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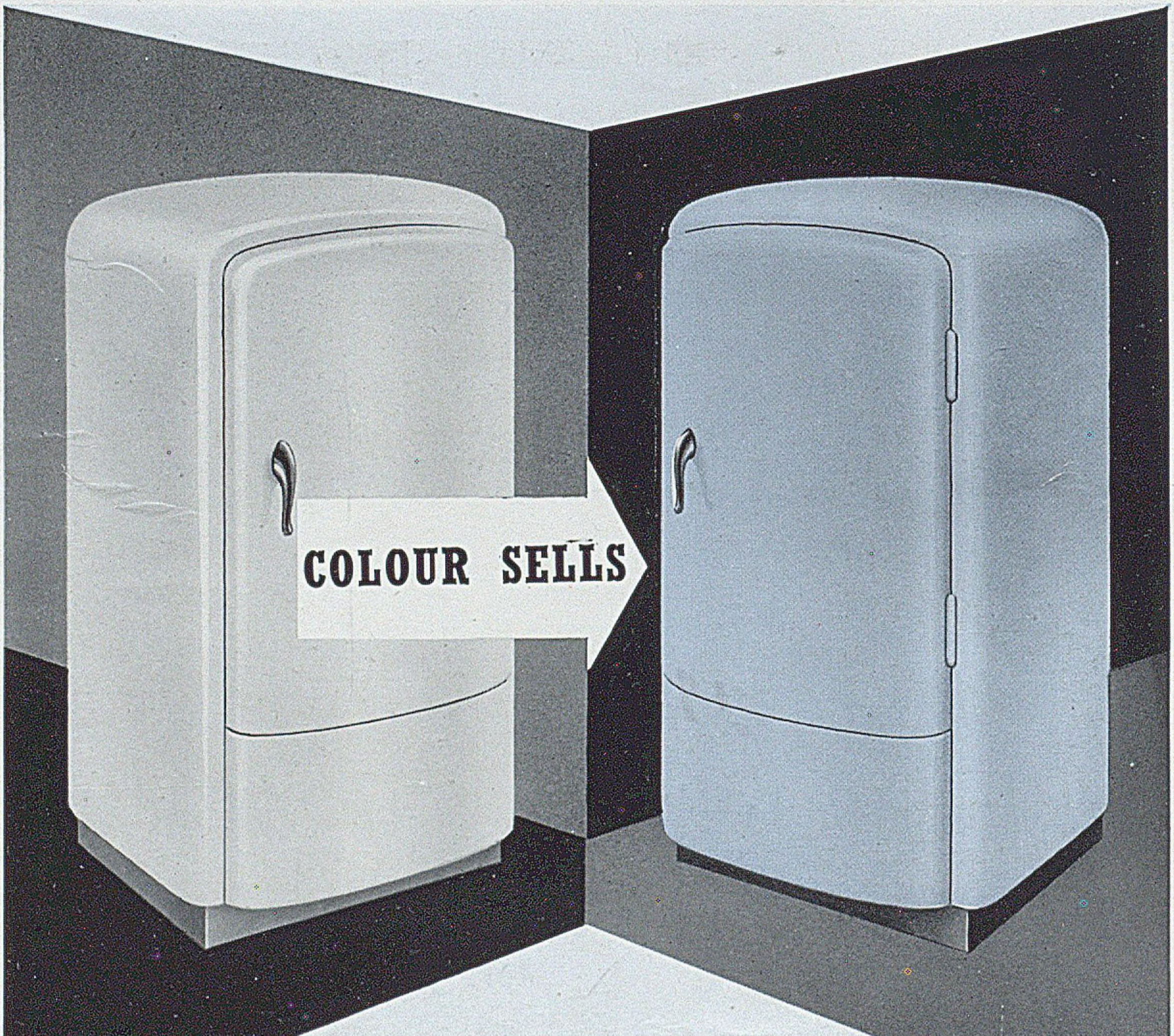
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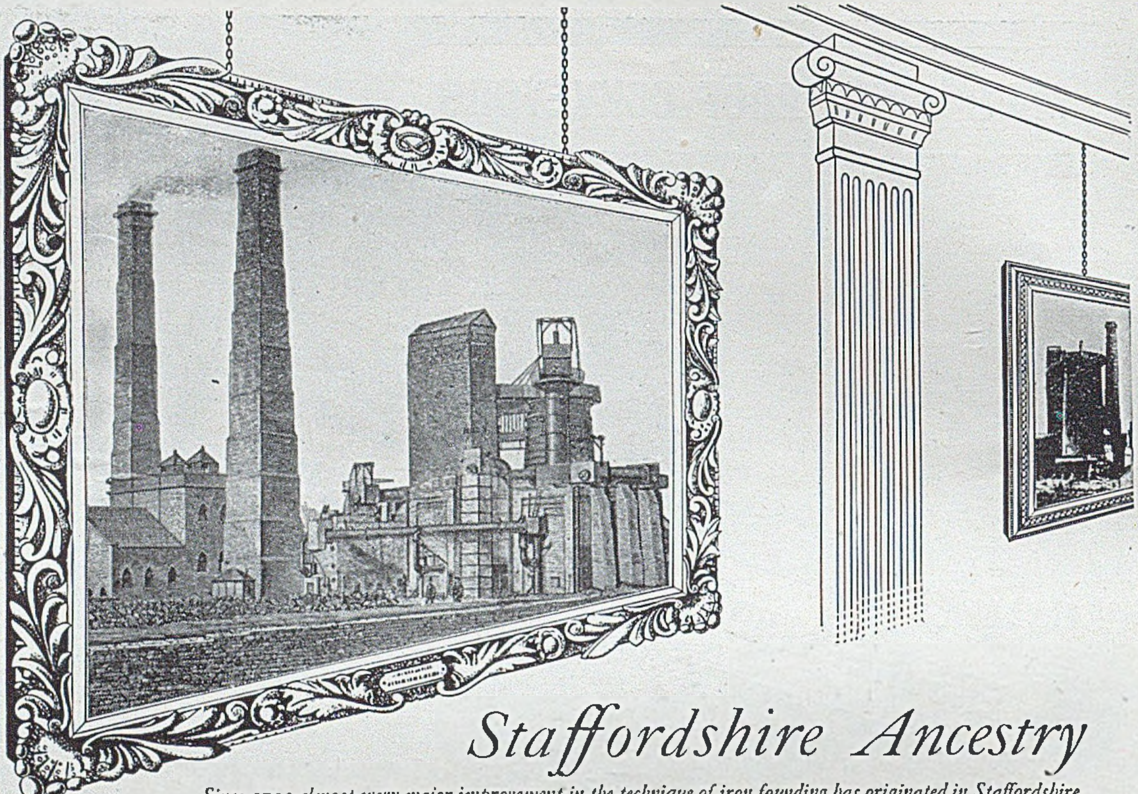

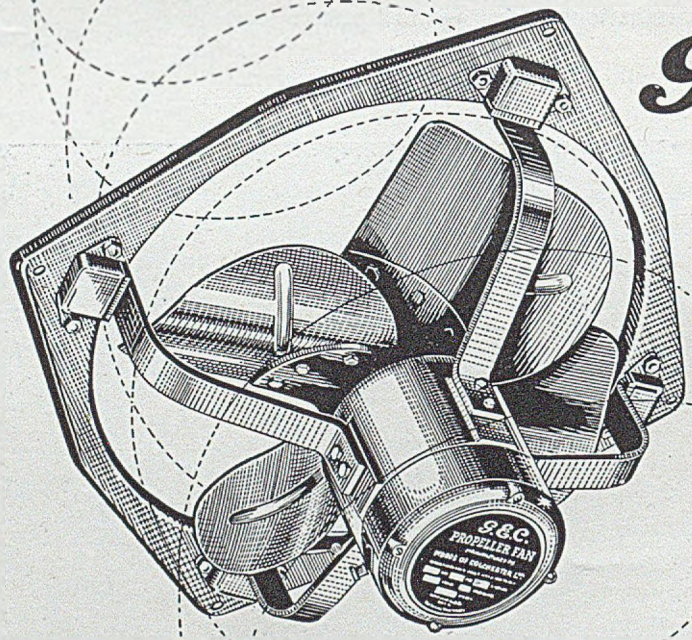
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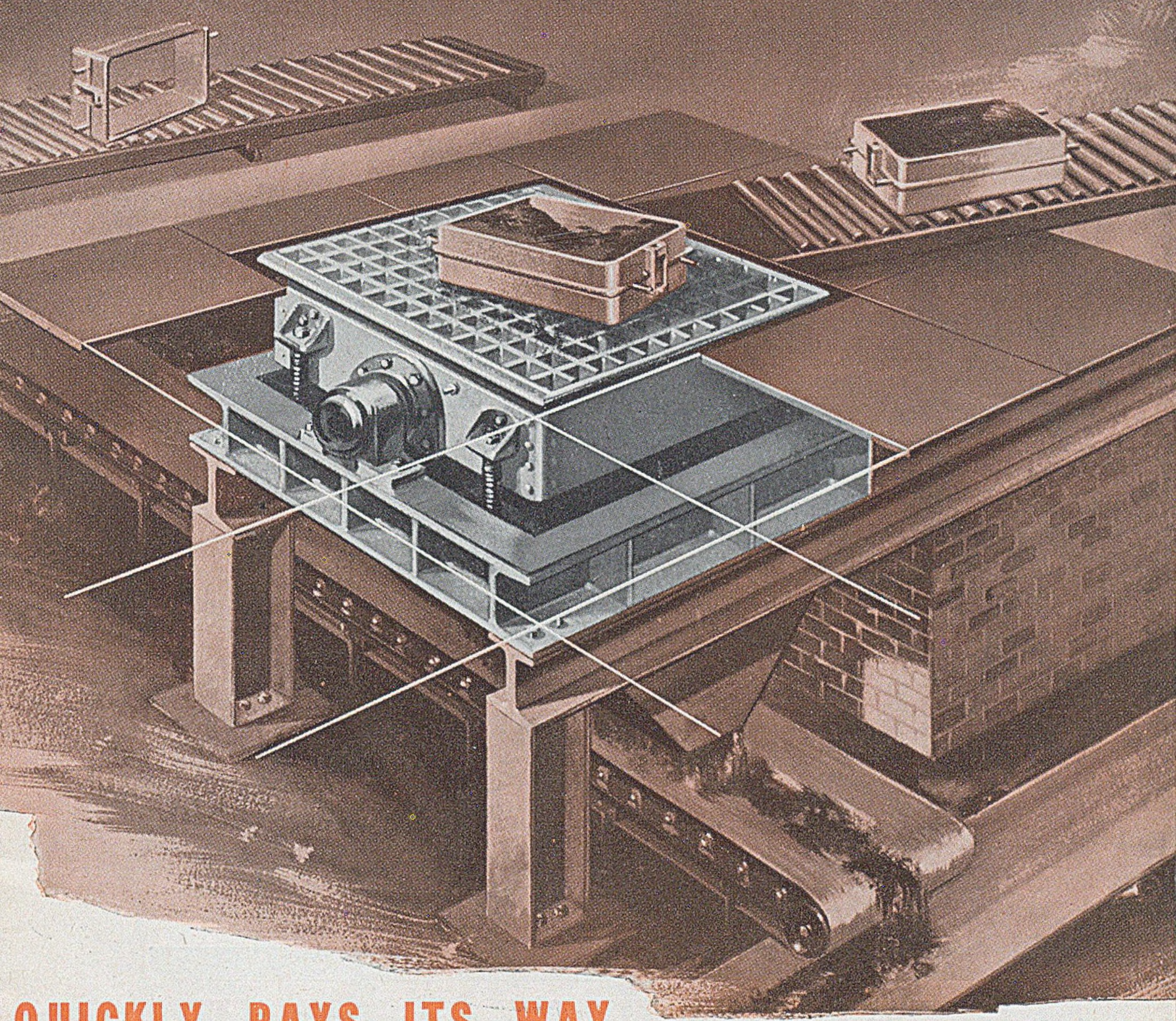

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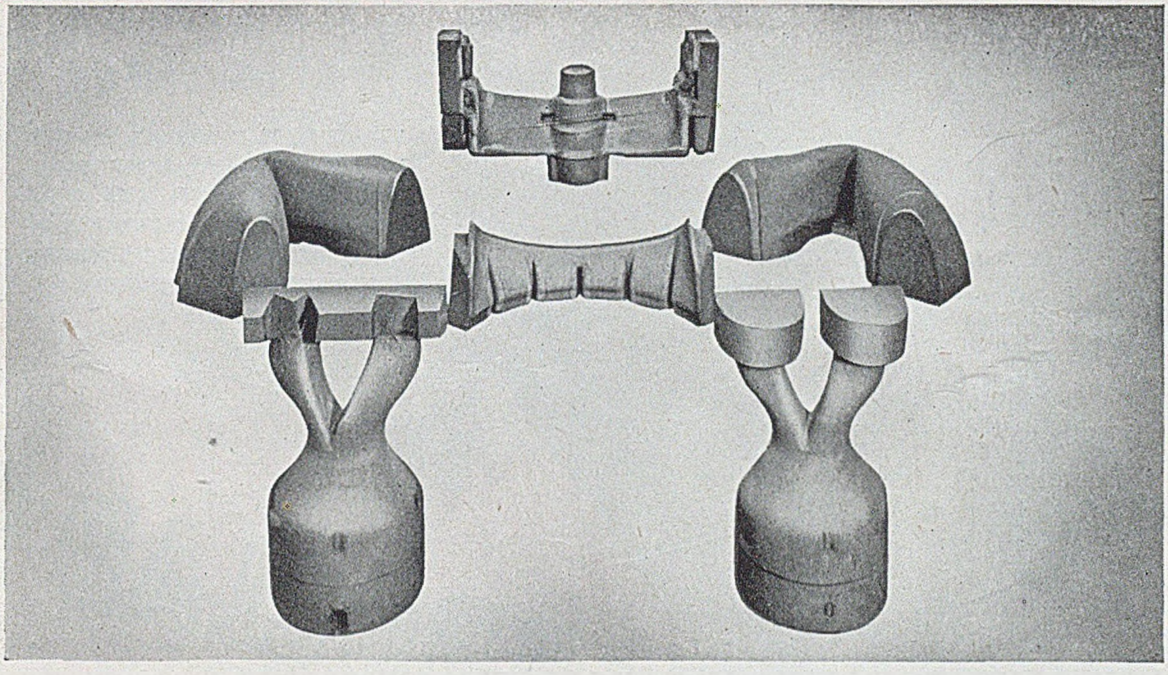

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We are indebted to Messrs. Sterling Metals, Ltd., for their kind permission to reproduce the photograph and for assistance rendered.

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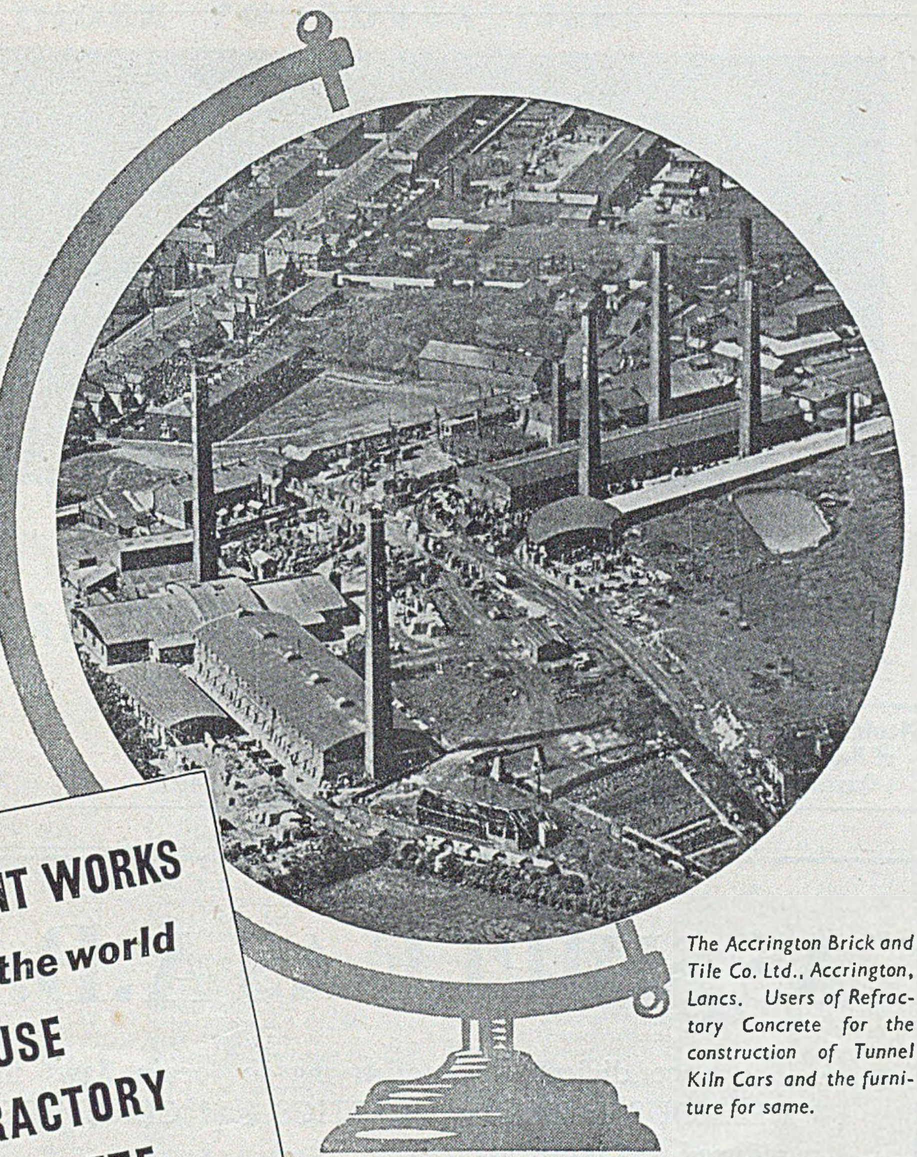

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Established 1902
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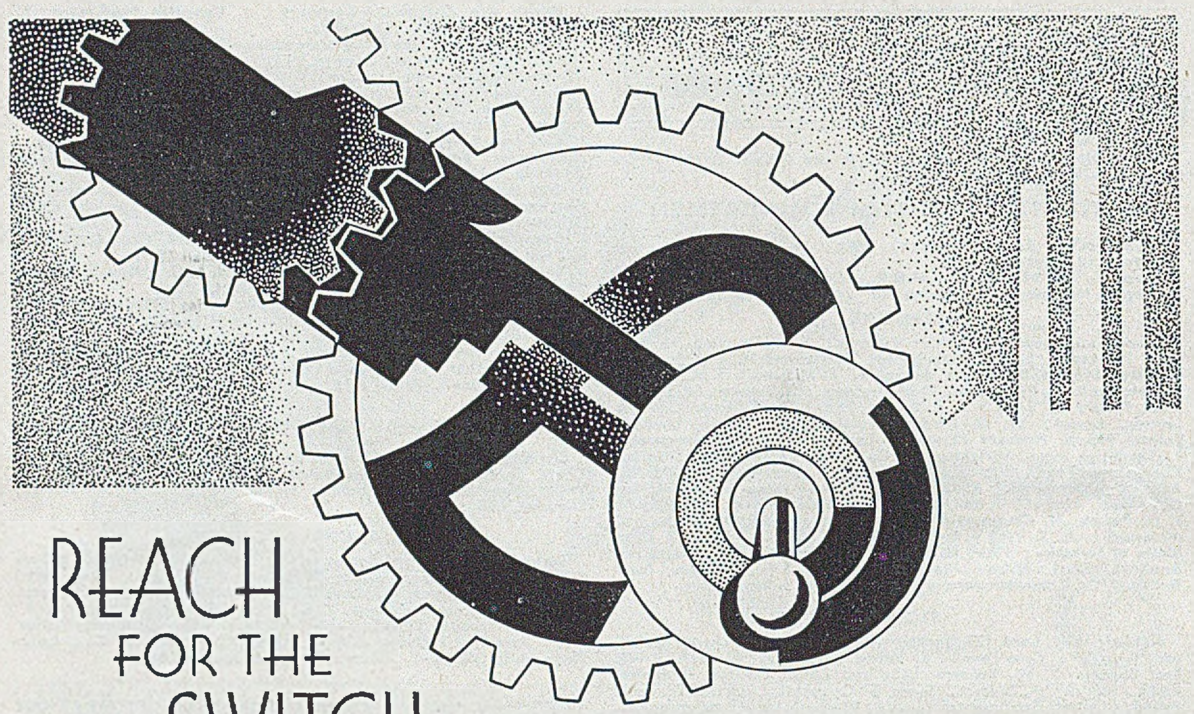

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CONTENTS

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

Providing the Yardstick

Last week we printed a long letter from Mr. John W. Bolton, the eminent American metallurgist which attacks Mr. Lissell's conclusions as set out in the Paper he gave to the Buxton Conference of the Institute of British Foundrymen. We think some misunderstanding has arisen on account of the title of the Paper which was "Testing the Metal or Testing the Casting". We base this on Mr. Lissell's statement in the discussion that "in Sweden they had started from the point of view that they were for the moment only going to test the iron; they were not concerned with the properties of the castings unless they had a statistical relationship between metal and castings." We cannot help but believe that Mr. Bolton has missed this statement. Surely as a long-term policy the determination of the actual service potentialities of a casting by statistical means should be worth while.

