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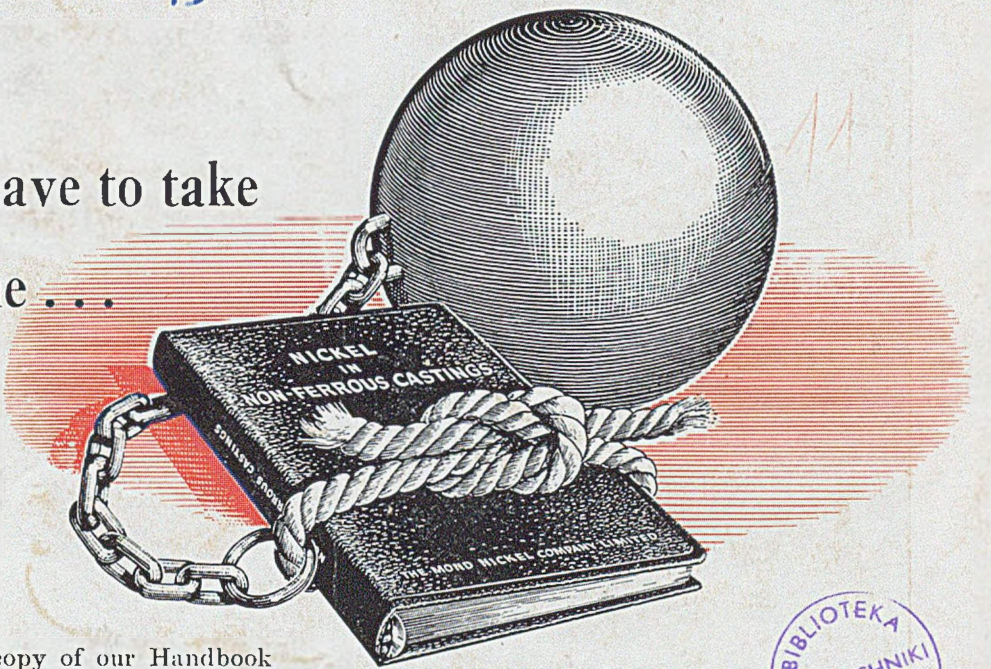

