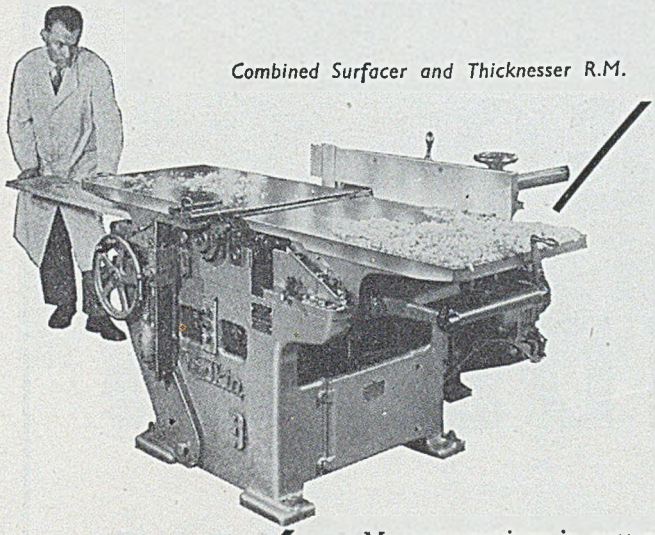
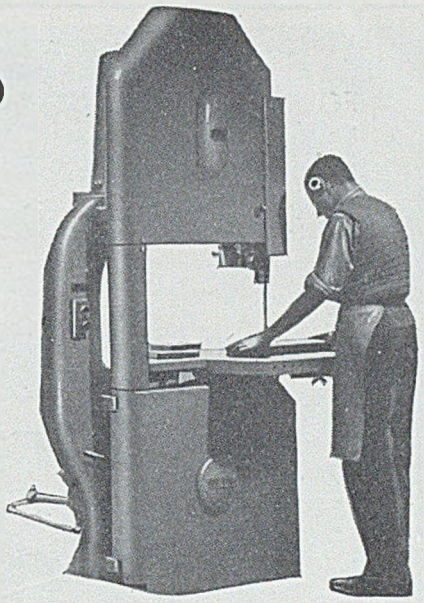


Combined Surfacer and Thicknesser R.M.



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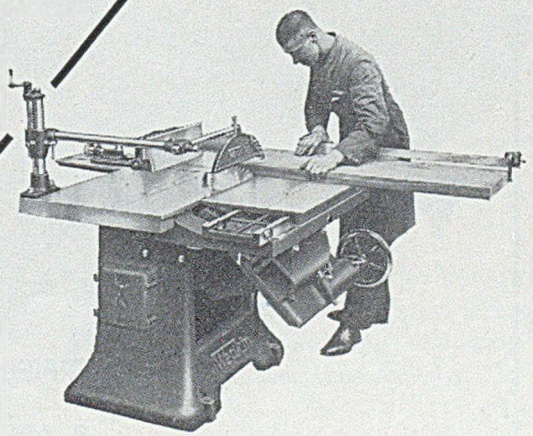

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Wadkin

Wadkin Ltd. · Green Lane Works · Leicester
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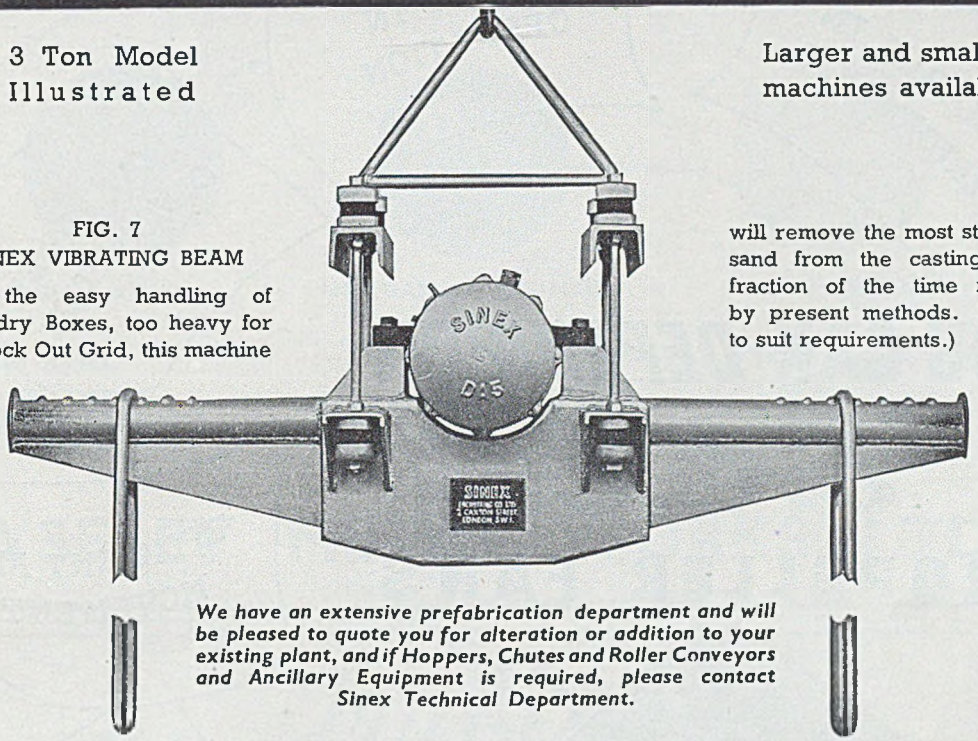
SINEX HIGH FREQUENCY VIBRATORS AND VIBRATING SCREENS