The position in this country is that the various service departments continue to issue their own private specifications, when those of the B.S.I. are in all probability more suitable at any rate for the metal itself. The existence of these bastard specifications may be due to the existence of an alloy which shows superior test-bar strengths, but in truth is such as to yield poorer properties in the actual casting. Tensile test-bars themselves are deceptive little affairs. Though required only to give data on the actual metal, they may on the British type—two inches or so long—show up the properties of the weakest spot of metal along the gauge length, whereas the Swedish type cuts out this variable to a large extent, by the provision of neck on a quite short test-piece. Which of the two is the better evaluation of the actual metal? Soundness of test-bars is so important that too much care cannot be given either to their design or production.

Mr. Bolton is undoubtedly right in his insistence on service tests as being the most important of all factors for evaluation of the casting, but only time and experience can provide these. In this connection it is interesting to note that it has been the advertising departments of the foundries and their trade groups rather than the scientific staff which have been foremost in providing data. The claims made for machinability, corrosion, chemical and heat-resistance have been given much more prominence by the publicity experts than the laboratories. Moreover, such claims rarely exaggerate, as their sponsors value repeat orders as much as new business. It is matter of some interest that such attention should be paid to tensile tests for cast iron, because in actual practice the alloy has seldom to withstand the type of stress implicated. Compression, shock, and bursting, the last one being a combination of a number of stresses are the normal ones encountered. In other cases, the suitability of the surface for taking a protective coating is a paramount factor, as of course is machinability. Still, it is in the actual foundry where specifications have to be met and the work of Lissell and Bolton and so many in the same field has for its ultimate end the provision of universally accepted yardsticks so designed as to aid the production of Saville Row castings.

Iron and Steel Institute

Annual General Meeting

The Annual General Meeting of the Iron and Steel Institute will be held in the Institute's offices, 4, Grosvenor Gardens, London, S.W.1, on Wednesday, Thursday and Friday, May 30 and 31 and June 1, 1951. A buffet luncheon (tickets 6s. each) will be available in the library on the Wednesday and Thursday, and there will be an interval during each morning for light refreshments (no charge). A members' dinner (tickets £1 5s. 0d. each) will be held at the Dorchester Hotel, Park Lane, London, W.1, on Wednesday, May 30, at 7 for 7.30 p.m. Members and their guests are requested to use the ballroom entrance (dress: evening dress; decorations will be worn).

Programme

Wednesday, May 30.

10.0 to 11.0 a.m.: Formal business; election of members; presentation of Report of Council and Statement of Accounts for 1950; announcement of the award of the Bessemer Medal for 1951 to Mr. Benjamin Fairless; presentation of the Sir Robert Hadfield Medal for 1951 to Mr. William Barr; presentation of an Andrew Carnegie Silver Medal for 1950 to Mr. A. B. Winterbottom; presentation of the Williams Prize for 1950 to Mr. T. H. Harris and Mr. W. H. Everard; presentation of the Ablett Prize for 1950 to Mr. D. A. Wise and Dr. L. N. Bramley, and induction of the new president, Mr. Richard Mather.

11.0 to 11.45 a.m.: Presidential address.

11.45 a.m. to 12 noon: Interval.

12 noon to 1.15 p.m.: Discussion on:—

"The Present Position of the Converter Process.—Economic Comparison with other Steelmaking Processes," by B. Matuschka.

1.15 to 2.30 p.m.: Buffet luncheon in the library.

2.30 to 5.0 p.m.: Presentation of films by Dr. J. B. Austin on: "Study of the Zone in Front of a Blast-furnace Tuyere by Means of High-speed Motion Pictures and Models." Discussion on:—"Significance of Equilibrium and of Reaction Rate in the Blast-furnace Process," by J. B. Austin.

7.0 for 7.30 p.m.: Members' dinner at the Dorchester Hotel, Park Lane, London, W.1.

Thursday, May 31.

10.0 a.m. to 1.15 p.m.: Joint discussion on:—"Aspects of the Blast-furnace Situation in the U.S.A.," by Owen R. Rice. "Evolution of the All-carbon Blast-furnace," by J. H. Chesters, G. D. Elliot and J. Mackenzie, and "Radio-active Indicators for Blast-furnace Refractory Wear," by E. W. Voice.

(11.30 a.m. to 12 noon: Interval.)

1.15 to 2.30 p.m.: Buffet luncheon in the library.

2.30 to 5.0 p.m.: Joint Discussion on:—

"The Smidth Agglomerating Kiln.—Plant and Practice at East Moors Works, Cardiff," by W. E. Simons; "Sinter Making at Appleby-Frodingham," by G. D. Elliot and N. D. Macdonald; "Investigation of the Effects of Controlled Variables on Sinter Quality. Part I.—Development of Experimental Sinter Plant and Preliminary Results using Northants Ore," by E. W. Voice, C. Lang and P. K. Gledhill; "The Sintering of Northamptonshire Iron Ore.—A Production-plant Study of Factors Affecting Sinter Quality," by D. W. Gillings, E. W. Voice, C. Lang and P. K. Gledhill.

Friday, June 1.

10.0 a.m. to 1.0 p.m.: Joint discussion on:—"Full-scale Blast-furnace Trials," by J. A. Bond and T. Sanderson, and "Distribution of Materials in the Blast-furnace. Part III.—Further Factors Influencing the Distribution of Solids in the Blast-furnace," by R. Wild.

Film Review

GREAT NAMES

This is, if the reviewer is not at fault, the fourth film produced for F. H. Lloyd & Company, Limited, of James Bridge Steel Works, Wednesbury, Staffs, by the Big-Six concern (Mr. Edward Cook). Progressively, and rightly, there has been greater stress laid on blatant advertising. This is probably due to their success overseas. The commentary—made by Lionel Marsden, who has a pleasing voice and is devoid of mannerisms—is to be translated into Turkish (for showing at their forthcoming trade fair), French, Spanish and Portuguese. The scheme of the film is first to show something of the foundry (stressing in this case "size") and then to illustrate the use of steel castings in the manufacture of agricultural, excavating and cement-making plant and locomotives. These are the productions of internationally-known firms. Curiously enough, no small castings, such as colliery-tub wheels, were included, perhaps because their users could not be included under the title of "Great Names." The film finishes rather abruptly and the reviewer suggests that a series of "flash-backs" to the major items illustrated would have rounded-off the film to its advantage. The level of photography and the general production is distinctly good and enhances the high reputation achieved by the Lloyd-Cook co-operation.

Increased Prices for Cast-iron Hollow-ware

The Board of Trade, in consultation with the Central Price Regulation Committee have made the General Hollow-ware (Maximum Prices) (Amendment No. 4) Order, 1951.

This Order further amends the General Hollow-ware (Maximum Prices) Order, 1949, as amended by omitting the first schedule, which laid down manufacturers' cash maximum prices for specified descriptions of cast-iron hollow-ware, and fixing as maximum prices those charged by manufacturers during the "basic period" (June to July, 1949) together with an increase of 22½ per cent., in the case of cast-iron hollow-ware with tinned interior finish, and of 10 per cent., in the case of cast-iron hollow-ware with black, barffed or enamelled interior finish. These increases, which are the first since the end of 1947, have been granted at the request of the manufacturers to take account of the increased cost of tin and other raw materials.

The Order comes into operation on April 23 and copies are available from H.M. Stationery Office.

Hardware and Hollow-ware Trades

A preliminary report, based on the 1948 Census of Production, gives the value of production (gross output) in the hardware, hollow-ware, metal furniture, and sheet-metal trades in 1948 as £173,728,000, against £52,812,000 in 1937. The average number of persons employed was 168,435 in 1948 and 124,168 in 1937.

There were 1,898 establishments engaged in these trades in 1948.

THE END of 1950 saw Tyneside shipbuilding and engineering undertakings well placed for a considerable time ahead, states the annual report of the Newcastle-upon-Tyne and Gateshead Incorporated Chamber of Commerce, but the future position of some of the lighter industries is rather uncertain owing to the shortage of non-ferrous metals.

Manufacture of Ingot Moulds for an Indian Steelworks*

By V. M. McGowan

The Author, without previous personal experience of ingot-mould manufacture, was faced with the necessity for instituting a system for their quantity production in a large jobbing foundry in India. What follows is a record of the method by which the job was tackled at the outset and of the layout and equipment developed.

THE PROBLEM OF MAKING and casting ingot moulds successfully for the steelworks is one that has occupied the minds of many foundrymen over a long period. The Author cannot hope to add much to the great store of technical literature that already exists, but he would at the outset like to record his debt to literature on the subject. There are to-day many men recognised as experts in this particular field of foundry work, with many years of experience and each with his own theories about method.

Having read much of what these experts had written, the Author was left with the impression that here was a job that as a general foundryman he had no right to tackle. In point of fact, however, there was no choice in the matter. The steel plant was in the course of erection and ingot moulds were necessary to the successful operation of that plant. They had to be made and the Author's foundry had to make them!

Moulds of this description had yet to be designed and cast and production started as soon as possible. Added to the fact that it was a job never tackled before, the foundry was faced with the lack of skilled and experienced labour.

Casting Problems

So far as could be gathered before starting on the job, the greatest cause of mould failure at the steelworks was that the moulds cracked after a very short life. One cause of this cracking was said to be the effect of casting strain on the casting after pouring in the foundry. This may be so in a great number of cases, but many failures have been seen that were caused by strains set up in the mould in the steelworks that had nothing whatever to do with the foundry, but for which the foundry, as usual, had to take the blame. However, it was argued that if this casting strain, caused by the casting contracting on the core after pouring, could be eliminated much of the trouble would disappear and the mould when in use could be expected to last longer. The great problem was to eliminate this tendency to strain. The solution was at once apparent: to release the core and so stop it from binding the contracting casting. How this was accomplished will be explained later in this Paper.

The second great problem was to get the correct composition and casting temperatures. It seemed to be the accepted practice to use hematite irons for the making of ingot moulds, but hematite irons were not procurable unless imported at a prohibitive price, so that the problem was to make a successful job without. Casting temperatures would of necessity be a matter of experiment and close control until the founders had accumulated sufficient data to enable them to lay down strict rules to work to. Once the temperature range was established it could then be adhered to in all future castings.

The requirements of the steelworks made it essential that a minimum of four moulds were cast per day in the foundry, and as this was likely to be exceeded at a moment's notice sufficient plant was made to cope with six moulds. In describing the plant which was designed for the work and the methods adopted, it should be borne in mind that it was made to suit local conditions. Also, a highly specialised job was being undertaken by men who had no actual experience of this class of work and by labourers who did not have the slightest idea of what an ingot mould would look like. The plant had to be so designed that it would be understood and worked by those who were illiterate and had to have things explained to them in words of one or two syllables. With these difficulties in mind it will be clear why the Author went to such pains to make plant which, at first sight, might appear elaborate, but which worked well in practice.

Ramming of Moulds

There seems to be much difference of opinion between makers as to the best way to ram moulds for these jobs. Some advocate the jar-ramming machine as the only possible method, others think ramming mould and core at the same time is the better way, and still others ram the mould and core separately.

As there was no jolt machine large enough, the question of machine moulding did not enter. It only had to be decided whether to ram up the mould and core at the same time or separately. In the end it was decided to make pattern and core-box separately and it was here that an individual note in the design of the plant was struck and a departure made from the orthodox method, though not without misgivings.

The governing influence throughout the designing of the plant was that, if possible, all casting strain must be eliminated from the ingot mould to allow it to contract as much and as freely as it could. As before stated, the supply of labour also had a great

* Paper presented to the South African Branch of the Institute of British Foundrymen.

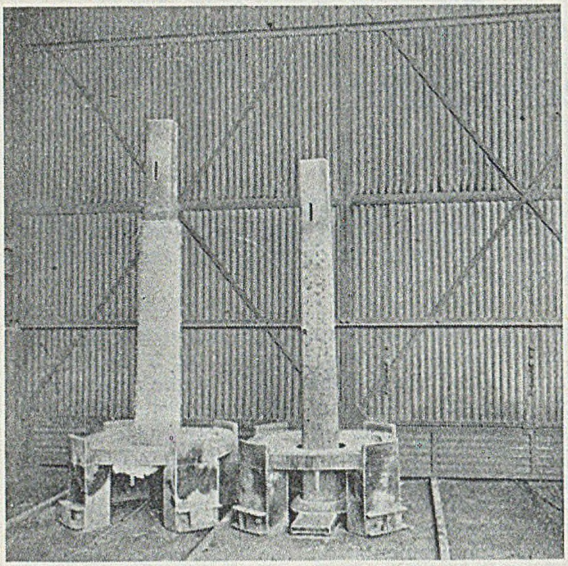

FIG. 1.—*Simple Coremaking Plant; no Bottom Boxes are used. The Cores are made on a Core-plate which also serves as Bottom-box. After the Core-bar has been given a coat of Clay-wash, it is lowered into a Pit, with the Corebox and the rest of the Assembly, for Ramming.*

bearing on the finished design of plant, as most of the workers had had experience of vertical pipe-making plant, described by Mr. Handley in his Paper on pipe-casting methods.* It was thought that if a plant following the same principle could be designed it would be easier for the men to handle. The main object, however, was to eliminate the casting strain on the mould. So far as is known the plant is (or was) entirely original and, in spite of gloomy prognostications, worked well and is giving good service.

Core-making

In describing the plant, commencement will be made with core-making. Explained in writing it may seem elaborate; in reality it is extremely simple. No bottom boxes (*i.e.,* drags) are used; the cores are made on a core-plate which is also the bottom box. The whole set-up for the core comprises three main pieces in all: first there is the bottom-plate, which is mounted on four stools to raise it from the ground. This plate is recessed to a depth of 1½ in. and this recess when rammed up forms the drag of the mould. In the centre of the plate is a tapered hole through which the core-bar proper passes and locates itself on this taper. Attached to the core-bar is a retaining plate which spans the main-plate and this in turn is pinned to the main-plate by two countersunk cotters. The whole forms a perfectly rigid core-bar plus bottom or drag box.

Fig. 1 reveals the simplicity and effectiveness of the plant. The usual vent holes are, of course, provided in the core-bar, as in any hollow bar used in the foundry, and were cast in when the bar was made. The reason for having the bar loose on the bottom plate is so that it may be dropped away from the casting and so obviate any tendency for the ingot mould to bind on the core. The taper of the bar and the height of the stools supporting the plate are such that when the bar is dropped, which process will be explained later, there is about one in. clearance all the way round the casting, to allow for contraction. This is in excess of requirements, of course, but it does make sure that there is no chance of any strain being set up with its attendant bad after effects at the steelworks. It also provided the founders with a much-needed insurance that they could not be held at fault if the moulds did crack when in use.

When the core-bar is assembled (taking about five to ten min. in all) one run of ½ in. straw rope is bound round the bar to joint level. This run of rope was not put on the first core made and great difficulty was experienced in getting the core-bar to drop after casting. With the one thickness of rope on the bar this difficulty vanished; in fact, it usually only requires the cotter pins to be released before the bar drops away and comes down with its own weight.

Having wound the rope on the bar it is given a coat of clay-wash and is then ready for the coremaker to ram up. The stool, complete with bar, is lowered into a pit for ramming and the core-box is lowered over the lot. It is made in a pit for ease of ramming and the pit is of such a depth as to bring the whole assembly to floor level.

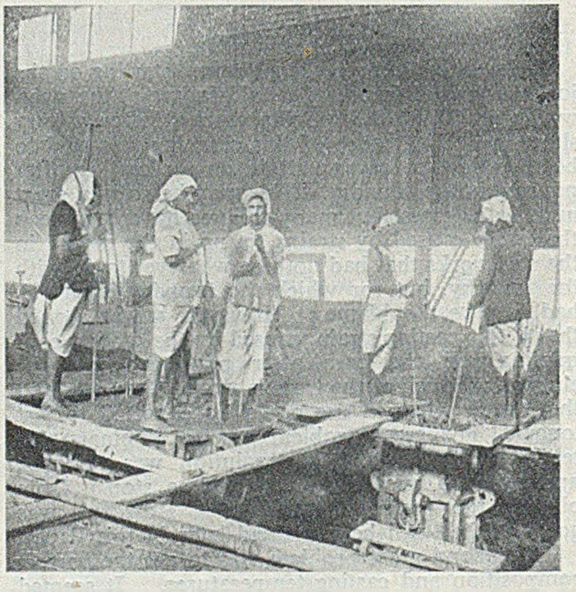

FIG. 2.—*A Pit ensures Ease of Ramming, being of such a Depth as to bring the Whole Assembly to Floor Level.*

* "Straight Cast-iron Pipes," by J. L. Handley, FOUNDRY TRADE JOURNAL, March 15, 1951.

This is shown in Fig. 2. The core-box is made of cast iron in four pieces from a quarter pattern. The joints are machined and corners mitred but the walls are ground with an ordinary hand grinder to give the required finish. No other core irons are used except for a very light one near the top. This light iron is made as the three sides of a square to allow for easy contraction of the casting, again with a view to eliminating casting strain.

Moulding-box Location

A word may be said here about methods adopted for locating core-box, moulding boxes, etc., to ensure accurate jointing. It will be seen from the photographs that the boxes are made square, or as nearly so as possible. In all, 12 sets of boxes were made, and to get all of them exactly the same would have been not only difficult and costly, but was thought to be unnecessary. Yet if they were to be interchangeable they had to have some common locating feature. It was therefore decided to have all corners machined to a diameter and that this diameter would be common to all locating points. This greatly simplified the work of fitting and made the locating fool-proof for, in addition to the diameter at the corners, two pin holes were drilled on the centre line. This might seem an added luxury but as the boxes were expected to last for many years it was well to have them absolutely fool-proof. The same jig was used for drilling the bottom-plate, core-box, moulding-box, etc., so that every part of the plant was interchangeable.

Mould Production

The pattern, like the core-box, is of cast iron and is mounted on a plate corresponding in all particulars to the bottom-plate on which the core-box is mounted for ramming up except of course, that the pattern-plate has no recess. The whole

FIG. 3.—*Final Ramming in Progress; a Light Core Iron is used near the Top to allow for easy contraction of the Casting.*

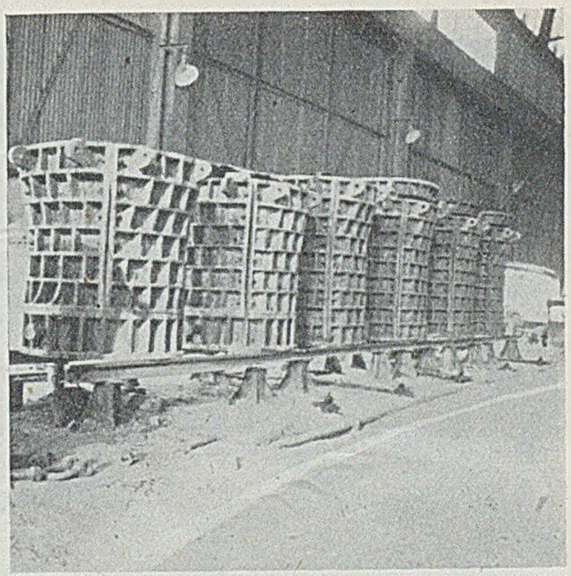

FIG. 4.—*To Dry the Moulds a Gantry was built from Scrap Railway Lines.*

set-up (the plate with the pattern mounted) is placed in the same pit as the core is rammed in, but the plate is anchored to weights sunk well below it; otherwise when the mould is being stripped from the pattern there is the danger that the whole would lift up. Substantial weight is required to hold the pattern-plate solid when stripping the box. A stripping plate is used to ensure a clean lift and $\frac{1}{4}$ in. is left on the length of the pattern to allow for this. The stripping plate itself is made from $\frac{3}{4}$ in. mild-steel plate and is fitted to the bottom of the moulding box by means of countersunk bolts. The lifting lugs on the casting are worked from loose pieces on the pattern mould on completion of the ramming operation.

Drying and Closing

The mould tops are flat and are rammed on a flat plate, these plates being drilled with the same jig as the other parts of the moulding box etc., are therefore also interchangeable.

The cores and the moulds require little, if any, finishing if they are rammed properly. In fact, any core that would require patching or making up in any way is rejected at once, as it is found that more often than not a core that had been patched produces a poor casting and, as the core of such castings has to come out perfectly smooth, a patched core usually means a scrapped ingot mould. All moulds and cores are blacked in the green state and no repairing or blacking is done after drying.

The foundry is fortunate in that it has a plentiful supply of coke-oven gas and this fact is taken every advantage of when considering how those moulds and cores are to be dried. To dry the moulds, a gantry was built from scrap railway lines and the boxes were lowered on to them as will be

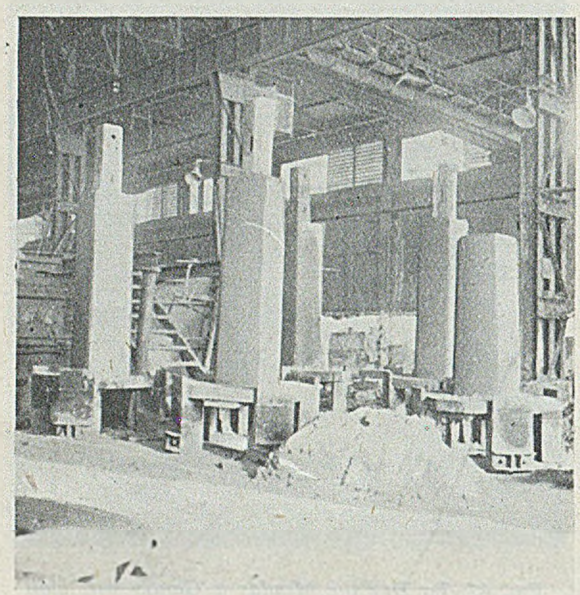

FIG. 5.—*Large Vertical Stoves are used for Drying the Cores. Fired by Coke-oven Gas, they are Sunk in the Floor to about Half their Depth and the Cores are lowered in from the Top. Each Stove is divided into Three Compartments, so that Cores can be Dried in Cycles. Four Cores are accommodated by each Stove.*

clearly seen from Fig. 4. Under each box is placed a burner and the gas is ignited. The top part is placed on the top of the mould leaving a 3 in. gap.