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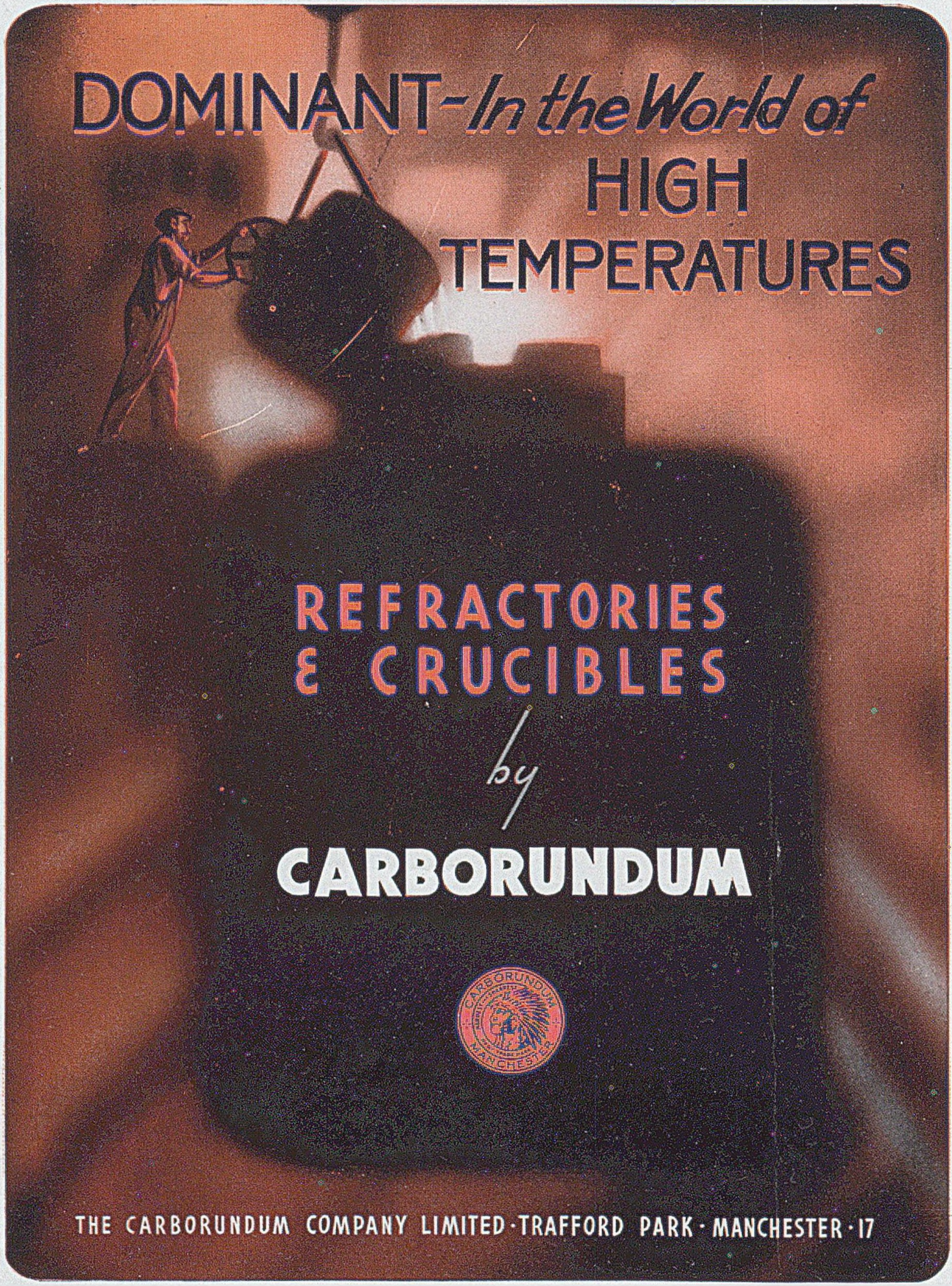
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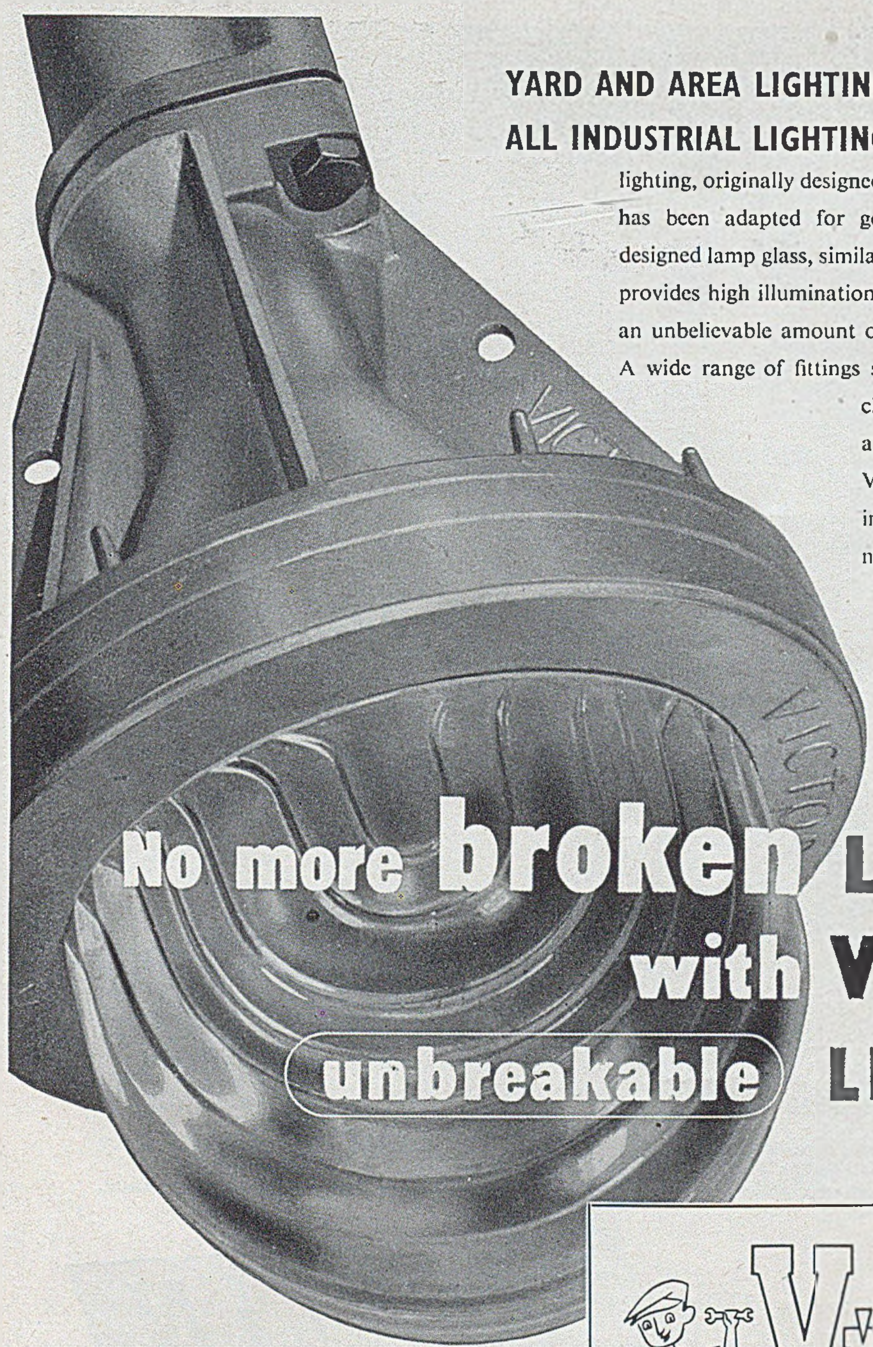