3 Ton Model Illustrated

Larger and smaller machines available

FIG. 7
SINEX VIBRATING BEAM

For the easy handling of Foundry Boxes, too heavy for a Knock Out Grid, this machine will remove the most stubborn sand from the casting, in a fraction of the time needed by present methods. (Links to suit requirements.)



We have an extensive prefabrication department and will be pleased to quote you for alteration or addition to your existing plant, and if Hoppers, Chutes and Roller Conveyors and Ancillary Equipment is required, please contact Sinex Technical Department.

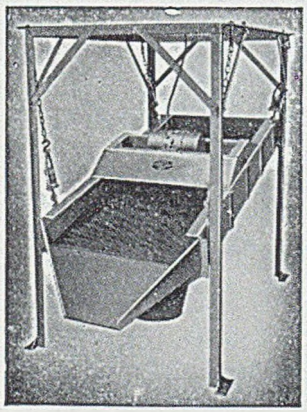


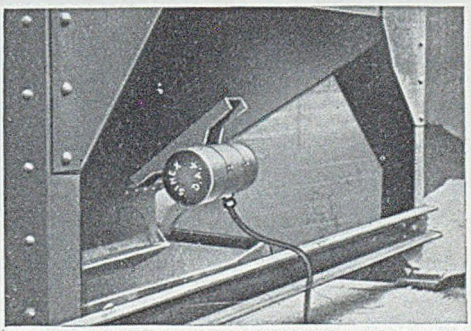
FIG. 10 (on left)

Sinex Vibrating Screen 6ft. x 3ft. Single Deck. Hourly output—15 tons of sand through ⅜in. mesh.

This screen is also manufactured in sizes to suit requirements.

FIG. 8 (illustrated below)

An important function of Sinex High Frequency Vibrators is the application to Sand and Storage Hoppers. To facilitate the rapid discharge of the material, long experience has shown that the fitting of a Sinex Vibrator to a Hopper containing the most stubborn material will avoid "arching" or "funnelling" of the material in the neck of the Hopper and assure a regular flow. Fig. 8 shows a Sand Hopper fitted with Sinex Vibrator. Manufactured in various sizes suitable to the capacity of the Hopper, and wound suitable for any electric supply, single- or 3-phase A.C.



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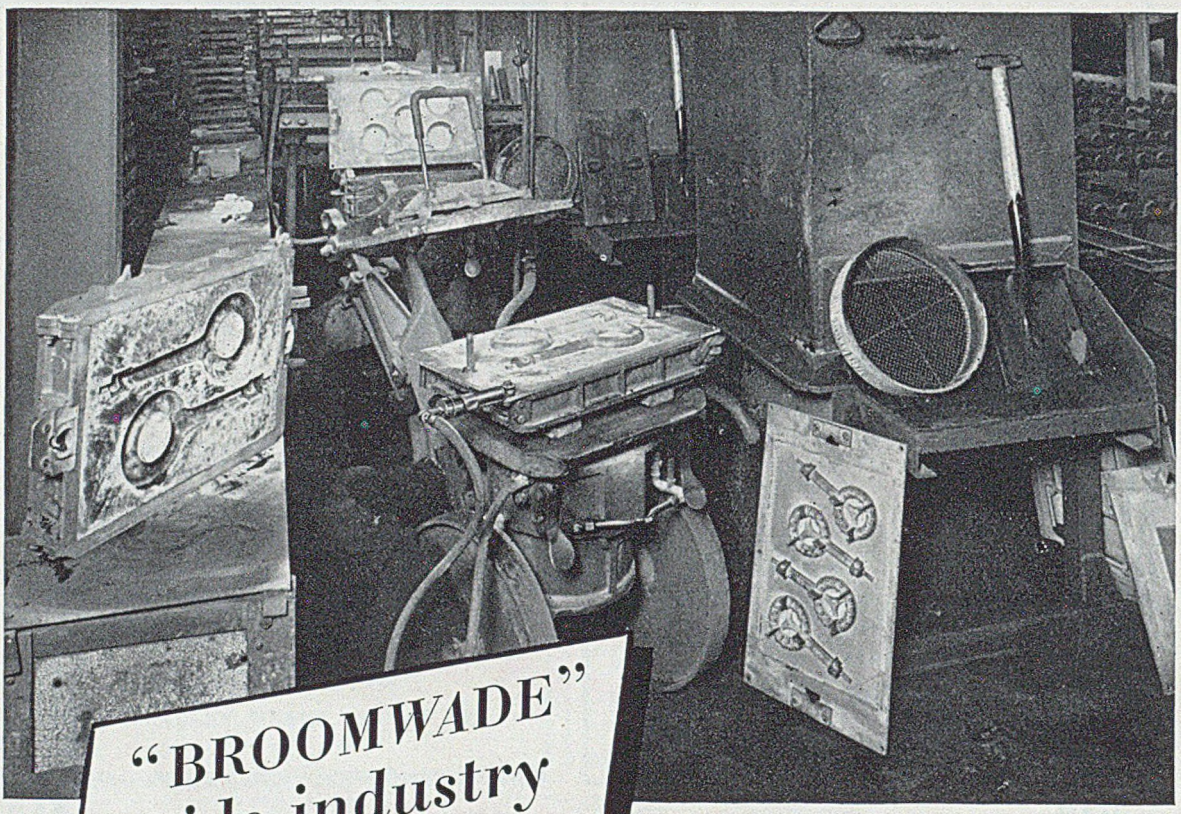