This method of drying was found to be very satisfactory and efficient. It may be stated, however, that at no time is a mould dried all the way through, but only for about 2 in. back. This may sound dangerous to some, but it is perfectly safe and never has there been any trouble with scabs, blows, etc., and the castings stripped perfectly clean and free from defects.

There were in the foundry large vertical stoves fired by coke-oven gas and those were utilised for the drying of the cores. They were sunk in the floor to about half their depth and the cores were lowered in from the top; the stove was divided into three compartments and this allowed for cores to be dried in cycles, each stove holding four cores, so that while one section was being loaded one was firing and the other could be unloaded.

Some idea of these stoves will be gained from Fig. 5. Fig. 6 shows the core ready for closing and Fig. 7 the completed, mould.

The dried moulds and cores are closed in a pit and to make sure that they are set down plumb and so prevent any danger of metal wash on the sides of the core or mould, large plates were made and bedded level on the floor of the casting pit. The cores, which it will be remembered also include the drag of the mould, on being drawn from the stove, are lowered on to those plates. The pit, incidentally, was made to accommodate four complete moulds for casting together. The moulds are lowered over the core and the top is put on. The whole operation from start to finish takes about 20 min., thanks to the well-fitting boxes. Having all joints machined and jig drilled prevents any difficulty in assembling. It is essential that all joint faces be machined, as this prevents any tendency to flash. This is most important as a thick flash would be likely to shorten the life of the mould considerably.

Running Methods

With the top-part closed, the runner boxes, which were also made for the job and so designed as to hold the minimum sand and metal, are made up and the job is ready for casting.

It may be noted here as a point of interest that the return scrap from heads, runners, etc., is very low, being in the region of from 7 to 8 per cent., giving a casting yield of about 92 per cent. of metal poured. Considering the type of work, this is very good and would compare well with other methods of manufacture.

Several types and methods of running were tried out with varying success until finally it was found that four drop runners of $1\frac{1}{4}$ in. dia. each, placed one on each side of the mould, gave the best and most consistent results. Everyone will not agree with this, but this method proved its value in this practical set-up and, from careful records taken of the first three hundred moulds cast, not one was lost which could be blamed on the method of running. Indeed, only one casting was lost from the first

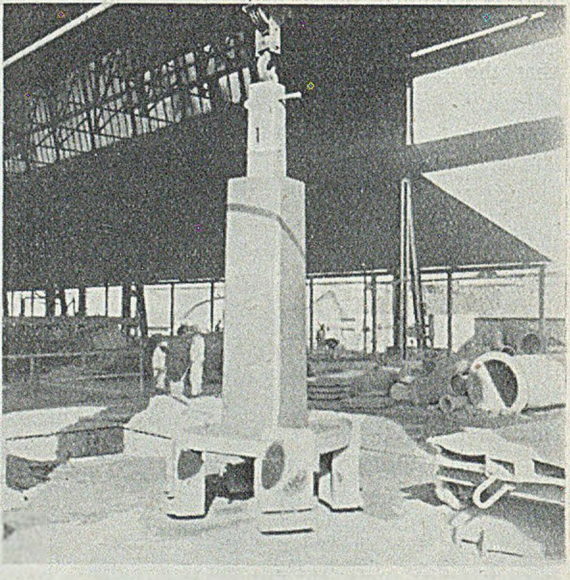

FIG. 6.—*Typical Ingot-mould Core ready for Closing. After Casting, 9 to 10 hrs. is Allowed to Elapse before Stripping. The Boxes are laid Flat and Opened along Two Opposite Corners on the Joint; the Casting, complete with Sand, is Lifted out as a Unit.*

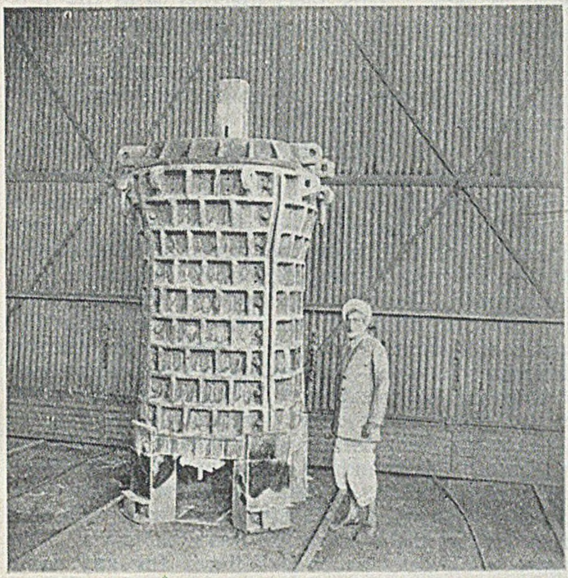

FIG. 7.—*Closed Completed Mould Ready for Casting.*

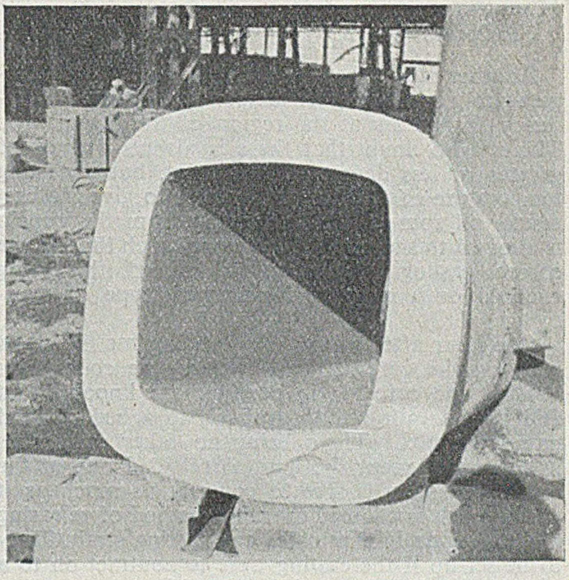

FIG. 9.—*The Castings usually Strip Cleanly, and very little Fettling is Required. This is Attributed in Large Measure to the Accuracy of the Machined Joints of the Boxes used.*

three hundred and that because the core cracked and left a bad mark in the inside of the casting, rendering it useless for its purpose.

Casting

The first two castings made were poured at a temperature which was recommended by the steelworks, *i.e.*, 1,180 deg. C., but this was not satisfactory and a badly-lapped mark was found in the inside of the mould opposite the lifting lugs. It seemed that this was caused by the fact that when the metal rose in the mould to the level of the lifting lugs, there would be a short pause until such time as the lugs had been filled. The metal, being too cold, could not recover and this caused what was, in effect, a cold shut.

The casting temperature was, therefore, raised to 1,220 deg. C. and this mark at once disappeared. Since then, until the time the Author left the firm, no less than 2,000 ingot moulds had been cast and at no time did the cold lap return, which seems ample proof that the casting temperature was altered in the correct manner.

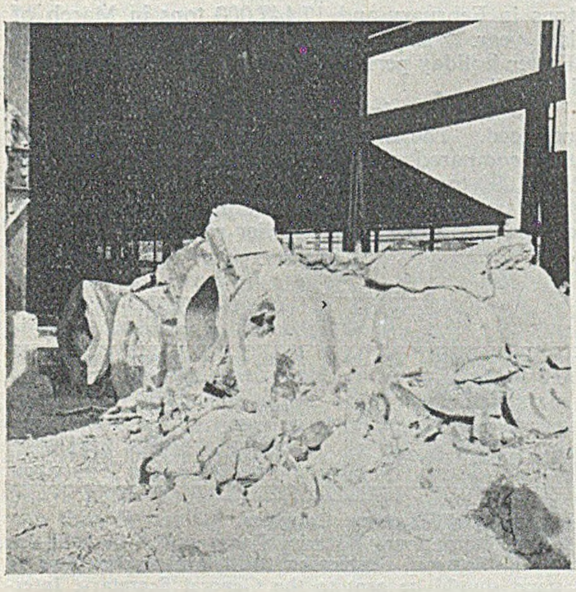

FIG. 8.—*The Casting is left for about 40 hrs. before Final Stripping, by which Time it is almost Cold.*

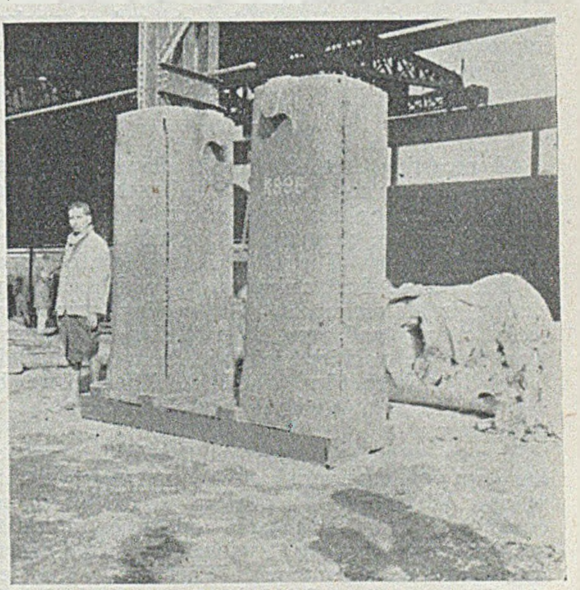

FIG. 10.—*Typical Ingot Moulds Made in the Indian Foundry, shown after Stripping.*

Manufacture of Ingot Moulds for an Indian Steelworks

Another factor that governed the use of this temperature was that higher temperatures caused a tendency to a draw at the region of the lifting lugs. There is no doubt that there is always a draw of greater or less degree at this point, but a casting temperature of 1,220 deg. C. seems to give the best results all round. Metal coming from the cupola is allowed to stand in the ladle until such time as the correct casting temperature is reached, this being checked on a disappearing-filament type of pyrometer.

One hour after casting—by which time the straw rope on the core-bar has burned—the cotter pins holding the core-bar in position are knocked out and the bar allowed to drop on to a bed of sand under the box. There being no other core irons in the core except the light three-sided one at the top, the casting is free to contract as much as it cares to. It is claimed that this method of releasing the core entirely eliminates any casting strain likely to be set up if the casting were to contract on to a more-or-less solid core-bar assembly.

Metal

It would seem to be the usual practice among makers of ingot moulds to use a hematite iron. None was available. Even if the life of the mould were a little impaired because of the lack of hematite it would still prove cheaper to use straight iron, which was made on the site. The irons used were mixed to give a final composition as follows:—T.C, 3.2; Si, 1.7 to 1.8; Mn, 0.68 to 0.75; P, 0.28 to 0.32; S, 0.07 to 0.08; G.C, 2.9 per cent.

Some moulds were cast with a very high Mn (in the region of 1.5 to 1.8 per cent.) as a trial to ascertain if they would give a greater life in service, but so far as is recollected they showed no marked improvement in use. Cupola charges were made up of 50 per cent. pig and 50 per cent. scrap, no steel being used.

Stripping

After casting, 9 to 10 hrs. is allowed to elapse before stripping commences. The boxes are laid flat and opened along two opposite corners on the joint and the casting, complete with sand, is lifted out as a unit (Fig. 8). The whole is then left for about 40 hrs. before final stripping by which time the casting is almost cold. The casting strips perfectly cleanly and very little fettling is required, thanks to the machined joints of the box. This will be obvious from Figs. 9 and 10. The job weighs 3½ tons and is kept within very close tolerances to this figure.

It may seem to some that the initial cost of the plant would be very high, but no matter in what manner the job was tackled, plant of this nature could never be made cheaply and the extra cost to make it really first class was well worth the expenditure of time and money. When the Author left the firm, and over 2,000 ingot moulds had been made, the only renewal was a few retaining plates for the core-bar; the rest of the plant was almost as good as new. This fact, together with the low scrap, brings the final cost very low indeed. It was calculated that if the plant would stand up to 3,000 castings the cost would work out somewhere in the region of 2d. per cwt. which is considered very reasonable.

Crucial Test

What of the life of the mould at the steel works? This, the crucial test of all ingot moulds, must be judged with leniency so far as the Indian product is concerned. It must be remembered that the steelworks was a completely new industry to the countryside. There was no supply of trained labour and every man on the plant had to be taught his job from scratch. How vast a job this was and the difficulties involved will be left to the imagination. It is reasonable to suppose, therefore, that the ingot mould came in for some very rough handling at times. This fact combined with lack of hematite iron made the founders scale down their hopes a lot. Nevertheless, it was guaranteed that the moulds would give a life of 50 casts minimum. In point of fact the average life was 66.23 casts. This figure took into account failures for any fault whatever, whether it originated in the foundry or not. If only the foundry scrap had been counted against the foundry, the average life would have been very much greater. There was one mould which gave a life of 150, so it must have been either a freak or received some very careful treatment.

Acknowledgments are made to Mr. Handley and Mr. Waller, both members of the Institute of British Foundrymen (South African Branch) who helped in taking the photographs reproduced with this Paper.

March Steel Output

Steel output in March—the first full month of State control of the industry—was at an annual rate of 16,546,000 tons, compared with 16,952,000 tons in February and 17,147,000 tons in March of last year. Last month, of course, included the Easter holiday period, whereas Easter last year was in April.

The fall in pig-iron production was less pronounced. The annual rate in March of 9,572,000 tons compared with 9,687,000 tons in February and 9,696,000 tons in March, 1950.

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.
1951—January ..	183,100	9,520,000	305,900	15,907,000
February	186.300	9,687,000	326,000	16,952,000
March ..	184,100	9,572,000	318,200	16,546,000
1st qtr. ..	184,400	9,587,000	315,900	16,425,000
1950—January ..	187,400	9,742,000	305,300	15,873,000
February	184,400	9,588,000	325,000	16,898,000
March ..	186,500	9,696,000	329,800	17,147,000
1st qtr. ..	186,100	9.677.000	207,030	17,696,000

International Foundry Congress

The International Foundry Congress will be held this year in Brussels, September 10-14, and applications to attend should be sent to the General Secretary, International Foundry Congress, c/o Fabrimetal, 17, Rue des Drapiers, Brussels, Belgium.

Moulding and Casting in Schools*

The inclusion of technical subjects such as woodwork and metalwork in secondary schools is amply justified by their high educational values and by the strength of their appeal to boys. The Council of Ironfoundry Associations has already stated a case to the Ministry of Education why schoolmasters should be encouraged to include simple moulding and casting in the metalworking crafts taught in their schools. The Ministry's reply has been that the headmasters are given a free hand in choosing the subjects of their syllabus, but it was agreed that moulding and casting work allowed the boy to apply in a practical manner many of the subjects taught to him in the classrooms.

It seems, therefore, that if the ironfoundry industry wants to see moulding taught in more of the secondary schools, ironfounders themselves must take steps to interest the teaching world in the subject. This is being done successfully in some districts. Individual companies have talked to headmasters, instruction has been introduced, and the local foundry has sometimes acted as patron by supplying prepared sand, and lending simple equipment. The chairman of the Development Panel recently said that while ironfounders often seek to interest the boys, they very often leave the teachers out in the cold. This is an unfortunate mistake. Member-firms may already be aware that at least one County Council Education Committee has appointed a practical foundryman as a lecturer and demonstrator of foundrywork for the Committee's courses to teachers. This is an arrangement which could be emulated in all other counties where there is any appreciable number of ironfoundries. The initiative lies with the foundries, and the secretary of the C.F.A. will be pleased to supply more information about the nature of this appointment if any member-firm or association wishes to follow up the idea.

Some Scottish Recommendations

The Scottish Education Department has recently prepared a booklet on "Technical Subjects in Secondary Schools" (H.M. Stationery Office, price 1s. 9d. net), which includes an excellent general survey of the place of technical subjects in secondary education, and outlines five-year courses in craftwork, technical drawing and applied mechanics. The Department recommends the inclusion of some simple moulding in the work of the third and subsequent years in craftwork because "moulding is a basic and very important branch of metalwork and has considerable educational value. The equipment need not be elaborate or take up much room. One moulding bench large enough to accommodate two boys at a time will be adequate. The metals and alloys used should have a low melting point; they can then be melted easily in a plumber's lead pot over a gas ring or forge fire. Alloys such as are used for die casting have a low melting point and are very good for the purpose, as they solidify with a clean, hard surface capable of being machined. Aluminium, which has a higher melting point, is very suitable also and has a high shrinkage value. Sand may be obtained from the nearest foundry."

"Pupils should be trained to appreciate the value of improvising equipment. Metalwork, in particular, offers ample scope for this. Cores can be baked on a sheet-metal plate heated by a soldering stove or gas ring or, preferably (since they should be heated as uniformly as possible) they can be baked in an oven made from an old tin can. Such improvisation adds flexibility to the course and also reminds pupils that many operations can be carried out successfully without elaborate or extensive equipment."

The course proposed by the Department suggests the making of a casting from a simple pattern in the third year, and in the fourth and fifth years the making of castings from shell and split patterns and castings involving the use of cores. An appendix to the memorandum gives some notes on moulding which are reproduced in full below. These notes may suggest useful techniques for the ironfounder who has already met snags in trying to demonstrate the actual casting operation in classroom or lecture hall.

Notes on Moulding

To teachers who have a special interest in the craft of moulding, castings in wax will have great appeal because of the use that can be made of them for demonstrating the right and wrong methods of running a mould, the common faults associated with shrinkage and contraction and the feeding techniques for eliminating them. Wax is easily cut and it is possible to see what has happened inside the casting. A shrinkage cavity can be made visible or, if wax of a different colour from the parent wax has been fed into it, the pupils can see where there would have been a hole. (Ordinary lamp black is a good dye for wax.) Wax consisting of 70 per cent. of paraffin wax and 30 per cent. of stearic acid is very suitable and has about the same shrinkage value as steel. The best casting temperature is 68 deg. C., which means that venting problems do not arise. The moulds may be of plaster of Paris or of metal, preferably the latter, and preferably aluminium because of its high specific heat.

One difficulty in demonstrating with wax is the slow speed of solidification, but if the sections used are not more than ½ in. thick and the mould is of aluminium, solidification can be complete and the casting taken out of the mould within the normal period of attendance in the workshop. If a mould is made with plate glass replacing the aluminium on one face, the pupils can watch the freezing process; they will see the growth of the crystals and the

* From Industrial Management Bulletin No. 59, issued by the Council of Ironfoundry Associations.

Moulding and Casting in Schools

freezing of the various sections in the order of their thickness, and they may also see the formation of a shrinkage cavity. The pouring of a cored casting should present no difficulty. The fact that a tube of glass or other impermeable material is used for the core emphasises that the core and the mould are quite separate.

The making of a mould and casting offers many opportunities for showing pupils the unnecessary work that they and others often give themselves and how this can increase substantially the time required to make an article. The fact that one person completes a job or task in less time than another does not necessarily mean that he has worked harder; the difference may be wholly or partly due to the elimination of needless work. An economy of effort is usually an economy of time.

Blast-furnace Research among O.E.E.C. Countries to be Pooled

For the first time, several countries of Western Europe will share both the expense and the results of setting up large experimental industrial units for research on a new process for pig-iron production. As a result of the initiative taken by the Council of the Organisation for European Economic Co-operation, interested countries will undertake, on a co-operative basis, the operation of two new blast furnaces, at Liège in Belgium and Oberhausen in Germany, respectively.

The general technical direction of the trials at the new blast furnaces will be undertaken by a Governing Board comprising representatives of all contracting countries. Similarly, the administrative and financial management will be undertaken by international managing bodies.

The new blast furnaces will be of the low-shaft type, employing a tonnage oxygen blast in the manufacture of pig-iron, for example from low-grade or powdery ores, from ores of high sulphur content—yielding sulphur-free pig-iron—using small coke and mechanically weak coke, raw coal, or lignite.

Work on this project has been carried out by a special body set up by the O.E.E.C. during last year; the setting up of the furnaces was recommended by the recently-constituted O.E.E.C. committee for scientific and technical matters.

Austria, Belgium, France, Germany, Greece, Italy and the Netherlands have already indicated their intention to join in the scheme, and it is hoped that other member countries will also take part. The United Kingdom, without at the moment entering into the scheme as a contracting party, will make a financial contribution as a goodwill gesture. Luxemburg and Canada are also considering contributing to the scheme.

POWER CUTS during the winter months cost between £8,000,000 and £10,000,000 in industrial production, some of it in dollar goods, according to the Minister of Fuel and Power.

Ten-ton Ingot Moulds

Mr. A. Jackson, in a long article on ingot moulds in the Journal of the Iron and Steel Institute, states in his conclusions that the introduction of the taper-top mould, designed to overcome certain types of failure in the open-top mould, resulted in a decrease in mould consumption from 17.5 to 14.6 lb. per ton. Similarly, a new and heavier design of bottom plate produced a rather striking fall in bottom-plate consumption from 15.1 to 4.0 lb. per ton.