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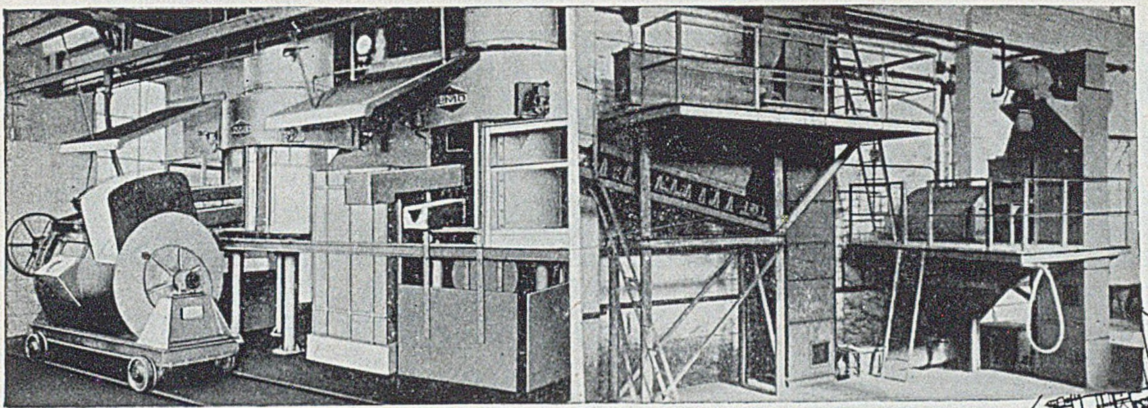