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Photograph by courtesy of Messrs. Storey Foundry Co. Ltd.

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This new "BROOMWADE" pattern plate vibrator, shown in use by Messrs. Storey Foundry Co. Ltd., ensures quicker, better moulds—higher quality castings.

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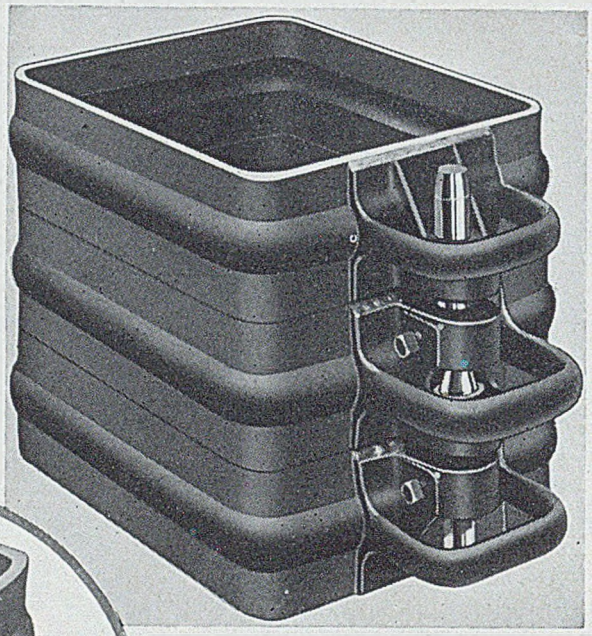

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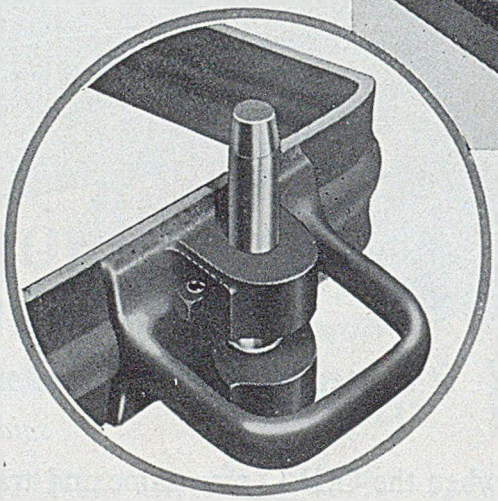
Type "O" Top and Bottom
Type "M" Middle Part.