Using taper-top moulds at a temperature of about 50 deg. C., and with other conditions as uniform as practicable, decreasing the tap-to-strip time from 127 to 44 min. decreased the mould consumption, with the usual method of failure, from 18.2 to 9.6 lb. per ton. If the moulds were allowed to cool for at least 36 hr. between heats, being used each time at atmospheric temperature, their life was reduced by about 10 per cent. with both long and short tap-to-strip times. Moulds with the long tap-to-strip time required about 45 per cent. longer cooling time than those with the short, to fall to the same temperature (about 50 deg. C.); it is obvious that a constant tap-to-tap period for re-use does not mean constancy of operational conditions in practice.

Causes of Failure

Basically, in all tests, failure was normally caused by a horizontal crack on the broad side of the mould, frequently accompanied by a vertical crack growing downwards from the centre, but there was a fundamental difference in the type of crazing that developed. With the long tap-to-strip times, the crazy pattern was of small mesh and the markings were depressions. Rapid stripping, however, produced a very coarse mesh of projections, each subdivided by a fine crack. From some part of this pattern major failure started.

A few moulds failed prematurely owing to vertical cracks on the narrow side, and it is tentatively suggested that this type of failure has its origin outside the sphere of the user.

Other Factors

Neither order of teeming nor chemical composition within the limits shown, appear to have any important effect on mould life. There are indications that, had both sides of the first mould of each heat been "cold," then life would have been increased with rapid stripping.

The defective specimens produced in the plate mills from these trial casts were segregated from the general run and analysed in an endeavour to relate their number to mould life. For comparison they were placed into groups representing each quarter of the normal life. Examination of the figures failed to show any increase in the number of defective specimens with increasing mould life.

In the past it has been suggested frequently that it is necessary to scrap moulds because their worn inner surfaces produced increased numbers of defective steel specimens, and this was a reason for short mould lives. The figures shown here indicate that mould life by itself does not give a comparative indication of the state of the inside surface, *e.g.*, a mould which has a long tap-to-strip time with a life of 100 will have a much worse inner surface after 70 lives than a rapidly stripped mould after 120 lives.

THE BRITISH THOMSON-HOUSTON COMPANY, LIMITED, is to take over a former Ministry of Supply depot at West Chirton, North Shields, and convert it into a factory for making aero accessories.

Intricate Castings from a Durable Loam Mould*

By J. Currie

Durable loam moulds are those which can be used over and over again, some minor repairs and patching being all that is required for each succeeding cast. The first part of this Paper, printed last week, described the preliminaries to the moulding of a large evaporator body weighing nearly 7 tons and gave details of the foundry construction of the mould up to the building of the top section. This second part carries the job to completion, giving information as to drying, assembly and pouring. Finally, there is a section on the treatment of the mould preparatory to its re-use.

(*Continued from page* 388.)

Method of Binding Sections Together

As each part of the mould was built up, cast-iron packing pieces were wedged into the 1 to 1½ in. space left between the bolting lugs of the three sections of the lifting plates and building rings. Commencing with the three sections of the first building ring, a cast-iron fishplate, of sufficient length to include the lug of the plate section directly underneath, was hung vertically from each of the six lugs.

A mild-steel bolt 18 in. long by 1 in. dia. was then passed horizontally through the slotted holes in each pair of fishplates to fasten the sections together. The fishplates, 10 in. long, including a 1 in. deep toe at one end, were 6 in. broad by 1⅛ in. thick, having a thicker central part 4 in. by 3½ in. by ¼ in. surrounding the slotted central hole. Altogether 42 fishplates and 21 bolts were required to fasten the three vertical sections together.

Preparing the Top Plate

A start was now made toward the building of the 5 ft. 7½ in. dia. lightening core on the top plate, this plate being first set level on stools above the spindle seat at floor level. A 2½ in. dia. spindle was then fitted and the spindle arm and sweep set, after which measurements were taken for the gratings required to carry the loam and brickwork. Those were then marked off and cast, with dabbers and lifters of suitable length, in an open-sand mould.

Since it was intended that this part of the mould be also used again, the two 8¾-in. deep parts of the lightening core were made so that they could be detached before the top plate was lifted off, after the job was cast. The loose parts were afterwards recovered and placed back in position on the top plate. The part section view of the completed plate, shown in Fig. 14, illustrates the position of the gratings; the circular grating (*a*) supporting the central portion, including that part forming the vapour outlet (E), blown-down (F), and the cleaning door (*g*). The grating shown at (*b*) for easy handling was cast in four parts and carried the loam on the joint and top-flange face, while two gratings as (*c*) supported the deep parts of the lightening core (D-D).

Fig. 15 shows the top plate finished ready for the stove, this preliminary drying at 400 to 450 deg. F. (205 to 230 deg. C.) for 12 hrs. was necessary to stiffen the loam before the next operation. All the lifters from the gratings which appeared through certain of the holes in the top plate were toggled up before it was taken to the stove. Seven risers were taken from the top flange, measuring 3½ in. dia. at the root and widening out sharply to 6 in. dia. at the top, also two risers 2 in. dia. were taken from the vapour outlet and cleaning door respectively.

Location Marks

To locate the top plate correctly and have its bolting lugs directly over the lugs on the bottom plate, four location marks were made on it. Those marks were made in the usual manner by first drawing

* A Paper read before the Scottish branch of the Institute of British Foundrymen. The Author is in charge of the Cathcart foundries of G. & J. Weir, Limited.

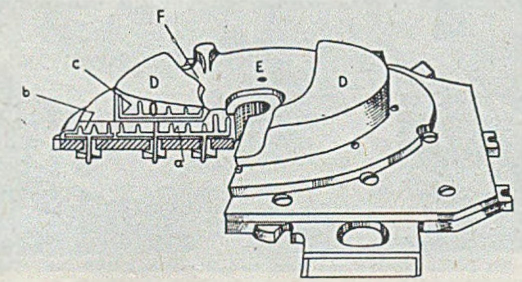

FIG. 14.—*Section through Top Plate showing the position of Gratings.*

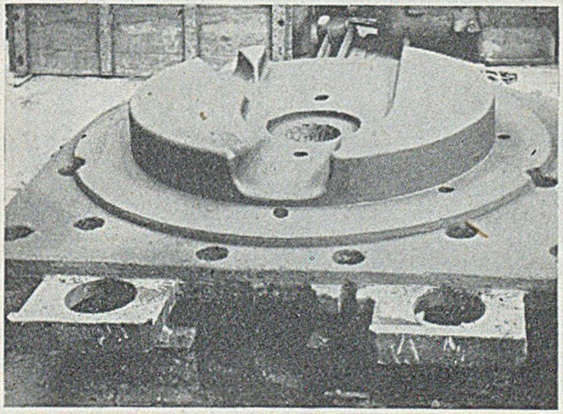

FIG. 15.—*Top Plate with Lightening Core Built-up.*

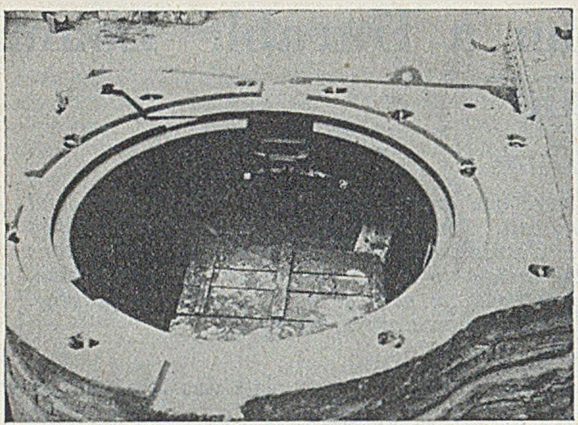

FIG. 16.—*Top or Fourth Joint and Top Part finished ready for next Operation.*

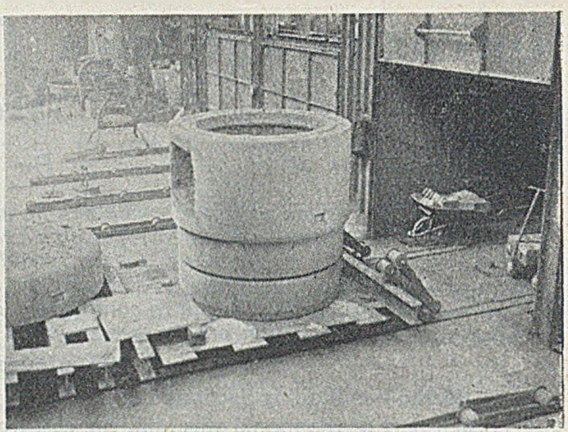

FIG. 18.—*Bottom Part of the Main Core.*

a large circle on the joint face, taking a centre between the main turnover lugs and using the size-stick as a straight edge, marking a diameter from this centre. The other diameter was marked off by using trammels on the circle. Two marks diametrically opposite each other were also marked off on the top joint of the moulds, other location marks being made on the outer wall of the vertical sections at the first, second and third horizontal joints.

Finishing the Mould

Preparation was now made for the finishing of the top section of the mould, the spindle and board being taken out and a platform rigged inside. All the loose-pattern parts were then drawn, those including the vapour outlet, blow-down and cleaning door parts. Fillets were cut where required, all cracks were filled up with loam, the whole roughed up, blacked and then finished (Fig. 16).

Picking up the Top Section of the Mould

The top plate was taken from the stove in which it had been placed the previous night, turned over and located in position on the mould. Hook bolts 6 in. long by $\frac{5}{8}$ in. dia. were then passed through the holes left clear on the plate, hooked round the eye of the lifters, on the top section of the mould, then tightened up on fishplates placed across the holes.

With the top section of the mould now attached to it, the plate was lifted up and placed on stools on the foundry floor. The two drawbacks, built on top of the steam box and main door print, were now lifted off and placed in a stove to dry, all the loose pattern parts being drawn, the whole dressed, blacked and finished ready for drying. Fig. 17 shows this part of the mould completed, the two inlets $2\frac{1}{2}$ in. by 1 in. leading from the downgates to the mould cavity, and also shows the method of binding the vertical sections together.

Drying the Mould

Since it was intended to dry this mould *in situ*, firebricks were built up on a light cast-iron plate, to form a box-shaped baffle 26 in. by 26 in. by 28 in. deep approximately, having a series of openings $4\frac{1}{2}$ in. by $1\frac{1}{2}$ in. left between the bricks. The baffle was placed on 4 in. stools at the centre of the main core-print on the bottom of the mould, the top plate, with the top part of the mould still attached,

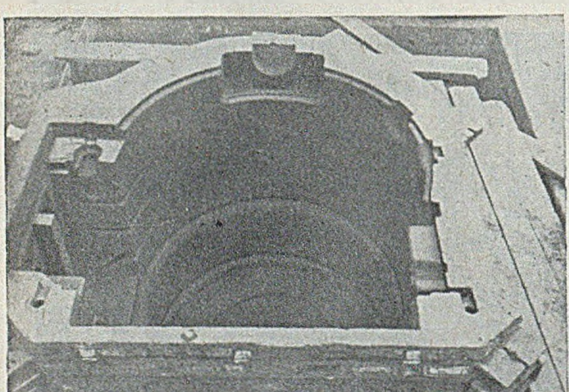

FIG. 17.—*Top Part of the Mould removed for Core Placing.*

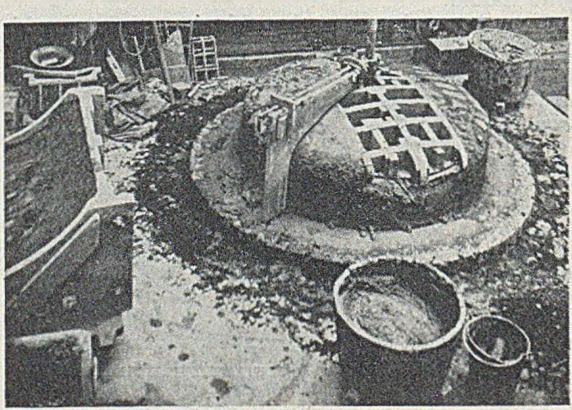

FIG. 19.—*Dome Part of Main Core showing the Vapour Outlet Part built into position.*

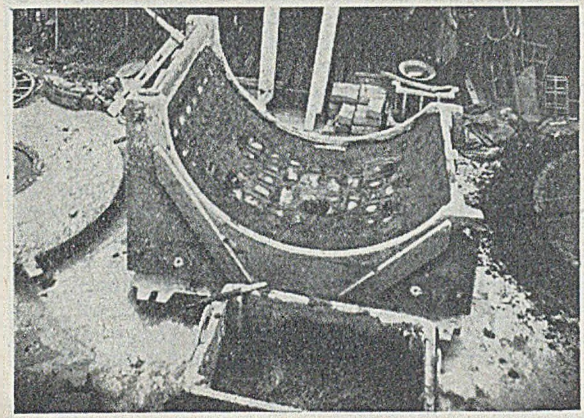

FIG. 20.—*Main-door Core.*

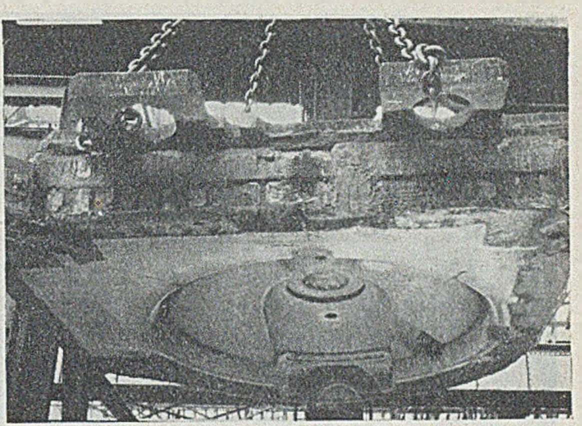

FIG. 22.—*Top Plate with the Top Part of the Mould attached ready for Trying on.*

then being lifted and located correctly to close the mould.

Next, a 60 in. long by 9 in. bore mild-steel pipe was dropped through the 10 in. dia. central hole in the top plate, to hang suspended from a flange at one end of the pipe, the portable dryer being placed over the hole and set ready for firing. Careful control was maintained over the drying of the mould by rigging up a temperature recorder and inserting the thermocouple through a hole in the brickwork. The following cycle was found to give optimum results for both the dry sand and loam moulds:—

24 hours at 450 deg. F. (230 deg. C.)
24 „ „ 550 deg. F.
24 „ „ 600 deg. F. and finally,
20 „ „ 700 deg. F.

Total drying time = 92 hours.

This drying time was cut down considerably on subsequent loam moulds—30 hours being saved.

Making the Cores

Permanent beds were provided for the continuous production of main cores, swept up in loam, for evaporator bodies produced from dry-sand moulds. The cores for the loam mould were therefore included in this production cycle and permitted the mould and cores to be produced at the same time. The main core was built in two parts, the bottom part 5 ft. 7½ in. in height and the top or dome part 2 ft. 2 in.—total height 7 ft. 9½ in., including 4 in. for the print and 1 in. approximately for contraction. Gratings were cast in open moulds for the two parts of this core, the main grating for the bottom part having three mild-steel lifters.

Parting sand was dusted on one of the core beds, a layer of loam was spread on and the main grating for the bottom part bedded down, central to the 2½ in. spindle. The board was then set on the spindle arm to sweep the core to the required diameters. This core was built having a 9 in. wall, using soft brick, with an occasional loam brick built in to weaken the core against contraction. As the core was built up, a seat was swept for the internal ring 3½ in. broad by 1 in. deep, situated 15½ in. above the core bed, and for the internal bracket 6 in. broad at its centre by 1½ in. deep, 26¼ in. above the core bed.

A grating was made to carry the loam above this bracket, and a stiffener grating was included in the building just before the last row of bricks was put

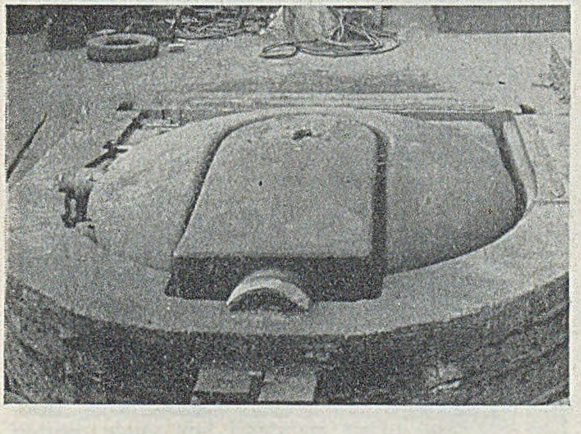

FIG. 21.—*Mould partly Cored-up, showing the position of Vapour-outlet Core.*

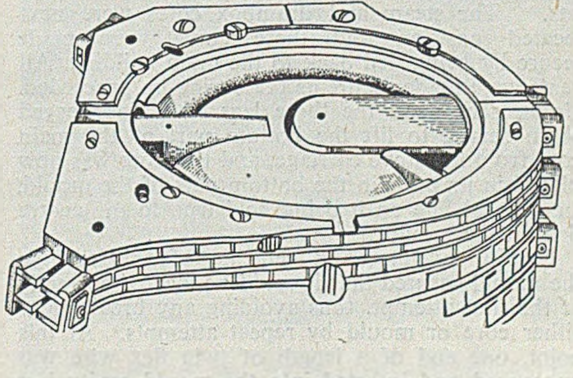

FIG. 23.—*Top Part of the Mould closed and Top Plate removed.*

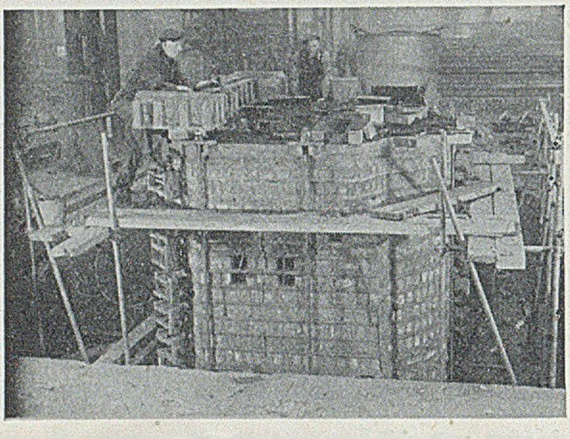

FIG. 24.—*Larger Mould being made ready for Casting. Note the Runner Box and Flow-off Riser.*

on. In Fig. 18 this core is shown fully built up, having a recess cut in the joint to retain the stamping loam placed in it when the dome part was placed on during coring up.

Fig. 19 gives a view of the dome part of the main core, which shows the bottom part of the vapour-outlet pattern in position. This core and the main door core (Fig. 20) were made entirely of loam brick. Four steel lifters $\frac{3}{4}$ in. dia. were provided for lifting the latter core to and from the drying stove and two lifters 1 in. dia. for lifting this core when it was turned on end.

The end part of the grating was also used to give a balanced lift. A corebox and strickle was provided for the vapour-outlet core, and this core, which was split at the 17 in. dia. part forming the opening at the top of the casting, was also made in loam. Coreboxes were provided for the other cores required, which were made in oil-sand in the usual manner.

Coring-up and Closing

At the start of the coring-up, two small cores were located in the lower part of the mould to form regulator and hinge brackets and these were followed by the steam-inlet branch core, set in its print and held firmly in position by four $\frac{3}{4}$ in. chaplets. The steam and drainbox cores were next located position and these cores were made secure by being tied back to the main building. All vents were made secure as the coring-up proceeded. Union screws on the three legs of a four-legged chain served to lift the bottom part of the main core from the stove carriage, and this core was now placed in its print in the bottom part of the mould, the vertical line on it being held true to the centre line on the mould.

Careful levelling and centring of this core in the mould ensured that it could be located correctly at the first attempt, thus avoiding any breakage to either core or mould by repeat attempts. At this point, one end of a length of twin flex wire was uncovered and inserted into the mould cavity just under the position of the main-door core. The other end was then connected to a simple lighting arrangement which was placed in full view. When pouring, the metal reaching this point completed the circuit and the light going on indicated that the metal had reached the required level to allow two dropgate plugs to be lifted.

The main-door core was turned on end on a sand bed, and four union screws served to lift this core as required, plumb at the ends but slightly off plumb at the clip or front part. This core was now centred over its position in the mould and lowered to within 1 in. approximately of its seating, when it was pushed hard against the main core. Since it was off centre, the bottom part made contact with the main core first, and on touching the print, fell slightly forward at the top, to ensure a snug fit all round.

Certain of the bricks around the back of the print for this core had been taken out, the space left serving as hand-holes through which the joint around the core was seamed up securely with loam. The rest of the space was left to allow the gases to escape to the atmosphere.