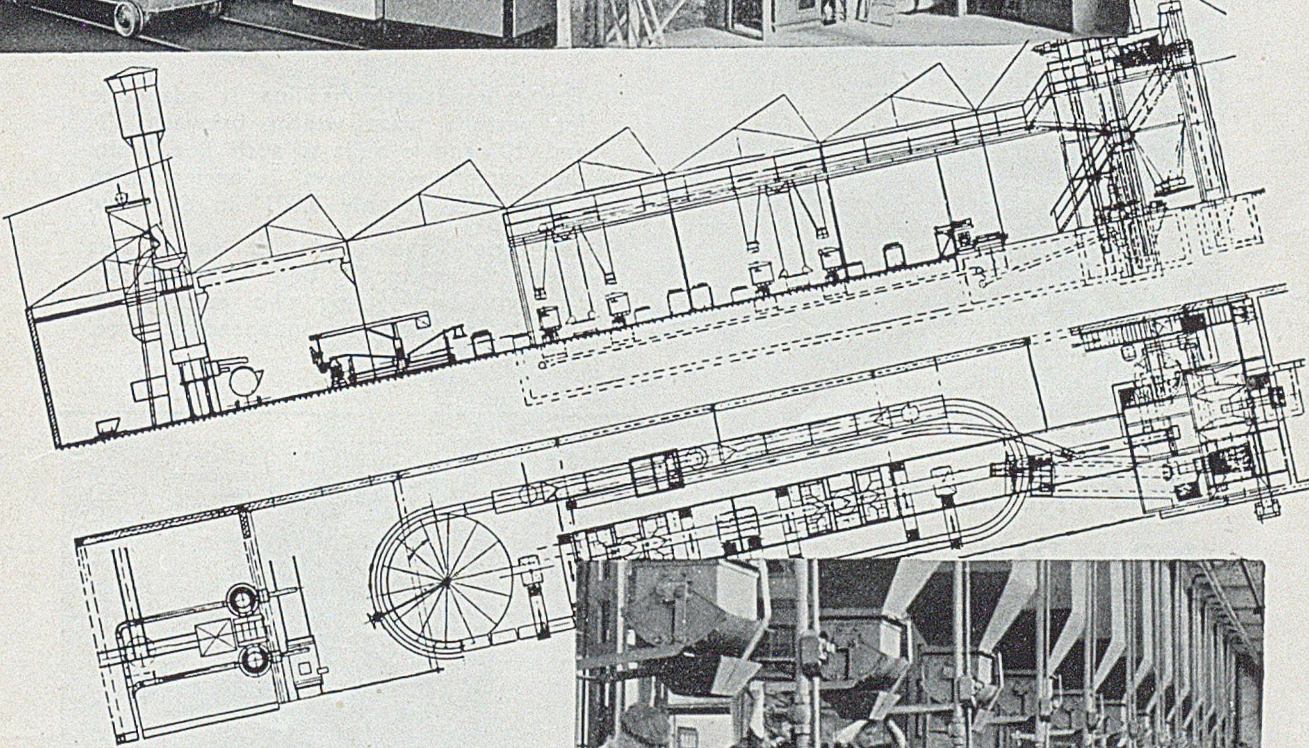

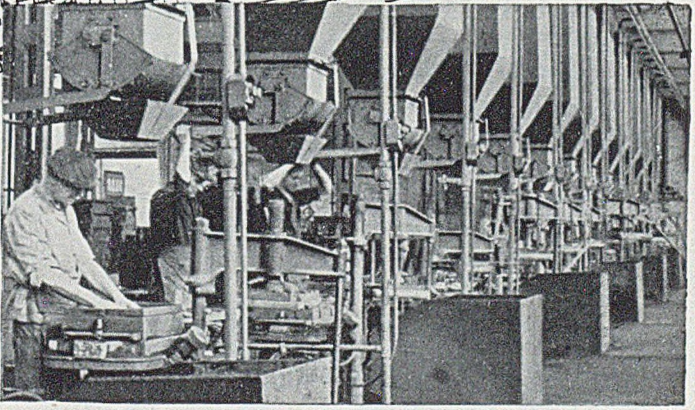

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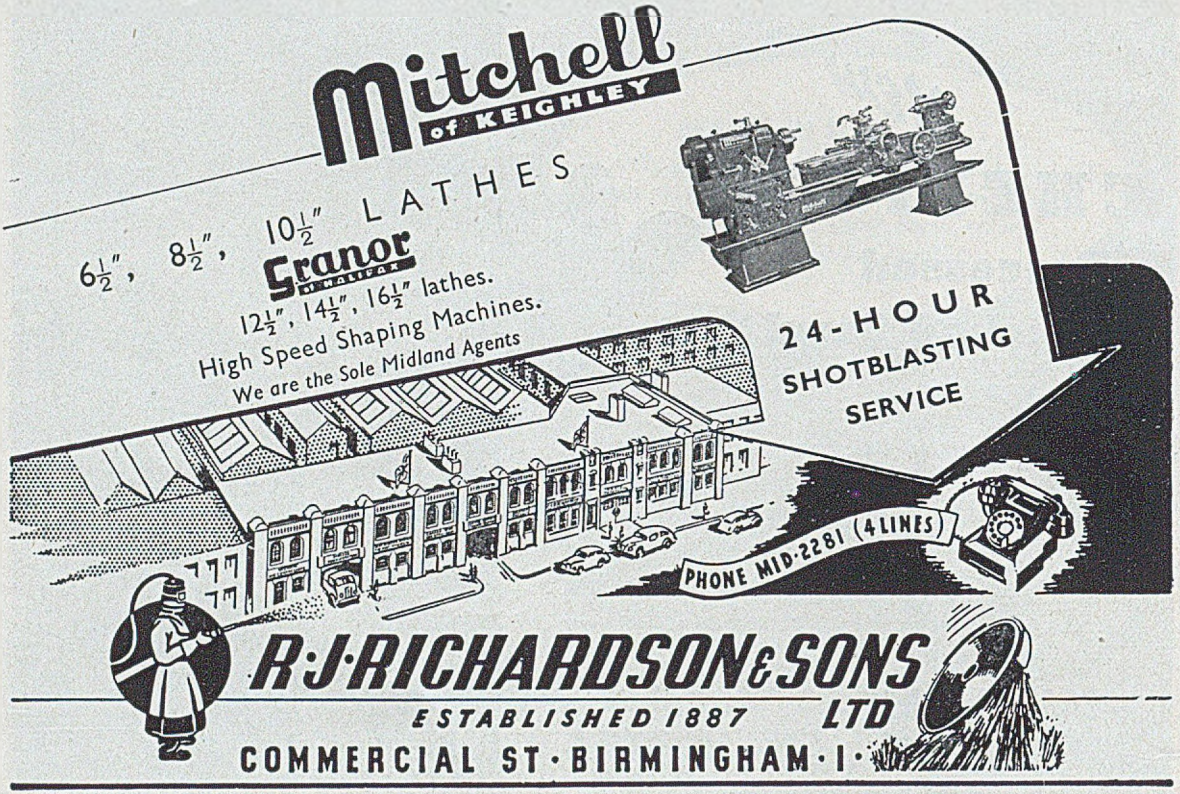
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Storm in a Tea-cup

Just two years ago, the rainwater-goods section of the ironfoundry industry was selected by the Board of Trade for examination by a Commission to ascertain whether or not monopolies and restrictive practices were in vogue. Their findings have now been published as a "Report on the Supply of Cast Iron Rainwater Goods" by His Majesty's Stationery Office—a document running to some 191 pages. Never has the history of this section been so thoroughly detailed. Skeletons have been withdrawn from their cupboards, and have been subjected to *post mortem* investigation. From all this emerges the fact that a method has been devised to eliminate by sensible means uneconomic trading resulting in bankruptcies, unemployment and generally unsatisfactory conditions of working. As a result of what we know to have been much hard work by both the staff of the British Ironfounders' Association and its predecessor (the National Light Castings' Association) and many individual foundry owners, this section of the industry was put on a sound economic basis.

The report informs us—(we quote) "nor have we had complaints of any pre-war shortages"; "we have also been informed that fixed prices are convenient to users"; "we have received no serious criticisms of the present prices of rainwater goods or of their prices before the war," and "average profits have not been high in this industry."