TYPE "M" LUG



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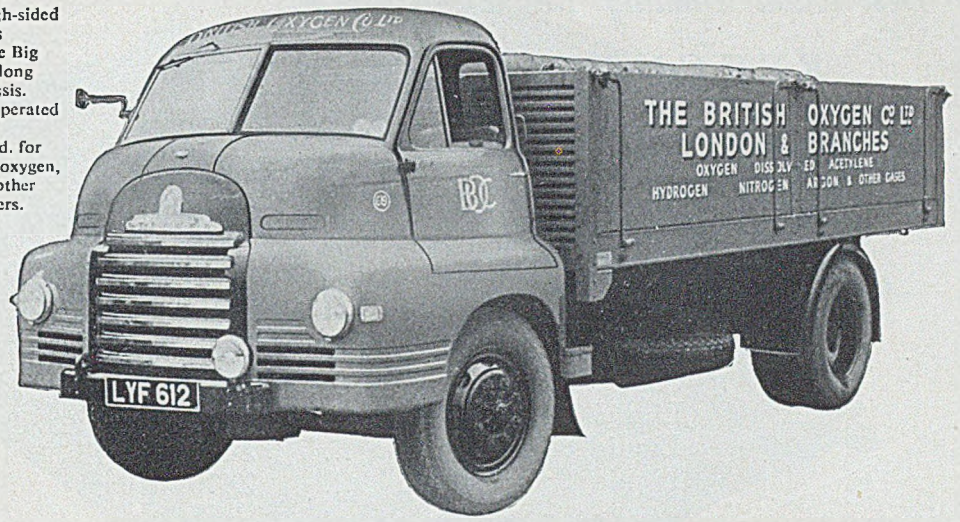

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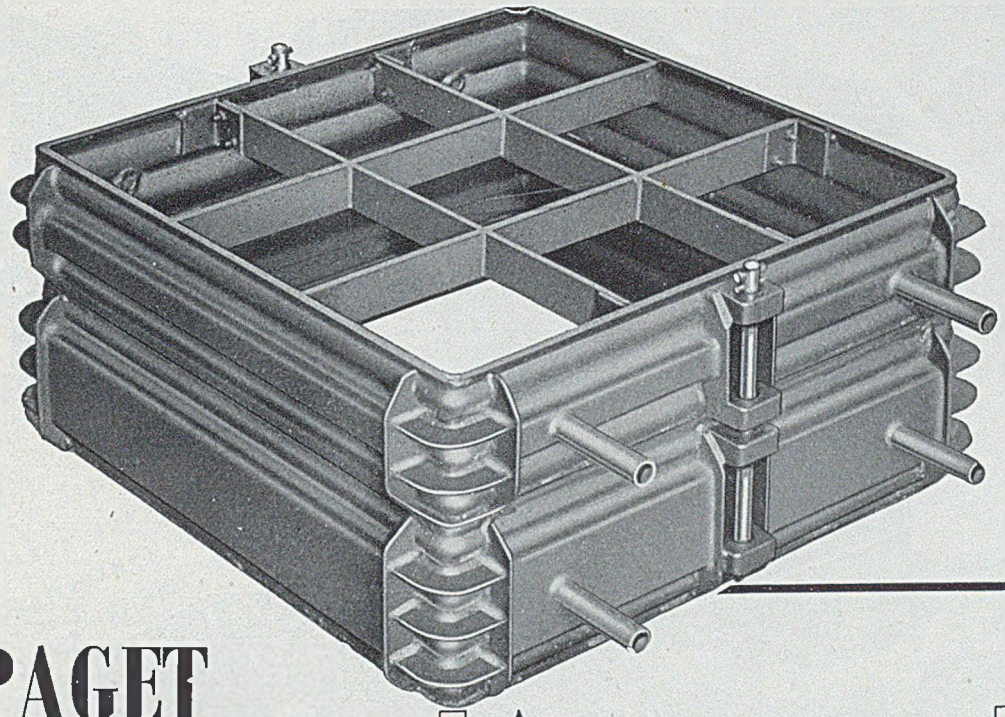

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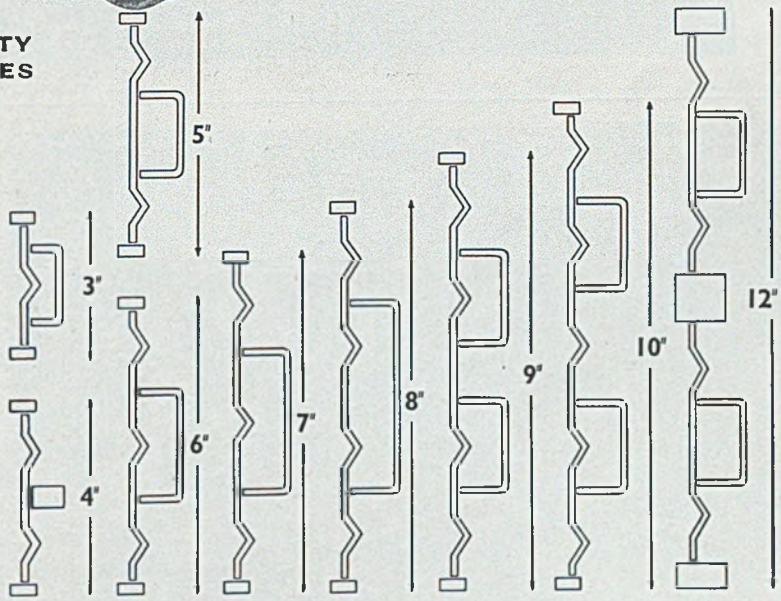

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