Stamping-up

Stamping loam was now put into the recess on the joint of the bottom part of the main core, and the dome part was then placed on, butting hard against the clip of the main-door core, the wall of the vapour outlet lining up with its counterpart

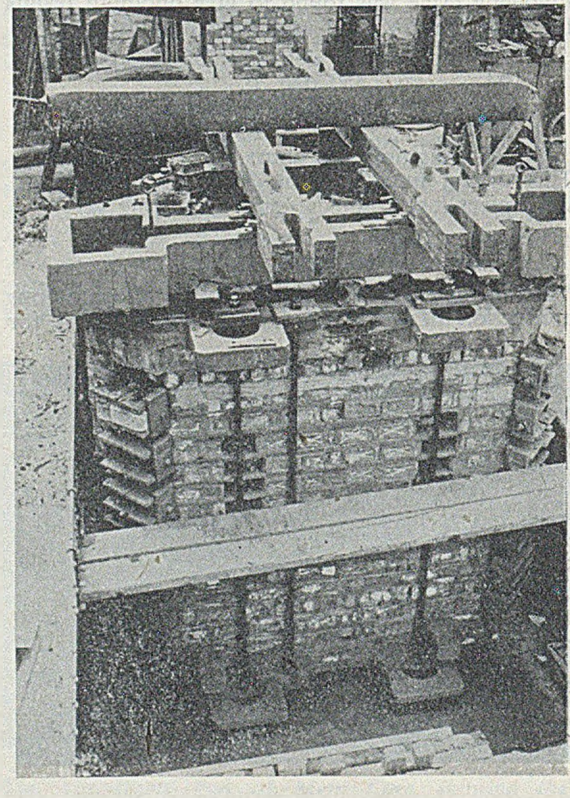

FIG. 25.—*Mould ready for Casting.*

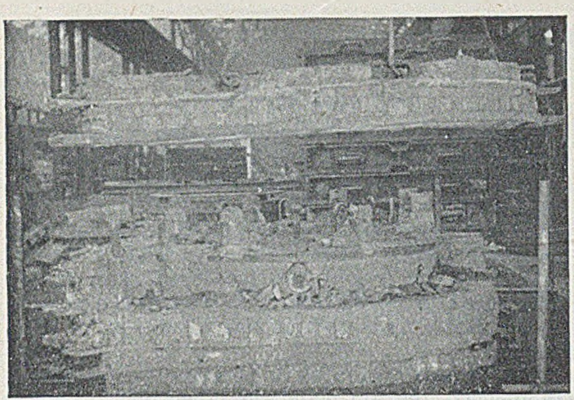

FIG. 26.—*One of the Top Sections stripped from the Casting.*

on the mould. When locating the coil-drain core in position on three ¾ in. chaplets, the vent from it was taken through to the drain-box core, 1¼ in. chaplets being placed on top of the cores at that part and the drawback placed on, to hold them firmly in position.

The drawback at the door was then located and both seamed up with loam. The four small cores located at the joint of the mould were meantime fixed in position, butting hard against the main core and those were followed by the vapour-outlet core. Located as shown in Fig. 21, this core was set on six 1¼ in. chaplets and held firmly in position with one 1¼ in. chaplet at each end of the side walls.

As can be seen, the top section of the mould had previously been tried on, and after drying the loam stamp around the core-prints and the drawbacks, this part (Fig. 22) was finally positioned to the location marks. Eleven hook bolts, holding the top plate to the top section of the mould, were now loosened and taken out, the top plates were lifted off, and the 17-in. dia. loose part of the vapour-outlet core was fixed before placing on stools on the foundry floor.

To complete the coring-up, two cores forming the blow-down and the cleaning door were now fixed in position, a loam stamp was placed on the vapour outlet core at the point where the 17 in. dia. part would meet it, and the plate then tried on to ascertain the metal thickness on top of the dome and other cores (Fig. 23). Chaplets were then placed where necessary before locating the top plate to close the mould.

Final Preparations

Six fishplates still remained, and these were hung vertically from the six lugs of the grating above the third joint to include the six lugs of the building ring directly below this joint. A mild-steel bolt was then passed horizontally through the slotted holes of each pair of fishplates and tightened up to complete the binding of the vertical sections. Finally, ten 1½ in. dia. mild-steel bolts 10 ft. long were placed in the bolting lugs of the top and bottom plates and tightened up to bind the horizontal sections together.

Runner Box

A special plate, having prods 12 in. long around its outer edge, was cast 2 in. thick. This plate was shaped to accommodate the two downgates and dropgates, and provide for two pouring basins, having a connecting runner between. Cast-iron boxes 12 in. by 12 in. by 6 in. deep were bolted to the underside of the plate, central to each of the holes for the gates. These boxes raised the runner box above any obstruction on the top plate. Made up with bricks and loam and having been placed in a stove to dry, this runner box was now located, the gates on it extending through the box parts to line up with the gates on the mould, with a loam stamp between to seal the joint.

Six risers from the top flange, and two central risers, were made up to 6 in. above the top plate. The remaining riser from the flange was allowed to flow off at 3 in. into a prepared bed.

Fig. 24 shows one of the larger moulds being made ready to cast, both the runner box and the flow-off can be seen in this illustration. Fig. 25 shows the prepared mould, with two binding bars, used as weights, placed at right angles to the runner box, also a mild-steel bloom placed parallel to it. Packing was placed from the centre of the top plate, and from the runner box to the binding bars, and wedged tight.

The total weight placed on the top was 4 tons 10 cwt. Two ladles were used to pour, one containing 6 tons 10 cwt. and the other 2 tons 10 cwt. of

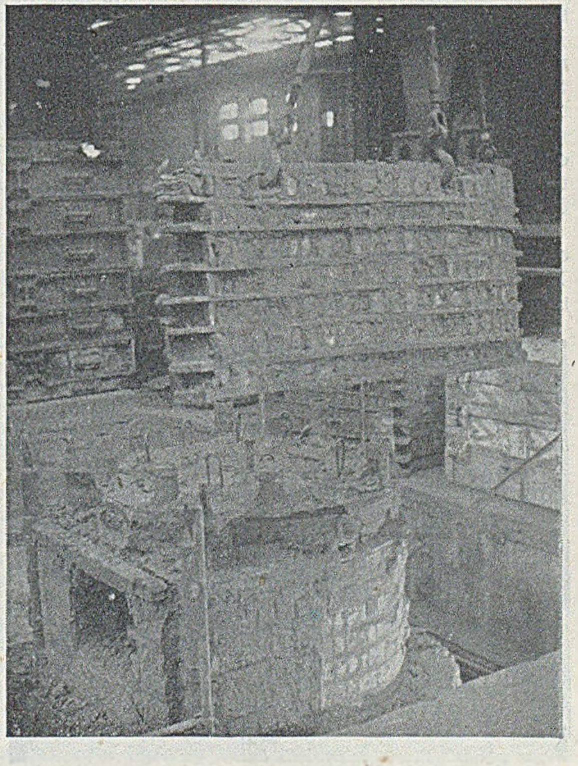

FIG. 27.—*One of the Mid-sections stripped from the Casting.*

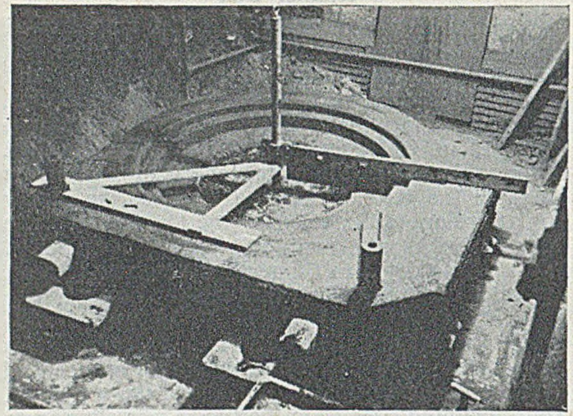

FIG. 28.—*Setting of Inlets and Downgates by means of a Template.*

metal. The pouring temperatures recorded were 1,280 deg. C. and 1,360 deg. C. respectively. The composition of the metal was:—TC, 3.30; Si, 1.75; Mn, 1.00; P, 0.20 per cent.; and S, 0.10 (max.).

Pouring

A plug was placed on each of the gates just before pouring was commenced, and pouring from the larger ladle, the basins were allowed to fill before the downgate plugs were removed. Allowing the larger ladle to do the bulk of the pouring, the hot metal from the smaller ladle was next poured into the other basin. When the metal within the mould made contact with the uncovered ends of the twin flex wire inserted under the main door core, the light flashed on to indicate that it was safe to remove the plugs from the dropgates. This was done and pouring continued until the metal began to overflow at the flow-off riser, when the runner box was allowed to empty itself.

Approximately 8 tons 5 cwt. of metal was required to cast and this left a safety margin of 15 cwt. in the smaller ladle. Details of the casting time were:—First plugs up after 20 sec.; second plugs up after 55 sec.; cast up, 116 sec. The actual running time was therefore:—116 − 20 = 96 sec.

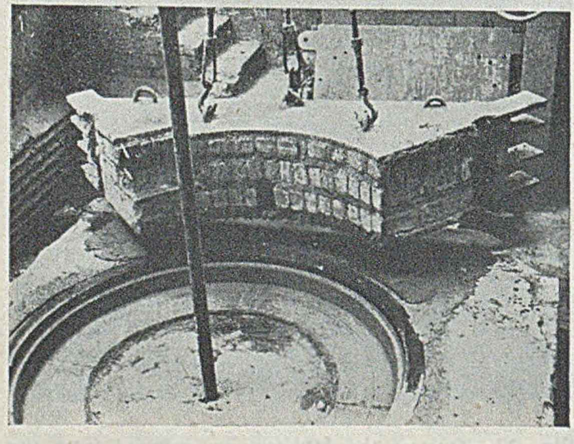

FIG. 29.—*Re-assembly; View of the Bottom Section below the Main-door Position.*

Stripping the Casting

Within two hours of pouring, the weights had been removed, all binding bolts slackened, and the gratings at the main door and dome parts broken. On the following day all the binding bolts, except a few at the mid-part of the mould, were removed and stacked away. The hook bolts holding the top sections of the mould and the loose parts of the lightening core to the top plate were taken off and the top plate eased up and placed on 3-in. packing pieces.

Two days later, the work of stripping the casting commenced, the top plate was taken off, to be followed by the loose parts of the lightening core. Those were followed in turn by the top sections (Fig. 26) and then the mid section of the mould (Fig. 27)—and finally the bottom sections were removed. The time taken by three labourers to strip the casting was 9 hours, this time comparing favourably with the knock-out of evaporator bodies of similar size, moulded in dry-sand.

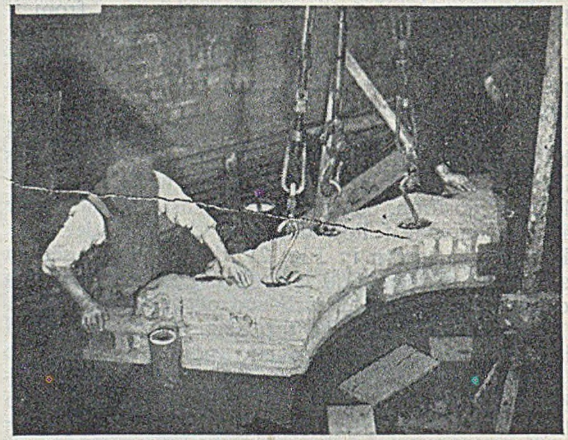

FIG. 30.—*Re-assembling one of the Larger Evaporator Bodies. The First Part replaced in position was the Distance-piece which increased the Length between the First and Second Joints.*

Re-assembly

After the casting had been removed, the foundation was cleared of all facing loam still adhering to it, and the spindle with the sweep still attached then fitted into the spindle seat. Fresh loam was applied to the foundation and the sweep was rotated to again form the seats for the main core, bottom flange and first horizontal joints. Having marked off a diameter directly underneath and central with the main-door position (Fig. 28) a triangle template was set as shown to locate the downgates in correct position and from these the inlets gates were also located. The spindle and sweep for the foundation was now removed and was replaced by the spindle and main sweep for the vertical wall or cope.

What now followed was merely a repeat of the original operations, except that, whereas originally each section required to be located and built up, the completely built sections were now located, as shown in Fig. 29. Since external location marks are apt to be destroyed, it was found that the downgate pipes, in conjunction with the main sweep, were the better media for locating the sections. Fig. 30 fully illustrates this in showing one of the distance pieces for the larger mould being located.

Comparison of Moulding Time Loam and Dry-sand

The true value of this particular method of moulding can hardly be assessed without a comparison being made with other methods. In comparing it with the time taken to produce a mould from a similar evaporator body pattern rammed in dry-sand, the time taken for the original mould was 180 per cent. greater; the time for the second mould (re-assembled) was 53.2 per cent. greater; and the time for the third mould (re-assembled) was 12.44 per cent. greater.

If the 30 hours saved in the drying of the re-assembled loam moulds is taken into consideration, then the time for the full operation compares favourably with the dry-sand mould.

In conclusion, the Author desires to thank the directors and foundry management of G. & J. Weir, Limited, for permission to publish this Paper, also his colleagues and staff for help generously given.

Restoration of Price Controls

The Central Price Regulation Committee has now reviewed most of the price controls over consumer goods (other than food) which have been removed since 1945. Announcing this in the House of Commons, Mr. Harold Wilson, President of the Board of Trade, said that the committee had reported that, in general, price increases since decontrol had not been excessive having regard to rises in raw material prices and other costs.

In the case of certain classes of goods, however, it had reached the conclusion, after consideration of all the circumstances, that it would be necessary in the near future to reintroduce price control either on a statutory or on a voluntary basis. He was now taking steps to give effect to the recommendations.

Among the classes of goods in respect of which the committee had recommended that price control either on a statutory or on a voluntary basis should be introduced were:—Domestic hollow-ware made of aluminium, copper, brass, plated and stainless steel; hardware and ironmongery (including cutlery, spoons and forks, brooms and brushes) and other articles not normally fitted by trade craftsmen.

Discussions were now taking place or would shortly commence with the trade concerned as to the most suitable form of control in each case.

Synthetic Resins as Foundry Sand Binders

Synthetic resins as foundry sand binders will be discussed in a paper by Mr. P. G. Pentz on June 12 at a convention which is to be held concurrently with the British Plastics Exhibition at Olympia, London, from June 6 to 16, 1951.

The convention is being organised by a committee on which are represented the British Plastics Federation, the Plastics Institute, the Polymer Group of the Society of the Chemical Industry and "British Plastics," which is sponsoring the whole exhibition and convention.

The following is a synopsis of his lecture:—

Thermosetting resins, especially phenol-, urea-, and melamine-formaldehyde resins, have recently come into large-scale use as binders for foundry core sands, and promise certain advantages in moulding sands also. The factors controlling the performance of these resins as corebinders are examined individually. These determinants include grain-shape and grain-size distribution in the sand itself; amount of clay present; moisture content; type and proportion of cereal or similar green-bond agent; particular type of resin used; lubricant or release-agent employed; sand-mixing methods and equipment; ramming density and core-production process (whether by hand or by machines, such as blowers and extruders); method of hardening the cores (by acid catalysis at shop temperature, by di-electric heating, or in conventional ovens); design of the casting; and the type of metal cast.

It is claimed that, by suitable choice of sand, green-bond agent, resin, moisture content and lubricant, together with appropriate adjustment, in some cases, of baking conditions, resin-bonded sands can be produced with all the properties essential to satisfactory operation under normal foundry conditions, together with certain new and characteristic advantages.

These advantages, some of which vary with the type of resin used, include better bench-life, faster baking (an average saving of 50 per cent. in baking time), lower fuel consumption, less core breakage, less gas evolution during casting, less smoke and fumes, easier knockout, improved casting finish and lower fettling costs. Details are given of resin-sand formulations that have been adopted for regular use in foundries producing ferrous and non-ferrous castings.

The use of aqueous or alcoholic solutions of phenol-formaldehyde resins as core sprays, either alone or as media for refractory coatings, produces an extremely hard water-resistant shell or skin on the baked core. Advantages of this technique are improved casting finish and easier knockout, at lower costs; it is applicable in steel, grey and malleable iron, non-ferrous and even in light-alloy castings.

The same resin spray technique is applied to synthetic sand moulds (or mould facings) in the green state. After air-drying, torch-drying, or preferably oven-drying the mould surface is improved, moisture resistance is increased, mould/metal reaction is minimized, veining is reduced or eliminated, and casting finish is improved. The formulation of special mould dressings based on synthetic resins and containing refractory materials or other desired ingredients is suggested as a logical development.

As an extreme case of the shell core or mould technique, the "C" process is discussed. This process, which has not yet been adopted on a large scale, might revolutionise foundry sand technology. By using extremely fine sand, advantages are obtained in smoothness of finish, excellence of definition and accuracy of casting; while the serious effects of low permeability are avoided by limiting the thickness of the core or mould to about ¼ in.

The general conclusion is reached that urea- and phenol-formaldehyde resins, on account of their useful characteristics and especially of their versatility, can be expected to play an increasingly large and important part in the foundry industry.

(*Concluded at foot of column one*)

Notes from the Branches

Middlesbrough

On March 9 an interesting lecture was given at a meeting of the Middlesbrough branch of the Institute of British Foundrymen by Mr. N. Croft of Lloyds (Burton), Limited, on the subject "Producing Ductile Cast Iron." There was an exceedingly good attendance and it was very evident that the subject chosen had aroused a great deal of interest.

MR. JOHNSON, branch president, introduced Mr. Croft, saying that most of the audience would realise that the lecturer was a recognised authority on ductile iron and that his firm was one of the few who produced this kind of cast iron commercially. Mr. Croft gave an illuminating talk, the gist of which has already appeared in the technical Press. Some interesting theories about this new material were put forward and a description was given of many articles for which it was specially suited. The lecturer paid tribute to the refined pig-iron producers who by their co-operation had provided the type of raw material which was essential to the production of this new cast iron. After much research and experiment these pig and refined irons were being supplied with the required consistency. One of the most important factors for the production of this kind of iron was to have raw material of the correct analysis. Very stringent laboratory tests, too, were responsible for a good finished product.

After the lecture, the president asked Mr. Croft what the respective costs of ductile cast iron and steel were. MR. CROFT said that the cost of melting was approximately the same but the savings were made on moulding and fettling. The subsequent saving by the consumer on machining, due to the closer casting tolerances, was quite appreciable. Answering a question as to the use of scrap, Mr. Croft said that returned scrap was used but no outside scrap was brought in for the production of this type of iron as it raised too many difficulties in composition. He also said a separate cupola was desirable but not essential, provided that the producers ensured efficient control.

In proposing a vote of thanks, MR. SMITHSON said that Mr. Croft's lecture had been exceedingly enjoyable except, possibly, for steel founders. He said that the lecturer's firm was one of the few foundries in the country to put the production of this iron on a commercial basis, and the branch was extremely grateful that he had been able to come North and give the full story. He felt that there would now be many Tees-side firms who would be experimenting with ductile cast iron.

Light Castings Scrap

Shortage of cast iron at the moment has reached a very acute stage. Scarcity is widespread and Scottish merchants have been receiving urgent requests from consumers in the North of England. Stocks are so low that some curtailment of activity in certain branches of the light iron castings industry appears inevitable within the immediate future. Supplies of such products as rainwater pipes, grates, and other items used in the construction of houses are being affected, and a shortage of some of these, with an adverse result on building programmes, is not inconceivable. The situation has materially worsened during the past two weeks, and at least one firm in the Falkirk district, making a special type of fireplace, has been held up at times for raw materials.

MR. RICHARD H. MORRIS, editor of the Chicago monthly "Plant Engineering," is to address the annual conference of the Incorporated Plant Engineers to be held at Buxton on May 22 to 24.

Increases of Capital

The following companies are among those which have recently announced details of capital increases:—

BRITISH TINNING, GALVANIZING & CASTING COMPANY, LIMITED, Sheffield, increased by £2,400, in £1 shares, beyond the registered capital of £100.

DODD ENGINEERING COMPANY, LIMITED, Manchester, increased by £5,000, in £1 ordinary shares, beyond the registered capital of £9,000.

H. B. EDWARDS & COMPANY, LIMITED, iron, steel, bronze merchants, etc., of Southport, increased by £4,000, in £1 ordinary shares, beyond the registered capital of £1,000.

GWELO MANUFACTURING COMPANY, LIMITED, precision engineers, etc., of Ashford (Middx), increased by £1,000, in £1 ordinary shares, beyond the registered capital of £1,000.

HARDY MARTIN (CONSTRUCTIONS), LIMITED, constructional engineers, etc., of Kettering, increased by £3,000, in £1 ordinary shares, beyond the registered capital of £2,000.

JOHN INSHAW, LIMITED, manufacturers of tubes, pipes, etc., of Easterhouse, near Glasgow, increased by £17,100, in £1 ordinary shares, beyond the registered capital of £35,000.

MAYER, NEWMAN & COMPANY, LIMITED, scrap iron and metal merchants, etc., of London, W.C.2, increased by £10,000, in £1 "A" ordinary shares, beyond the registered capital of £10,000.

MARSDEN & SHIERS, LIMITED, engineers, etc., of London, S.W.1, increased by £4,400, in £1 ordinary shares, beyond the registered capital of £600.

PRODUCTION DESIGNS (READING), LIMITED, industrial engineering designers, etc., increased by £1,000, in £1 6 per cent. redeemable preference shares, beyond the registered capital of £1,000.

REDHEUGH IRON & STEEL COMPANY (1936), LIMITED, Gateshead (Co. Durham), increased by £15,000, in 50,050 preference and 99,950 ordinary shares of £1 each, beyond the registered capital of £60,000.

FRED SMITH (BASINGSTOKE), LIMITED, engineers and agricultural implement makers, etc., increased by £10,000, in £1 redeemable preference shares, beyond the registered capital of £30,000.

J. STONE & COMPANY (DEPTFORD), LIMITED, mechanical, general engineers, etc., of Deptford, London, S.E.14, increased by £1,399,900, in £1 ordinary shares, beyond the registered capital of £100.

J. STONE & COMPANY (CHARLTON), LIMITED, mechanical, general engineers, etc., of Charlton, London, S.E.7, increased by £599,900, in £1 ordinary shares, beyond the registered capital of £100.