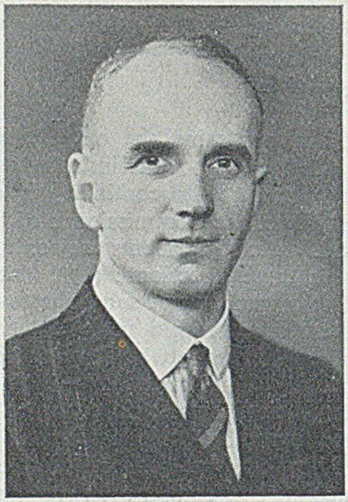
The formation of a body capable of ironing out the fluctuations in demands for rainwater goods consequent upon the vagaries of the building industry was to our mind the only sensible action to take. Whether or not the industry over-stepped the mark to ensure its continuity is difficult to assess. However, the Commission is of the opinion that the Rainwater Agreements are contrary to public interest in three directions: (1) "Manufacturers and merchants who do not subscribe to the Agreements are excluded from a share in the great bulk of the trade, while those who have subscribed cannot withdraw their support without seriously jeopardising their business; (2) owing to the operation of the minimum-price agreement, the introduction of low-cost methods of production is retarded, since a manufacturer after signing the agreements cannot count on market expansion which lower prices could have secured for him and which might be necessary to justify the commercial commitments involved, while as a non-signatory he would be unable to get adequate distributive outlets; (3) no adequate incentive is given to buyers so to bulk and standardise their demands as to encourage foundries to specialise their production; nor is there any means by which any consequential savings, either in production or in distribution costs, can be passed on to the consumer." The Report recommends that those concerned should amend their agreements so as to meet these objections—and no doubt this will be done.

The Report makes interesting reading for those in the foundry industry, and especially for those of us who have always known the "inside stories," in one of which we personally played a minor rôle. Taken by and large the whole affair was just typically a storm in a tea-cup.

Leaders of the Industry

G. L. BAILEY, M.Sc.

Mr. G. L. Bailey, the director of the British Non-Ferrous Metals Research Association was born in 1901 and graduated in metallurgy at Birmingham University in 1921. In 1922 he was awarded the degree of M.Sc. for some post-graduate research on the founding of phosphor-bronzes. From 1922 to 1930 he was on the metallurgical staff of the Research Department, Woolwhich, where most of his time was given to study of the casting of brass ingots, the results of which are summarised in a book with this title by Genders and Bailey published by the B.N.F.M.R.A. In 1930 he joined the Association staff, succeeding Mr. Nightingale as the chief officer of what was then called the development department. The functions of this department were the same as those of what is now called the liaison and technical service department. In 1942, he was appointed deputy-director of the Association and, on the retirement of Dr. Harold Moore in the Autumn of 1944, was appointed director.



Mr. G. L. Bailey.

Mr. Bailey has always been particularly concerned in the problems arising from the casting of metals and has taken a special interest while with the Association in the investigations carried out by his colleagues in this field. He joined the Institute of British Foundrymen in 1938 and was a member of the technical committee of the Institute for some years. He is now an honorary member of council of the Institute of British Foundrymen, a member of council of the Institute of Metals and a founder member of the Institution of Metallurgists. Mr. Bailey has been a member of the Inter-Services Metallurgy Research Council since its formation in 1948 and succeeded Professor A. J. Murphy as chairman of the non-ferrous committee of that council in 1950.

R. J. Richardson & Sons, Limited, of Commercial Street, Birmingham, have had reprints made of an article by Mr. R. T. Ankers on "Some Developments in Modern Shotblasting," which appeared in the technical Press. It is available to our readers on writing to Birmingham.

*Correspondence**

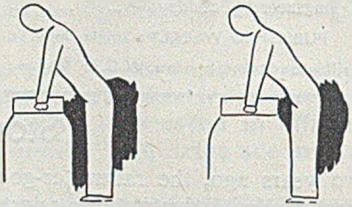
[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

FOUNDRY FATIGUE

To the Editor of the Foundry Trade Journal

Sir,—During the past ten years I have worked on several types of moulding machines and found that the best is the jolt-squeeze, yet even this piece of mechanical perfection can have its faults. At the end of the day my chief worry was not an aching body, but two very painful knees.

The manufacturers, apparently proud of their brain child (and rightly so) had prominently displayed their name and address in raised letters on the section of the machine that came into contact with my legs, and as I am of average height other moulders have probably had the same trouble. In an effort to overcome this irritation I tried standing away from the machine when lifting off a mould, but soon found that this caused muscular strain as the legs play an important part in the actions of a machine moulder.



In this age of mechanisation it does seem a pity that production can be slowed down by a simple thing like housemaid's knee.—Yours etc.,

Trouper.

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* Additional correspondence is printed on pages 389 *et seq.* of this issue.

New Foundry Film Strip

We have received from the British Steel Founders' Association a film strip, illustrating a lecture on the "Design of a Steel Casting." After showing a few typical examples of castings and their strength evaluation, there follows a diagram of the skin and shell formation of a casting. After this, many sensible data are presented to enable the designer to incorporate features in his creation which are acceptable to the foundryman. A second slide film lecture is in course of preparation entitled "Steelmaking and Heat-treatment." The one reviewed is now available on writing to the Association at Broomgrove Lodge, Broomgrove Road, Sheffield 10.

Dr. Manson Benedict, whose appointment as professor of chemical engineering at the Massachusetts Institute of Technology was announced recently, will also serve as scientific director of the National Research Corporation.

Mr. A. Logan, F.I.M., after 15 years with the Light Production Company, Limited, at Slough, recently joined the foundry supplies division of the Harborough Construction Company Limited as technical manager. On the occasion of his leaving the Light Production Company he was presented with a wrist-watch as a parting gift from the directors and staff. In his new sphere, in addition to control of production Mr. Logan will be concerned with metallurgical investigation and the development of new foundry products; particularly with improved fluxes for aluminium and all types of alloys.