STANDARD ENGINEERING COMPANY, LIMITED, Leicester, increased by £35,000, in £1 ordinary shares, beyond the registered capital of £140,000.

THOMAS HOLT, LIMITED, mechanical engineers, etc., of Whitworth, Rochdale, increased by £43,500, in 8,700 ordinary shares of £5, beyond the registered capital of £106,500.

WOMERSLEY & BROADBENT, LIMITED (formerly C. H. Broughton (1934), Limited), ironfounders, etc., of Brighouse (Yorks.), increased by £39,000, in £1 ordinary shares, beyond the registered capital of £1,000.

facturers, etc., Horbury Junction, near Wakefield, increased by £50,000, in 49,152 "A" ordinary and 848 shares of £1 each, beyond the registered capital of £100,000.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference E.P.D. or C.R.E. can be obtained from the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, London, S.W.1.

CAISTOR, May 4—Contract 8—Supplying and laying about 11 miles of 6 in., 4 in., and 3 in. dia. spun-iron mains, for the Rural District Council. Mr. J. H. Haisto, chartered civil engineer, 4, Queen Square, Leeds, 4. (Deposit, £3 3s.)

LONDON, W., April 30—Supplying and erecting wrought-iron railings, for the Acton Borough Council. The Borough Engineer, Town Hall, Acton, London, W.3.

MONTEVIDEO, May 16—10 generating sets for the Usinas Electricas y Telefonos del Estado. Room 1073 (CRE (IB) 57452/51).

PONTYPRIDD, May 7—Provision and laying of about 1,100 yds. of 6 in. dia. cast-iron pipes, for the Mid-Glamorgan Water Board. The Mid-Glamorgan Water Board Offices, Wyndham Street, Bridgend. (Deposit, £2 2s.)

SKIPTON, April 23—Supply and erection of approx. 330 yds. of single line wrought-iron tubing fencing, gates, etc., for the Urban District Council. Mr. K. B. Robinson, engineer and surveyor, Town Hall, Skipton.

STOKE-ON-TRENT, May 2—Approx. 196 yds. of wrought-iron fencing, 6 ft. 6 in. high., for the City Council. The City Engineer and Surveyor, Town Hall, Stoke-on-Trent. (Deposit, £1.)

Scientific Instruments and Apparatus

Physical Society Exhibits of particular interest to the Iron and Steel Industry

THE PHYSICAL SOCIETY'S 35th annual exhibition of scientific instruments and apparatus held at Imperial College, London, last week and the sixth to be held since the war, comes at a time when both national and international interest is increasingly focused on scientific instruments and instrumentation. A wide selection of instruments was on show. While the emphasis was on tools for physical research, the field covered by the exhibits was diverse, and the versatility of many instruments in solving engineering, physical, chemical and metallurgical problems was clearly demonstrated. The recent trend towards the greater use of electronic methods was maintained, but a noticeable feature this year was the full collaboration between production engineers and instrument designers to ensure the most speedy and economic production of equipment. The exhibition was opened by Professor L. Bates, D.Sc., F.R.S., president of the Physical Society.

Continuous Measurement

Three out of the four exhibits shown by the British Iron and Steel Research Association reflected the steel industry's increasing interest in continuous measurement of variables in industrial processes. The fourth was of more fundamental interest. Two of these exhibits are mentioned below:—

Continuous temperature measurement in steelmaking.—A thermocouple in its protective alumina and silica sheath was shown, which had made possible continuous records of the temperature of steel in a side-blown converter. The thermocouple used (Fig. 1) was of the normal platinum/platinum-13 per cent. rhodium type, protected by a composite refractory sheath consisting of an outer fused silica sheath (7 in. by ½ in. by ⅝ in.) into which was inserted a recrystallised alumina sheath (6 in. by ¼ in. by ⅛ in). The intervening space was packed with dry alumina cement and the whole sealed with a refractory fire-clay cement, "Sairset." The two thermocouple wires were kept separate by insertion in a twin-bore alumina insulator, itself inserted into the inner sheath and embedded in position with dry alumina cement. The refractory sheaths were mechanically supported and the heat was more readily conducted to the thermocouple by the dry refractory packing. During the lining of the vessel, the thermocouple was inserted about two-thirds of the way down the metal depth, and about 9 in. from the tuyeres. One installation gives readings throughout nine consecutive "blows" of 20 minutes each, spread over a period of several hours.

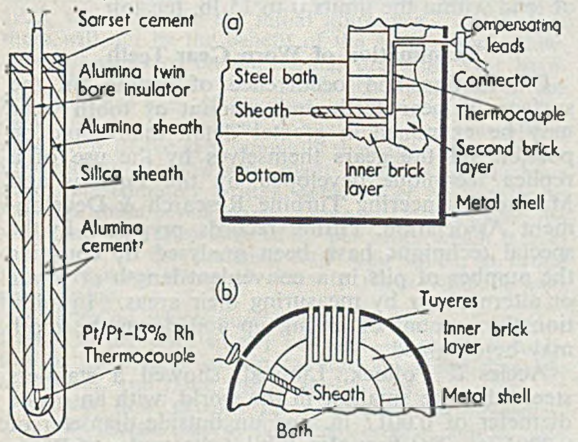

FIG. 1.—*Continuous Temperature Measurement in Steelmaking, showing the Thermocouple Arrangement on the Left, and Sections showing the Position of the Thermocouple in a Steel Bath* (a) *Vertical, and* (b) *Plan.*

Measurement of flame emissivity.—A method was demonstrated for deducing the mean flame temperature and emissivity from three measurements—radiation from the flame, from the flame backed by a standard radiator, and from a standard source. This had been developed in connection with international trials on heat transfer in progress at the Royal Dutch Steelworks, Ijmuiden.

Thickness Measurement

Several examples of the various techniques available for measuring the thickness of materials or coatings were exhibited. A miniature layer-thickness meter was shown by Salford Electrical Instruments, Limited, which was a pocket-sized magnetic gauge for the measurement of non-ferrous layers or films on ferrous bases. An industrial beta-ray thickness or weight gauge was demonstrated by Baldwin Instrument Company, Limited, of Dartford, Kent.

Radioactive thickness gauges were also featured by E. K. Cole, Limited, of London, and Electronic Instruments, Limited, of Richmond, Surrey, while the Armament Research Establishment of the Ministry of Supply showed a di-electric thickness gauge.

For thinner film measurement, the General Electric Company, Limited, exhibited an apparatus for the quick determination of metal films on insulating surfaces, *e.g.*, the aluminium backing on a cathode-ray tube screen. The instrument was built around a thermionic oscillator, the frequency of which was determined partly by the presence of the metal film.

A meter for measuring the thickness of enamel or non-conducting films on non-ferrous metal bases was shown by Nash & Thompson, Limited, Tolworth, Surrey.

Pocket Spot Test for Metals

The electrographic method of spot-testing metals was originated by Glazunov in 1929, and has since

Physical Society Exhibition

been developed further by other workers. A very small sample of the metal was taken on to absorbent paper electrolytically, by making the sample the anode in a cell consisting of the sample, absorbent paper wetted with a suitable electrolyte and a counter electrode; a distinctive colour was developed on the absorbent paper by adding the appropriate reagent. On this subject, the apparatus demonstrated by Baird & Tatlock (London), Limited, was a new development, designed to be used for qualitative tests in the workshop or stores, and was complete in itself. A central spring-loader plunger acted as the counter electrode, while the outer stainless steel edge completed the circuit by connecting to the sample.

Continuous Recording of Creep Strains

The Royal Aircraft Establishment, of the Ministry of Supply (Farnborough, Hants.), demonstrated a resistance gauge for continuous automatic recording of creep strains. The device utilised a new method of measuring creep strains which was capable of being used at elevated temperatures up to, say, 900 deg. C. The usual form of creep extensometer transmits the strain in the specimen through rigid arms to a measuring device outside the creep-test furnace. This measuring device is usually an optical lever, but in some cases electrical resistance or electromagnetic devices have been used. This type of extensometer suffers from the disadvantage that at high temperatures the rigid supporting arms themselves tend to creep. The equipment demonstrated overcame this difficulty by using wire-resistance strain gauges fixed between the ends of the specimen in the furnace.

Portable Hardness Tester

The "Penetrascope," produced by C. Tennant, Sons & Company, Limited, and shown at the exhibition, has been developed to fill the need for a portable hardness testing machine incorporating the 136 deg. diamond indenter principle—well known as one of the most accurate methods for testing the hardness of metals. The instrument could be operated in the vertical, horizontal or any other desired position and could always be taken to the specimen to be tested.

The indenter was operated by a hydraulic thrust unit of high accuracy, the load applied being instantly variable by the turn of a hand-wheel. Neither outside power nor changing of weights was necessary as the load application hand-wheel was operated by finger control. The indentation in the metal being tested was seen through an illuminated microscope and the width across the diagonals of the indentation was measured.

Micro Abrasion Tester

A micro abrasion and friction tester, demonstrated by Industrial Distributors (Sales), Limited, has been designed to investigate (i) abrasion resistance of hard and brittle materials, (ii) properties of abrasives, (iii) influence of lubricants, (iv) friction between the abrading wheel and surfaces. The main parts of the apparatus are a power-driven speed-controlled grinding wheel, an adjustable specimen holder and a loading arrangement. The specimen is fixed at one end of a balance arm, the other end of which carries the weight. The balance arm is pivoted in ball-bearing centres which are attached to a slide-system adjustable in three directions perpendicular to each other. The grinding wheel is either a cast-iron disc with V-shaped periphery provided with diamond dust or a sintered carbide wheel into which diamond grain is sintered.

French Government Research

Contributions by three organisations from French Government research were featured at South Kensington. The Office National d'Etudes et de Recherches Aeronautiques showed, among other instruments, a gas analyser designed for measurement of the content of one of several gases in a mixture. Gases which could be determined included CO, CO_2, CH_4 and the majority of hydrocarbons. Its principle was based on the selective absorption in the infra-red of gases to be analysed.

The Rogascope 31 also shown by the organisation was an electromagnetic apparatus for the detection of cracks or variations in diameter of wire threads.

The Centre National de la Recherche Scientifique exhibited various optical instruments, including phase-contrast oculars for fitting to microscopes having ordinary objectives, and an attachment for converting an ordinary microscope into a variable phase-contrast microscope.

The Commissariat à l'Energie Atomique showed equipment associated with handling of radioactive material.

Fatigue Testing

The Engineering Division of the National Physical Laboratory have designed and constructed a multiple unit fatigue testing machine for miniature test-pieces. This machine is capable of subjecting 24 test-pieces simultaneously to any desired ranges of load within the limits 0 to 15 lb. tension.

Examination of Worn Gear Teeth

Distribution and occurrence of pitting on the surface of gear teeth and amount of tooth wear may be examined in greater detail than could be possible on the gears themselves by the use of a replica technique developed by the Parsons and Marine Engineering Turbine Research & Development Association. Pitting records prepared by the special technique have been analysed by counting the number of pits in a convenient length of tooth, or alternatively by measuring their areas. In addition the amount of pitting up and down the tooth may be obtained.

Accles & Pollock, Limited, showed a stainless steel tube, the smallest in the world, with an inside diameter of 0.0017 in. and an outside diameter of 0.0005 in. The firm also exhibited samples of Bourdon coils, and tubing for medical work pyrometers, instrument pointers, high-pressure work and special light-gauge material for bellows. Composite and multibore tubing in varying sizes were also shown.

Industry and the Budget

Initial Allowances to be suspended

Raising of the distributed profits tax from 30 per cent. to 50 per cent. and the addition of 6d. to the income-tax rate were the main features of Mr. Gaitskell's first budget on April 10. He announced also the suspension next year of the 40 per cent. initial allowance for income-tax and profits-tax purposes on plant and machinery.

There are some purchase tax changes affecting branches of the iron and steel industry. Raising of the tax on petrol and other light and heavy oils used as road fuels by 4½d. per gallon will affect many industries.

The Federation of British Industries, in a statement on April 11, said that industry recognised the need for savings to finance defence expenditure, but deplored the apparent failure of the Government to realise the contribution that should have come from the curtailment of other forms of Government expenditures. The increase in income-tax and in the distributed profits tax would mean that the resources of industry would be further depleted at the very time when rising price levels called for increasing working capital. These measures could only operate to discourage capital development designed to promote production efficiency, and further to lessen the attractiveness of risk-bearing capital, the provision of which was so essential to the long-term needs of industry.

The National Union of Manufacturers said that the further burden proposed by the increase of the standard rate of income-tax and in the profits tax on distributed profits were unwelcome additions to the already crippling load of taxation which industry had to bear. Particularly vexatious was the proposal to suspend the initial allowances for depreciation of plant and machinery and buildings.

Purchase tax on motor-cars is doubled. The Society of Motor Manufacturers and Traders says that while the immediate effect will be upon the home market, already cut to 80,000 cars for the whole of this year, doubling purchase tax will have an adverse effect on the export market, particularly for the more expensive cars, which must have an adequate home outlet if their cost overseas is not to be prohibitive.

Suspension of the 40 per cent. initial allowance for income-tax and profits tax purposes on plant and machinery, and of 10 per cent. on industrial buildings, mines, and oil wells, will have effect from April 6, 1952. Any additions to plant or industrial buildings up to April, 1952, will rank for the initial allowance. After that there will not be the benefit of the 40 per cent. allowance for concerns on the normal preceding year basis.

In the five years since 1945, the allowance in the first year has been 50 per cent., made up of the 40 per cent. and the 10 per cent. annual wear and tear allowance, with 10 per cent. annually thereafter of the reducing amount. In this way, plant could be said to have been approximately written down to or near its scrap value in about seven years. There will now be only the wear and tear allowance of 10 per cent., which is also calculated on the declining total, and which, in broad terms, requires about 20 years to reach scrap or near scrap value.

Articles on which purchase tax has been doubled—from 33⅓ per cent. to 66⅔ per cent.—include, in addition to motor-cars, certain gas and electricity domestic appliances, and radio and television sets.

Articles now exempt from tax include:—Needles, base-metal pins (except hairpins), crochet hooks, and thimbles; steel wool, metal pot scourers; coal hods and coal scuttles, coal or cinder sieves and sifters, pedal-operated sanitary bins; baths, wash tubs; kitchen scale and kitchen weighing machines.

Obituary

Mr. Joseph Greig, who died recently at Hamilton, was a director and secretary of the Panther Iron & Steel Works which closed down in the early 1930's.

Mr. Cecil Frederick Farrington, proprietor of J. Arthur Farrington & Son, iron and steel stockholders, of Burslem, Stoke-on-Trent, has died at the age of 52.

Mr. A. G. Webb, a director and secretary of the Bryan Donkin Company, Limited, plant engineers, etc., of Chesterfield, and secretary of British Furnaces, Limited, has died at the age of 65.

Mrs. Alice Hunter, mother of Sir Ellis Hunter, president of the British Iron and Steel Federation and chairman and managing director of Dorman, Long & Company, Limited, has died in her 91st year.

Mr. Harry Davies, for 18 years a lecturer in non-ferrous metallurgy at Birmingham Technical College and vice-president of the Birmingham Metallurgical Society, died on April 9 after a long illness. He was 58.

Mr. Robert N. Swinney, formerly chairman of Swinney Bros., Limited, ironfounders, of Morpeth (Northumberland), who has died at the age of 85, retired in 1946 after 60 years' association with the company.

Mr. John Thomas Blackett, chairman and managing director of Blackett, Hutton & Company, Limited, steel-founders, of Guisborough (Yorks), who founded the company 50 years ago, has died at the age of 87. He was active with the company's affairs until Christmas.

The death has taken place at the age of 84 of Mr. William Key Billings, former alderman and Lord Mayor of Leicester, who from 1902 until his retirement carried on his father's iron foundry, which he first entered when he left school. He was a member of Leicester City Council for over 30 years and Lord Mayor for 1933-4.

Mr. H. O. Bennie, a former managing director of the Scottish Machine Tool Corporation, Limited, Glasgow, has died at the age of 86. He took over the firm of James Bennie & Company, at Polmadie, Glasgow, when he was 21, and later founded the firm of James Bennie & Sons, Limited, which, in 1937, joined with the Scottish Machine Tool Corporation, Limited. Mr. Bennie retired in 1949. He was a Whitworth scholar and studied at King's College, London, and was well known in shipbuilding engineering circles.

Mr. Edward Henry William Cooke, a director of Birmingham Small Arms Company, Limited, died suddenly on April 6. He was born in Birmingham in 1874 and entered the service of Birmingham Gas Department as a junior clerk, rising to the position of chief accountant in 1914. During the 1914-18 war he organised the food rationing in the city and was awarded the M.B.E. for his services. In 1920 he became chief accountant with Metropolitan-Vickers Electrical Company, Limited, and later was appointed comptroller of Associated Electrical Industries, Limited. Mr. Cooke joined the board of Birmingham Small Arms Company in 1937 and was appointed managing director of the Daimler Company, Limited, in the same year.

Wills

Greyling, N. D., late of Babcock & Wilcox, Limited £1,145

Wright, Dr. H. R., chairman and managing director of Siemens Bros. & Company, Limited, Caxton Electric Developments, Limited, and Siemens Electric Lamps & Supplies, Limited, a director of Submarine Cables, Limited, St. Helens Cable & Rubber Company, Limited, and associated with other companies, who had a number of inventions to his credit, including the electro-hydraulic system of ship steering £201,339

Raw Material Markets

Iron and Steel

Precariously the provision of basic iron for the melting shops is maintained, but outputs of hematite and low- or medium-phosphorus iron are well below normal. Stocks of high-grade imported ores are rapidly disappearing and some of the blast furnaces are operating on slack blast. Inevitably, deliveries to the foundries have had to be curtailed, and consumers have to make up their furnace mixtures as best they can. Engineering foundries are operating under the greatest difficulties, but common foundry iron supplies are by no means abundant, and blast-furnace men are under constant pressure to provide more material for the makers of light castings. Refined-iron makers have a substantial volume of orders in hand and are still providing small tonnages for export.

There is certainly no improvement in the aggregate tonnages of steel semis supplied to the re-rolling mills, and, in fact, re-rollers entertain lively apprehensions of further deterioration. This, it would appear, must be the unavoidable consequence of a shrinkage in the production of steel ingots. Extra tonnages of Continental billets, sheet bars, and slabs seem to be unobtainable. European producers have only very small surpluses available for export and their quoted prices are prohibitive. Hence it is a constant struggle for re-rollers to obtain sufficient material to keep the mills in operation, and all sorts of defective material and scrap are being used to eke out supplies.

The mills are still uncertain as to how far the rearmament programme will affect them. The total make of steel is unlikely to be as great this year as last, and yet the collieries and other large consumers are needing more. It is hoped by many consumers that some form of priority scheme will be formulated. As it is, one order is as good as another. A priority scheme would cut out tonnage not being wanted for essential purposes.

The amount of the tonnage of steel which will be released for export is not likely to be very large, in view of the pressing demands for the home trade, and the gradually increasing requirements for rearmament. This is unfortunate, because there is plenty of foreign business to be obtained, and our prices are very competitive.

Non-ferrous Metals

There was a spectacular fall in the price of tin last week. While from time to time, against the uncertain background of international events, erratic movements must be anticipated, it looks very much as if tin has embarked upon a downward course. There is still plenty of room for a fall and no great surprise would be occasioned if the forward quotation fell below £1,000 during the coming weeks. Consumption in this country is well maintained at around 2,000 tons monthly, and there does not at present seem to be any reason to anticipate any falling off.

Not unnaturally, consumers are covering their requirements on a hand-to-mouth basis, and last week's sharp setback will naturally make them more cautious still. Although the present tin quotation is now well below the peak of over £1,600 which was reached for the cash position, consumers are hardly likely to turn at all bullish about the prospect for this metal. On the contrary, they are likely to bear in mind the fact that during the first half of last year tin stood at around £600 per ton. It is reasonable to suppose that the amount of tin available for market operations has increased, thus leading to a smaller premium for spot metal.

Official tin quotations on the London Metal Exchange were:—

Cash—Thursday, £1,250 to £1,255; Friday, £1,165 to £1,170; Monday, £1,125 to £1,130; Tuesday, £1,125 to £1,135; Wednesday, £1,115 to £1,125.

Three Months—Thursday, £1,200 to £1,210; Friday, £1,135 to £1,140; Monday, £1,100 to £1,115; Tuesday, £1,115 to £1,120; Wednesday, £1,105 to £1,100.

While it may reasonably be claimed that the price of tin is strongly influenced, if not actually fixed, by the scale of operations in London, this is not true of copper, lead, and zinc, which are based as to the sterling price on the U.S. internal quotations. Changes there must inevitably lead to alterations in the schedule of Ministry of Supply prices in the United Kingdom, but we have recently seen that our quotations here can move up, even though no appreciation has taken place across the Atlantic. At present these three metals are cheaper in New York than anywhere else, and consumers in Britain must pay well over the U.S. parity. Copper at £210 is equal to 26¼ cents, which compares with 24½ cents domestic in America, while lead at £160 is the equivalent of 20 cents, which is well over the U.S. parity. The same applies to zinc. In regard to these two metals the Ministry of Supply is believed to have bought on the world market at prices over the New York figure and that doubtless accounts for the recent rise.

Scholarships to Aid Productivity

The cost of the 35 post-graduate scholarships which are to be awarded this year for the study of technology and management at selected universities or technological institutes and in industrial undertakings in the United States will be met from funds provided by the American Economic Co-operation Administration. Announcing this last week, the Ministry of Education stated that the aim of the scholarships was to contribute to industrial productivity in this country.

The awards, which will normally be tenable for a period of one year, will be open to students who hold good honours degrees in either pure science or technology, who have had at least two years' industrial experience, and who are now working in industry or research associations or are teaching in universities or technical colleges. The scholarships will provide for tuition fees, books, and travelling expenses in the U.S.A., and suitable maintenance allowances. The cost of the return passage to the U.S.A. will be met from public funds. Successful candidates will be expected to cross the Atlantic early next September.

Slower Rise in Industrial Output

Compared with the opening months of last year, the rate of increase in industrial production slowed down appreciably in January and February last. The index number (1946=100) prepared by the Central Statistical Office is estimated provisionally at 141 for January, 1951, compared with a revised figure of 139 for December, 1950. Figures for the corresponding months last year were 135 for January, 1950, and 131 for December, 1949. On the basis of information so far received the index for all industries for February, 1951, is expected to be 146-147.

The provisional figure for January and the early estimate for February suggest that the rate of increase in these two months over a year earlier was about 5 per cent. for all industries, compared with the increase of 8½ per cent. in 1950 over 1949.

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

(Delivered, unless otherwise stated)

April 18, 1951

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2:—Middlesbrough, £10 17s. 9d.; Birmingham, £10 13s.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent P, £12 9s., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si)—North Zone, £12 16s. 6d.; South Zone, £12 19s.

Scotch Iron.—No. 3 foundry, £12 7s. 9d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £13 7s. 6d.; South Zone, £13 10s.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £13 17s. 6d.; South Zone, £14.

Cold Blast.—South Staffs, £16 10s. 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, £12 7s. 6d.; Scotland, £12 14s.; Sheffield, £13 2s. 6d.; Birmingham, £13 9s.; Wales (Welsh iron), £12 7s. 6d.

Spiegeleisen.—20 per cent. Mn, £18 3s.

Basic Pig-iron.—£10 19s. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered.)

Ferro-silicon (6-ton lots).—40/55 per cent., £37 15s., basis 45% Si, scale 14s. per unit; 70/84 per cent., £52, basis 75% Si, scale 14s. 6d. per unit.

Ferro-vanadium.—50/60 per cent., 15s. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 8s. 9d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £167; ditto, copper free, £183.

Ferro-tungsten.—80/85 per cent., 33s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 35s. 3d. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent C, £66, basis 60% Cr, scale 22s. per unit; 6/8 per cent. C, £61, basis 60% Cr, scale 21s. per unit; max. 2 per cent. C, 1s. 6¾d. per lb. Cr; max. 1 per cent. C, 1s. 7¼d. per lb. Cr; max. 0.15 per cent. C 1s. 8d. per lb. Cr; max. 0.10 per cent. C, 1s. 8½d. per lb. Cr.

Cobalt.—98/99 per cent., 17s. 6d. per lb.

Metallic Chromium.—98/99 per cent., 5s. 9d. per lb.

Ferro-manganese (blast-furnace). — 78 per cent., £32 3s. 7d.

Metallic Manganese.—96/98 per cent., carbon-free, £215 per ton.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft, u.t., £17 4s.; tested, up to 0.25 per cent. C (100-ton lots), £17 9s.; hard (0.42 to 0.60 per cent. C), £19 4s.; silico-manganese, £24 6s. 6d.; free-cutting, £20 9s. Siemens Martin Acid: Up to 0.25 per cent. C, £22 11s. 6d.; case-hardening, £23 9s.; silico-manganese, £26 14s.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £20 4s.; basic, hard, over 0.41 up to 0.60 per cent. C, £21 9s.; acid, up to 0.25 per cent. C, £23 9s.

Sheet and Tinplate Bars.—£17 6s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £21 3s.; boiler plates (N.-E. Coast), £22 10s. 6d.; chequer plates (N.-E. Coast), £23 8s.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £20 1s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £22 15s.; flats, 5 in. wide and under, £22 15s.; hoop and strip, £23 10s.; black sheets, 17/20 g., £29 13s.; galvanised corrugated sheets, 17/20 g., £43 6s.

Alloy Steel Bars.—1-in. dia. and up: Nickel, £37 19s. 3d.; nickel-chrome, £56 6s.; nickel-chrome-molybdenum, £63 1s.

Tinplates.—I.C. cokes, 20 × 14, per box, 42s. 7½d., f.o.t. makers' works.

NON-FERROUS METALS

Copper.—Electrolytic, £210; high-grade fire-refined, £209 10s.; fire-refined of not less than 99.7 per cent., £209; ditto, 99.2 per cent., £208 10s.; black hot-rolled wire rods, £219 12s. 6d.

Tin.—Cash, £1,115 to £1,125; three months, £1,005 to £1,100; settlement, £1,120.

Zinc.—G.O.B. (foreign) (duty paid), £160; ditto (domestic), £160; "Prime Western," £160; electrolytic, £164; not less than 99.99 per cent., £166.

Lead.—Good soft pig-lead (foreign) (duty paid), £160; ditto (Empire and domestic), £160; "English," £161 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, all English destinations, £180; rolled zinc (boiler plates), all English destinations, £178; zinc oxide (Red Seal), d/d buyers' premises, £178.

Other Metals.—Aluminium, ingots, £124; antimony, English, 99 per cent., £390; quicksilver, ex warehouse, £73 10s. to £74; nickel, £406.

Brass.—Solid-drawn tubes, 21¾d. per lb.; rods, drawn, 29¼d.; sheets to 10 w.g., 26⅜d.; wire, 27½d.; rolled metal, 25⅛d.

Copper Tubes, etc.—Solid-drawn tubes, 23¾d. per lb. wire, 226s. 6d. per cwt. basis; 20 s.w.g., 254s. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), —; BS. 1400—LG3—1 (86/7/5/2), —; BS. 1400—G1—1 (88/10/2), —; Admiralty GM (88/10/2), virgin quality, —, per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, —; L.P.Bl, — per ton.

Phosphor Bronze.—Strip, 37d. per lb.; sheets to 10 w.g., 39½d.; wire, 40½d.; rods, 36¾d.; tubes, 42d.; chill cast bars: solids, —, cored, —. (C. Clifford & Son, Limited.)

Nickel Silver, etc.—Ingots for raising, 2s. 4½d. per lb. (7%) to 3s. 3½d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 2s. 10½d. (7%) to 3s. 9¼d. (30%); to 12 in. wide × .056, 2s. 10½d. to 3s. 9¾d.; to 25 in. wide × .056, 3s. 0½d. to 3s. 11¾d. Spoon and fork metal, unsheared, 2s. 7½d. to 3s. 6½d. Wire, 10g., in coils, 3s. 4d. (10%) to 4s. 3½d. (30%). Special quality turning rod, 10%, 3s. 3d.; 15%, 3s. 7¾d.; 18%, 4s. All prices are net.

News in Brief

Stordy Engineering, Limited, have removed to more commodious premises at Cumbria House, Goldthorn Hill, Wolverhampton.

The British Standards Institution has recently issued a new standard for sizes of metal sheets for letterpress photo-engravings (B.S. 1705:1951).

Mitcham Smelters, Limited, of 36, Victoria Street, London, S.W.1, have taken over as from April 2, the business founded by the managing director, Mr. H. Roseman.

Newman Industries, Limited (electric division), have appointed Mr. H. McConchie as manager of their new branch office situated in Russell Chambers, 54, Merrion Street, Leeds.

Ley's Malleable Castings Company, Limited, Derby, on April 12 opened their new ablution building which provides separate changing rooms and lockers for clean or soiled clothes; the washing facilities include showers, footbaths and basins.

British Ropes, Limited, of Doncaster, are to make a rope 27 in. dia., which it is believed will be the biggest in the world. It will serve as the main cable for the River Severn suspension bridge and will have a breaking load of 47,839 tons.

A large vertical boring and turning mill constructed by Froiep Rheydt of Germany has been acquired by the General Electric Company, Limited, and erected in their Fraser and Chalmers Engineering Works at Erith, Kent. The mill can take work up to 26 ft. 3 in. dia. and up to 14 ft. in height, with a maximum load of 200 tons.

The Birmingham and District Industrial Safety Group has organised an exhibition to be held from May 30 to June 2, in the Bingley Hall, Birmingham. More than 50 stands will be occupied by firms manufacturing industrial safety and factory welfare equipment including all kinds of machine guards, fire-fighting appliances, protective clothing, goggles, etc.

Three Rotherham headmasters and 21 school teachers attended a four-day course on iron and steel manufacture during their Easter holiday arranged by the education department of the Steel, Peech & Tozer branch of the United Steel Companies, Limited, as an experiment in co-operation between industry and education. The course included tours of all the departments of a steelworks and lectures on management, research, economics, education, and production.

B. O. Morris, Limited, of Coventry, announce new appointments to their board; Mr. H. S. Royce becomes director and general manager and Mr. M. B. E. Masters, sales director. Mr. Royce held several positions with the Rolls Royce Company of Derby and during the war was loaned by them to the Ministry of Aircraft Production. Whilst with the Ministry he spent some time with the British Purchasing Commission in the United States. Mr. Masters has been with the company for several years as sales manager.

A valve-driven high-frequency generator, claimed to be the largest in Europe, has recently been installed at De Havilland Propellors, Limited, Hatfield, to operate a furnace for rapid local heating and hardening of large components, *e.g.*, steel propellor blades and hubs when these are not heatable by other means. The generator, built by Philips Electrical, Limited, is type F280, and has a maximum output of 150 kw. (continuous) and above 200 kw. (intermittent). It is designed for operation on a mains supply voltage of 380-440 v. three-phase, 50 c., and measures approximately 7 ft. high, 4½ ft. wide and 12 ft. deep, and weighs 3 tons.

Personal

The Rt. Hon. Lord Rea and Mr. Reginald J. E. Dodds have been elected directors of Burntisland Shipbuilding Company, Limited. Mr. Dodds is chairman and Lord Rea is a director of Alto Parana Development, which organisation recently acquired the share capital of the Burntisland Company.

Mr. D. A. Dodson has been appointed manager of Foundry Services (Canada) Limited, with headquarters at 49, Wellington Street East, Toronto 1, Canada. Mr. M. Reading, of the company's European technical staff, has joined Mr. Dodson to service the Province of Quebec. Mr. R. L. Lucien, who has been acting as temporary manager, has returned to Europe in his former capacity of overseas technical manager.

Sir Archibald Forbes, deputy-president of the Federation of British Industries, has been, at the annual general meeting, elected president of the Federation in the place of Sir Robert Sinclair, K.C.B., K.B.E., who retires after holding the presidency for two years. Sir Archibald Forbes, who is an executive director of Spillers, Limited, flour millers, and chairman of the Debenture Corporation, was chairman of the Iron and Steel Board—consisting of representatives of both sides of the industry and independent members—from its inception in 1946 to its termination in March, 1949.

Mr. Bernard Thomas, for the second year in succession, has been elected chairman of the Birmingham area section of the Institute of Metals. Mr. Thomas, who was the first Wolverhampton metallurgist to hold this position when he was elected a year ago, is the owner of the Grove Foundry, Bridgnorth, and of the Birchall Plating Company, Walsall. In addition he is a director of MacBee, Limited, of The Grove, Bridgnorth. Mr. Thomas was president of the Staffordshire Iron and Steel Institute and until within the last two years he was visiting lecturer on metallurgy and heat-treatment to the County Technical College, Wednesbury.

Mr. F. C. Baker, works manager, has been appointed to the board of directors of J. Hobkirk, Sons & Company, Limited, Ampthill Road, Bedford, as works director as from April 2. Mr. Baker has been continuously employed with this firm for many years, having started work with the company as an apprentice and working his way up through the foundry, having been foreman in the non-ferrous foundry and works manager for the past 2½ yrs. Although Hobkirk's is primarily a family concern it is their policy to encourage employees to accept executive responsibility, and an employee is, therefore, welcome on to the board of directors as part of this policy.

Mr. W. G. Thornton, managing director of the Yorkshire Repetition Castings Company, Limited, was on April 6 presented with a cocktail cabinet by the members of the West Riding Ironfounders' Association. Mr. W. Mallinson presiding at the presentation dinner at the Midland Hotel, Bradford, asked Mr Thornton to accept the cabinet as a mark of appreciation for his two years as president of the Association. Mr. Thornton was a founder member of the West Riding of Yorkshire branch of the Institute of British Foundrymen, their president from 1925 to 1927, and represented the branch on the general council of the Institute for 25 yrs. He was also a past-president of the Bradford & District Engineering Employers' Association. Mr. Thornton, he announced, would continue as representative to the executive of the National Ironfounding Employers' Federation.

Forthcoming Events

APRIL 23

Sheffield Society of Engineers and Metallurgists

Film Show:—Manipulation of Corrosion- and Heat-resisting Steels—Machining, Pressing and Polishing; Sound Steel; Steam; and Splashing in an Ingot Mould, 7 p.m., in the Mappin Hall, The University, St. George's Square, Sheffield.

APRIL 24

British Non-ferrous Metals Research Association

Luncheon at the Savoy Hotel, London, at 12.45 for 1 p.m.

APRIL 25

Institute of British Foundrymen

London Branch:—Annual General Meeting, followed by films "Castings" and "Forgings," 7 p.m., at the Waldorf Hotel, Aldwych, London, W.C.2.

Birmingham Branch:—Annual General Meeting, followed by "Report of Sub-committee T.S. 23 on the Repair and Reclamation of Grey-iron Castings by Welding and Burning-on," presented by Dr. A. B. Everest, 7.15 p.m., at the James Watt Memorial Institute, Great Charles Street, Birmingham, 3.

APRIL 26

Institute of Vitreous Enamellers

Southern Section:—Annual Social Evening, commencing with Dinner at the Comedy Restaurant, Leicester Square, at 6.45 for 7 p.m., followed by theatre visit.

APRIL 27

Institute of British Foundrymen

London Branch:—Day Works Visit to Suffolk Iron Foundry (1920), Limited, Stowmarket. Party leaves Liverpool Street Station at 10 a.m.

Lincolnshire Branch:—Social Evening (details to be obtained from the Secretary).

Institute of Economic Engineering

London:—"Problems of Organisation," by H. A. Macdonald, M.A., guest chairman Rt. Hon. Lord Marley, D.SC., 7 p.m., at the Cowdray Hall, London, W.1.

Institution of Mechanical Engineers

Discussion on "The New Factory," by J. G. Bulger, M.I.MECH.E., 5.30 p.m., at Storey's Gate, St. James's Park, London, S.W.1.

U.S. Metal Controls

The U.S. steel industry has been ordered by the National Production Authority to set aside an additional 1 to 10 per cent. of its output for the defence programme. The directive specifically applies to carbon steel, and becomes effective in June. Manufacturers are to continue making consumer durable goods in the same proportion as they have in the past. At the same time, the N.P.A. director has told production officials that they must keep small business in operation to the greatest degree possible as control orders are developed.

The U.S. Government has taken complete control over the production of ferrous and non-ferrous alloys. Beginning with meltings scheduled for June, producers must file melting schedules with the N.P.A. 30 days in advance of the month in which the alloys are scheduled for melting. In the same order, permissible inventories of ferro-alloys for alloying purposes, are limited to a 45-day or practicable working minimum, whichever is less.

Liverymen to Visit the Midlands

Possibly for the first time in their exceptionally long history, the Liverymen of the Founders' Company are to visit a few foundry installations in the Midlands. Lasting two days (April 24 and 25), the Liverymen will visit the National Foundry College at Wolverhampton, the works of Birmid Industries, Limited, at Smethwick and the Imperial Foundry at Leamington. One evening will be spent at the Shakespeare Memorial Theatre at Stratford-on-Avon.

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

REPRESENTATIVE, non-ferrous castings (bronzes), established connection Midland area, desires change. Keen and trustworthy.—Box 872, FOUNDRY TRADE JOURNAL.

FOUNDRY PLANT ENGINEER, experienced in estimates, design, development, erection and maintenance of wide range of foundry plant, requires progressive executive position.—Box 874, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

ANALYTICAL CHEMIST required for routine chemical analysis. Preferably experienced in analysis of ferrous metals. Male or female. Assistant Experimental Officer grade. Salary £330-£475 p.a. male and £330-£430 p.a. female. State age, experience, and qualifications.—BRITISH CAST IRON RESEARCH ASSOCIATION, Alvechurch, Birmingham.

APPLICATIONS are invited for an appointment as GENERAL WORKS MANAGER in a well-known Light Castings Foundry in the North of England. The vacancy calls for experience in Mechanised Foundry and Floor Production, Control of Pattern Shop and Fitting and Assembly Shops. A sound technical and practical knowledge, backed by administrative experience, is essential. The position offers considerable prospects for a man of 35/40 years of age. Applications should give full details of present position, salary, etc., and will be treated in the strictest confidence.—Box 840, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required for Ceylon, to take charge of Iron and Non-ferrous Foundry turning out general engineering castings. Must have thorough floor and machine moulding experience and a sound knowledge of patternmaking and preparation of plate patterns. Age not over 35 years. Salary equivalent to £1,300 a year is offered for a man with the desired qualifications. Terms include Provident Fund benefits and periodical furlough.—Write, stating age and giving full particulars of experience, etc., to Box "74/4," c/o 95, Bishopsgate, E.C.2.

PATTERNMAKER first-class METAL FOREMAN required. Must be thoroughly accustomed to the construction of first-class metal pattern equipment as produced by this firm for the leading and largest automobile, aircraft and other trades. Only those used to working to dead-on limits, with highest possible class workmanship and highly polished mirror finish, also foundry experience. Must be absolutely a first-class estimator and essential able to check accurately, and accustomed to every type of measuring instrument.—Only those with this experience need apply to WRIGHT & PLATT, LTD., The World's Largest Engineering Master Patternmakers, Irving Street, Birmingham, stating age, full experience, and wage required.

SITUATIONS VACANT—*Contd.*

AN ASSISTANT CHEMIST (age 20-25) required for a large Iron Foundry, North Midlands. Knowledge of cast iron analysis, and preferably accustomed to sand control, although not essential.—Please state experience and salary expected to Box 866, FOUNDRY TRADE JOURNAL.

FOUNDRY SUPERINTENDENT wanted for Foundry near Birmingham. Applicant must have had experience of managing a High Duty Iron Jobbing Foundry, be a good organiser, and have ability to get things done. This is a progressive and lucrative appointment to a man of energy and initiative.—Details to Box 860, FOUNDRY TRADE JOURNAL.

AN opening exists for young Man in connection with development in technical control of sand, metal, etc., in foundry producing 14 tons each week. Mechanisation and other modernisation also being carried out.—CHRISTY & NORRIS, LTD., Chelmsford.

ASSISTANT MANAGER, not over 35 years of age, required for old-established Light Castings Foundry in North Midlands. Applicants should be experienced in Floor and Mechanised Foundry Production and in Modern Pattern-Making Technique. Excellent scope for exercise of initiative and drive. Good salary and prospects.—Apply in confidence to Box 842, FOUNDRY TRADE JOURNAL.

LARGE manufacturing organisation in Yorkshire requires the services of a MOULDER highly skilled in making aluminium castings for patterns, core boxes, core carriers, and match plates. Must be able to prepare own sand and metals, produce sound castings to accurate dimensions, good surface finish. Permanent position with prospects. Day work wage.—Reply, stating age, experience, and wages required, to Box 838, FOUNDRY TRADE JOURNAL.

FOUNDRY SUPERINTENDENT (aged 35/45) required for Grey Iron Foundry handling also High Tensile Iron, in West Riding of Yorkshire, producing 50 to 60 tons of high quality precision machine castings per month. Applicants must have proved themselves in a similar capacity and should be capable of taking full responsibility to the Works Manager for both the pattern making department and complete foundry covering coremaking, machine and floor moulding, fettling, cupolas and metal and sand control. Preferably also to have knowledge to facilitate instituting and operating visual foundry loading system and knowledge of stress relief which will possibly be installed in the foundry. Starting salary commensurate with responsibility.—Replies, which will be treated as strictly confidential, should state age, full details of practical and technical training, positions held, and present salary.—Box 864, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

WANTED. — First-class FLOOR MOULDER. House provided.—KETTON FOUNDRY CO., LTD., near Stamford, Lincs. 'Phone: Ketton 249.

FOREMAN, experienced, aged 30/40, for Foundry in Central Scotland making greensand, drysand and loam castings totalling over 2,000 tons annually. House available.—Box 846, FOUNDRY TRADE JOURNAL.

SKILLED MOULDERS, PLATERS, TURNERS, BORERS, etc., required by Distington Engineering Co., Ltd., Workington, Cumberland.—For further details apply to the LABOUR MANAGER.

REPRESENTATIVE for Sand and Gravity Die Castings in Brass and Aluminium Foundry. Must have contacts with all types of engineering firms. Commission basis.—Box 822, FOUNDRY TRADE JOURNAL.

ESTIMATOR required for Foundry handling and producing 400 tons a month. All types of castings up to 4 cwt. in weight. Must have had rate fixing experience. Position is permanent, in pleasant surroundings, and will offer scope for initiative. Please state experience and salary required.—Box 868, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required for Iron Foundry in South of England; light and medium castings produced. Applicant must be able to control semi-skilled labour, and have sound knowledge of modern production methods, Floor, Machine Moulding and Sandslinger.—Full particulars, age, salary expected, to Box 870, FOUNDRY TRADE JOURNAL.

SALES REPRESENTATIVE for Scotland for Ironfoundry. Wide experience in cast iron pipe trade. Good prospects for suitable candidate.—Write, stating experience and salary required, to Box 810, FOUNDRY TRADE JOURNAL.

RATEFIXER required for light engineering works near Leeds, Yorkshire. Experience in light casting foundry an advantage. Assistance with housing accommodation if required.—Apply, stating age, experience, and salary required, to Box 812, FOUNDRY TRADE JOURNAL.

OWING to the present Manager leaving to take up a position abroad, a vacancy occurs for a FOUNDRY MANAGER to take control of Pattern Shop, Ferrous and Non-ferrous Foundries producing medium and light castings averaging 50 tons per week. Applicants must be experienced, practical with a good theoretical knowledge, and have held a position with similar responsibility.—State age, experience, qualifications and salary expected, to the WORKS MANAGER, Thomas Robinson & Son, Ltd., Rochdale.

MACHINERY FOR SALE—*Contd.*

SHOTBLASTING COMPRESSORS AT RIDICULOUS PRICES.

TILGHMAN Horizontal, 400 c.f.m., 30 lbs., BH3½.
Tilghman Vertical, 400 c.f.m., 30 lbs., ½GB3.
Tilghman Vertical, 224 c.f.m., 30 lbs., FC6B.

S. C. BILSBY, A.M.I.C.E., A.M.I.E.E., Crosswells Engineering Works, Langley Green, near Birmingham. Broadwell 1359

FOR SALE

NO. 16 ATRITOR CRUSHER by Alfred Herbert, complete with Feed Hopper, overhauled and with a quantity of spares. Also a No. 12 Atritor by Alfred Herbert, for which we have available about 6 tons of spares. Both these machines are offered at extremely low prices for quick clearance.

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New Rushworth 3-ton ELECTRIC DERRICK CRANE. 100 ft. jib. Electric supply 400/3/50.

Several Jones KL 40 Diesel-driven 3-ton MOBILE CRANE, on four pneumatic or solid rubber tyred wheels or crawler tracks. 24 ft., 30 ft., or 40 ft. jib.

Several Jones KL 22 Diesel-driven 2-ton MOBILE CRANES, on four pneumatic or solid rubber tyred wheels. 13 ft. 9 in. or 16 ft. cantilever or 24 ft. lattice jib.

Several Jones Super 12 Petrol-driven 12 cwt. PORTABLE CRANES, on C.I. road wheels. 18 ft. jib.

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"SKLENAR" FURNACE. 1-ton capacity. Coke fired. New 1944. Very little used. Price £700.—Box 642, FOUNDRY TRADE JOURNAL.

ALBION (TWW) WORKS

FOUNDRY PLANT AND EQUIPMENT—GENERAL.

MOULDING MACHINES:

TYPE WT.562AY SHOCKLESS SIMULTANEOUS JOLT SQUEEZE TURN-OVER DRAW MOULDING MACHINE, for boxes 18 in. wide.

HAND SQUEEZE STRAIGHT DRAW MOULDING MACHINE, by BRITISH MOULDING MACHINE CO. Accommodate boxes 15 in. by 14 in. Pattern table 24 in. by 18 in. Pattern Draw 6 in.

SHOTBLAST AND DUST EXTRACTION PLANT:

TILGHMAN SHOTBLAST ROOM PLANT, having 6-ft. room, type SV2, Tilghman Shotblast Apparatus, Pressure Chamber, Paddle Blade Exhaust Fan, Air Receiver, etc.

TILGHMAN DUST EXTRACTION CABINET. 44 in. by 34 in. by 68 in. deep. Motor Driven Dust Extraction Fan, 400-440/3/50.

DUST ARRESTING PLANT, comprising Sheet Steel Cabinet 4 ft. by 3 ft. 6 in. by 5 ft. 6 in. high. Motor Driven Paddle Blade Dust Extraction Fan, 8 in. inlet. Driven by 1 h.p. Motor, 400-440/3/50.

RUMBLING BARRELS:

NEW MOTOR DRIVEN HEXAGONAL RUMBLING BARRELS. 36 in. long by 18 in. across flats, 1 ft. 2 in. plate. Driven by 3 h.p. Motor, and complete with Starter, 400/3/50.

NEW BELT DRIVEN—ditto. Size 36 in. long by 30 in. across flats. Driven through fast and loose pulleys, with belt striking gear.

"FORWARD" FOUNDRY SAND RIDDLE. 5 tons per hour capacity. Complete with Tripod and 22 in. dia. Sieve. Motorised.

GEARED FOUNDRY CRANE LADLES—BRAND NEW. 4-ton, 3-ton, 50-cwt., 2-ton, 30-cwt., 15-cwt., 10-cwt.

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SAND MIXERS and DISINTEGRATORS for Foundry and Quarry; capacities from 10 cwts. to 10 tons per hr.—W. & A. E. BREALEY (MACHINERY), LTD., Station Works, Ecclesfield, Sheffield.

MACHINERY WANTED

MOULDING MACHINES. — Two Coleman No. 24A Davenport Type Machines. Jarr, Roll-over. Pattern draw 12 in.; 1,100 lbs. working capacity. Suitable for boxes up to 40 in. by 24 in. Price £350 each.—Box 288, FOUNDRY TRADE JOURNAL.

10-CWT. Geared Ladle.
5-Cwt. Ungeared Ladle.
25 Cwt. Hand Mobile Workshop Crane.
Grinding Wheels: 16 in. dia. by 2½ in. face by 1¼ in. bore, 14 in. dia. by 2 in. face by 1¼ in. bore.
Quantity of Electric Motor Slide Rails.
Coggan Core Blower, 15-lb. capacity.

S. C. BILSBY, A.M.I.C.E., A.M.I.E.E., Crosswells Engineering Works, Langley Green, near Birmingham. Broadwell 1359

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NEW Bray Hydraloader; ⅞ cub. yard bucket; mounted on Fordson - Major petrol / paraffin tractor; fitted with electric starting, and complete with driver's cab.

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New shot blast cabinets complete with Dust Extractors, etc., size 5ft. × 3ft. Also new 8ft. cube room Plants Low prices.

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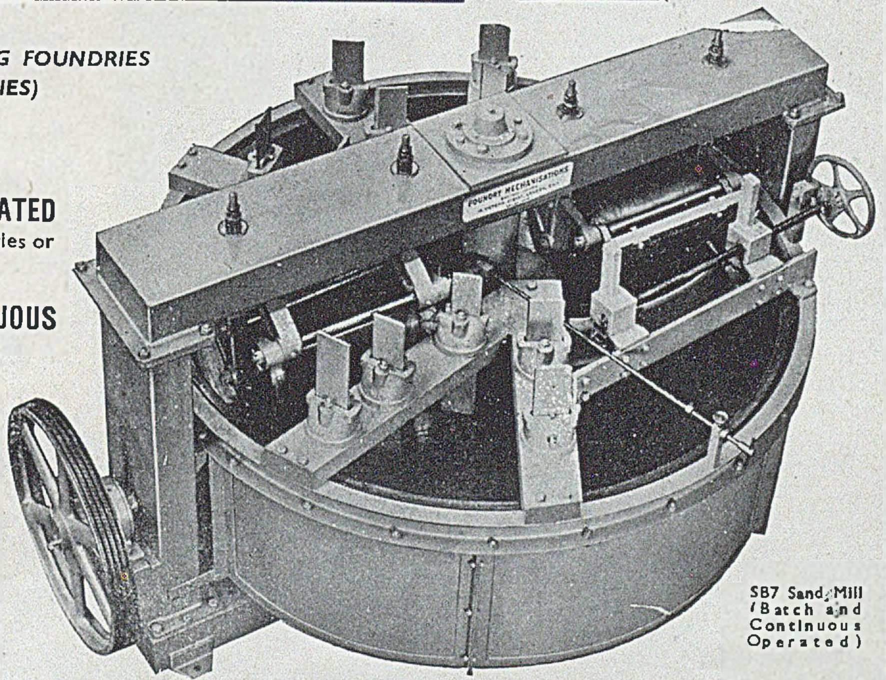

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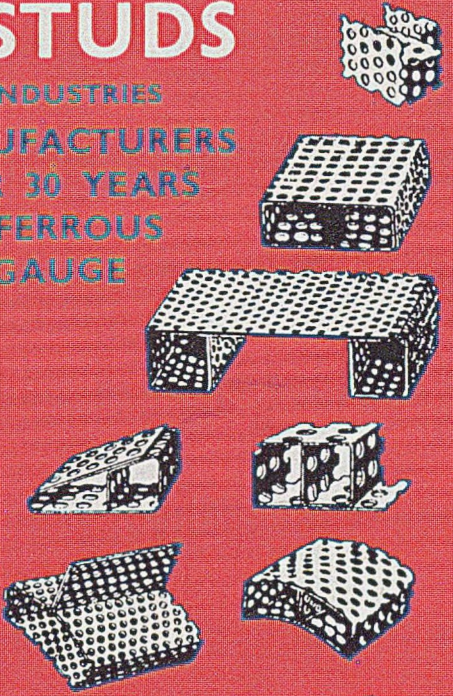

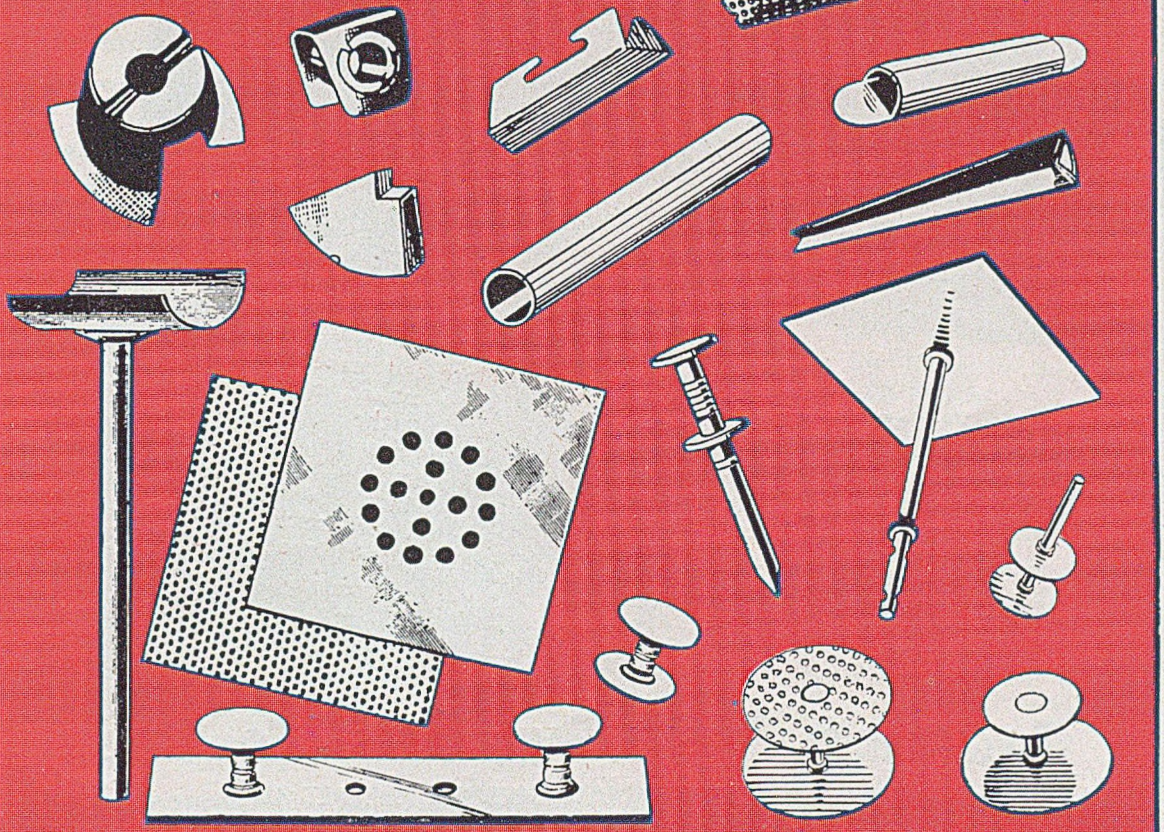

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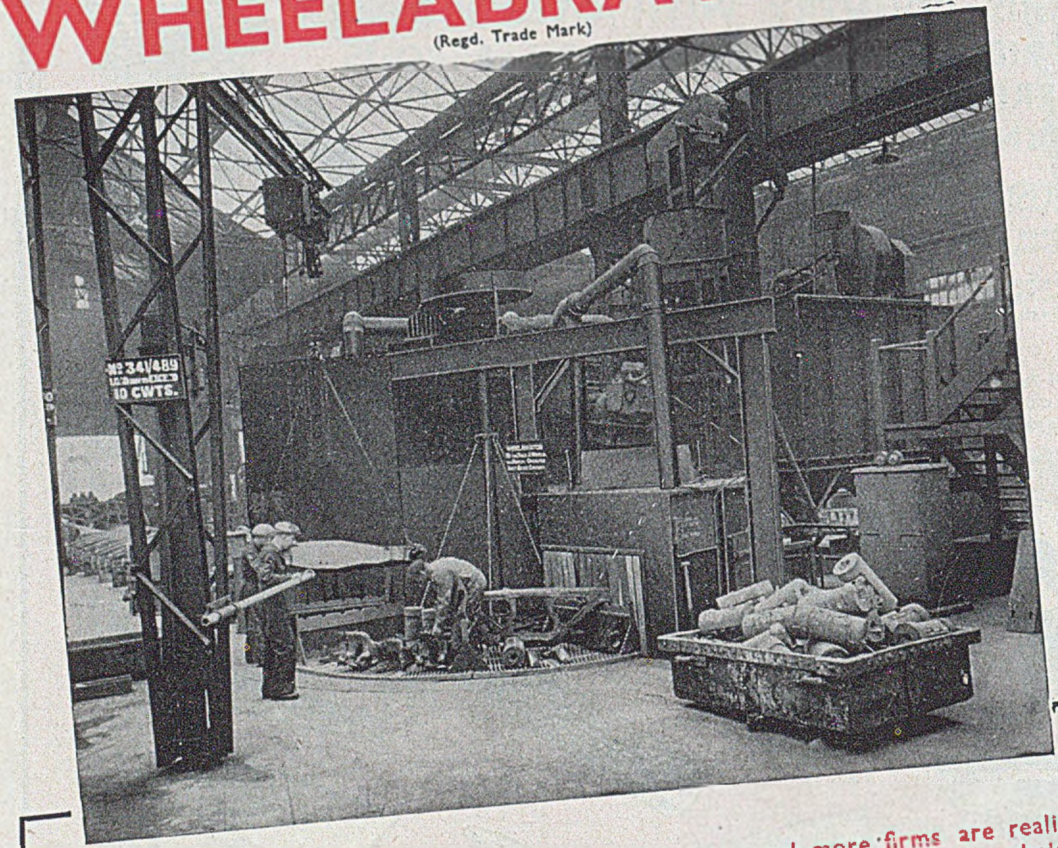

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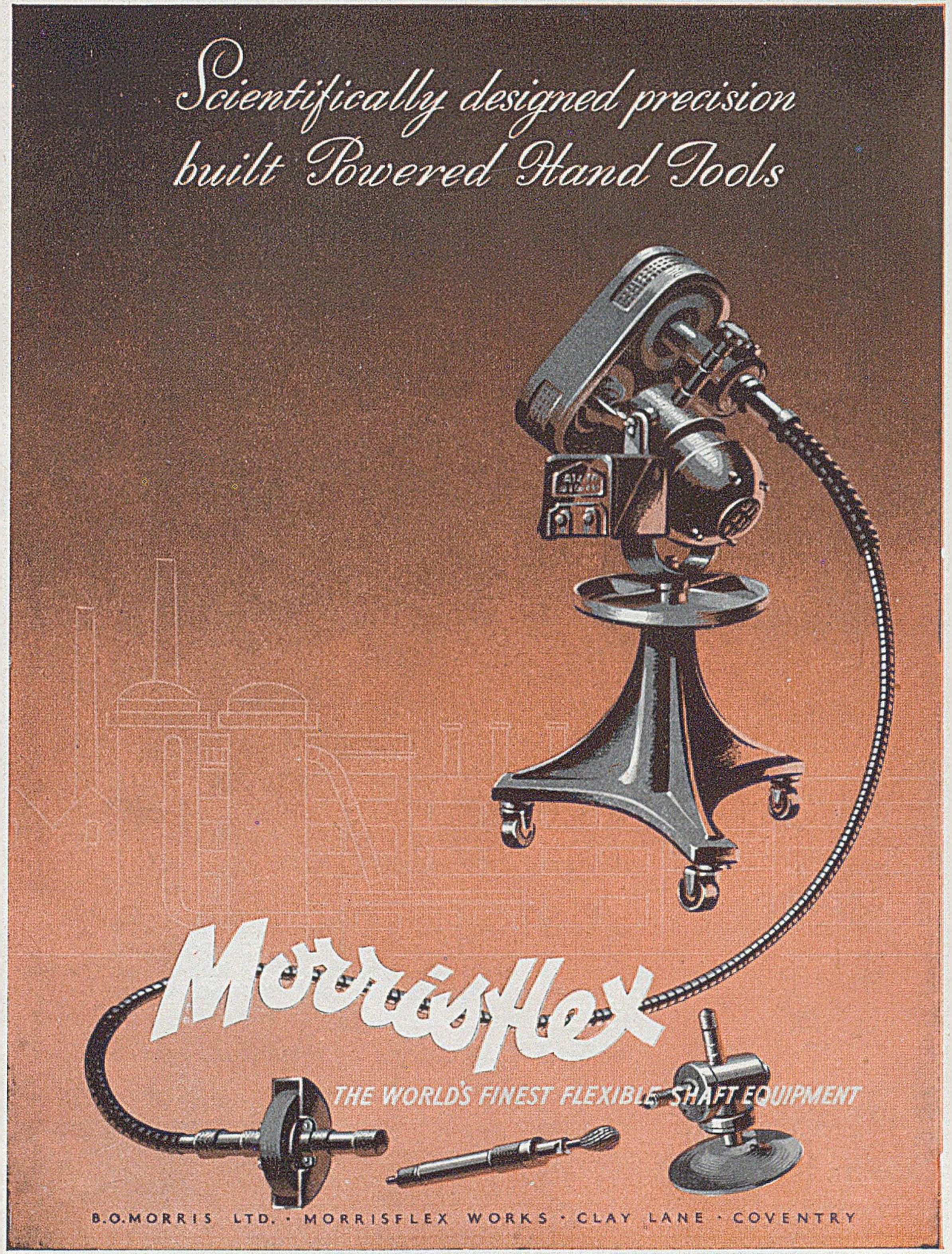
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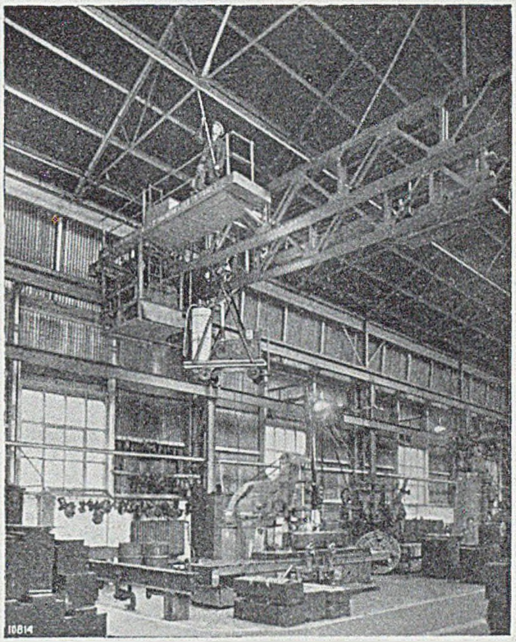

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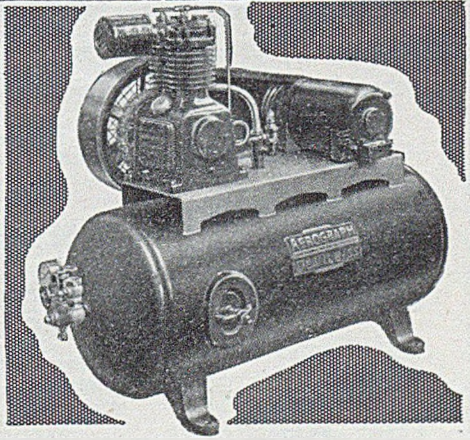

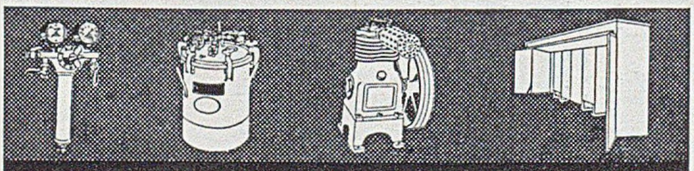

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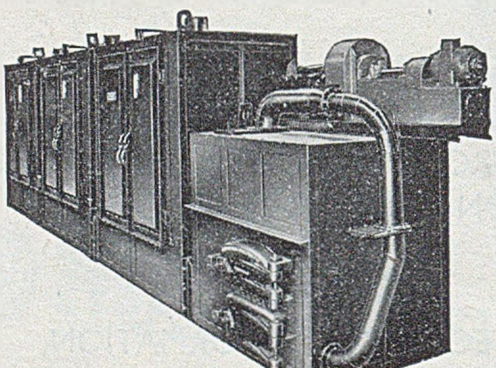

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