Intricate Castings from a Durable Loam Mould*

By J. Currie

This Paper describes the equipment used and the technique applied in the production of an evaporator-body casting. Durable moulds are those which may be used over and over again, some minor repairs and patching being all that is required for each succeeding cast.

Introduction

ALTHOUGH VERY LITTLE has been written about the production of castings from durable moulds, it is apparent that several foundries have to make castings in sufficient quantity which are ideally suited to this method. It would seem therefore that moulds of this type in loam for plain cylindrical castings such as liners, domes, etc., whether made horizontally or vertically, are the rule rather than the exception in the foundry today. However, the more intricate types of casting—*e.g.* those having projections such as flanges, branches, bosses, etc., are generally made from moulds which have to be partly or completely destroyed in order to get the casting free.

In making a mould for such a casting, the mould requires to be split into various sections or parts, making use of the vertical as well as the more orthodox horizontal partings, use is also made of drawbacks to facilitate the removal of sections in which branches etc., have been formed.

This Paper describes the making of a durable loam mould for a large evaporator body, from which four castings were produced, the mould then being completely dismantled and rebuilt to the opposite hand to produce further castings. The first two castings from this latter hand were increased by 23 in. in length and distance pieces (locally called "ekes") were added to give this increased height to the building. Production from this mould helped considerably the normal production of castings of similar type from dry-sand moulds, the usual pattern equipment being in use.

Figs. 1 (*a*) and (*b*) show two views of the rough casting which weighed 6 tons 16 cwt. and is 7 ft. 9¾ in. in height, having an average breadth of 6 ft. 4 in. with average section 1¼ in. The view at (*a*) shows the top end of the casting (as cast) with the various connections etc., and the view at (*b*) shows the bottom end with the steam box, steam-inlet branch and coil drain in the foreground.

A detailed sectional plan and front view were first drawn on a large board and from those views the decision was made to split the mould into three parts vertically and five parts horizontally. The vertical joints are indicated by the lines (X) on the plan view and the horizontal joints by the lines (Y) on the front view—(Fig. 2). It should be understood at this point that only two of the joints the third and fourth were to be used during moulding and closing, the others coming into operation when the mould was split so that the casting could be removed.

Gating the Mould

It was necessary when considering a method of gating that the system brought into use would not in any way hinder the removal of any of the sec-

* 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.

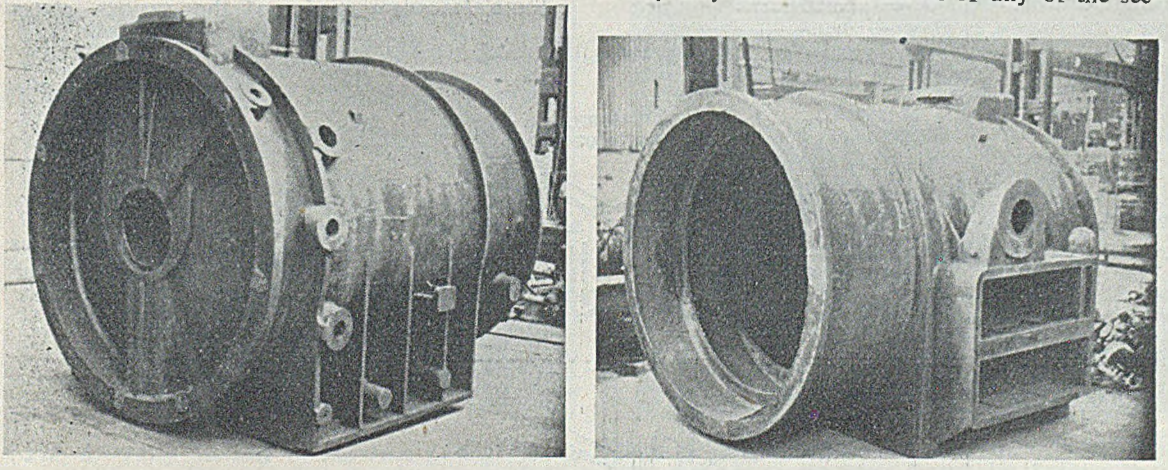


FIG. 1.—(*a*) and (*b*) Views of Top and Bottom Ends of the Large Evaporator-body Casting (as cast).

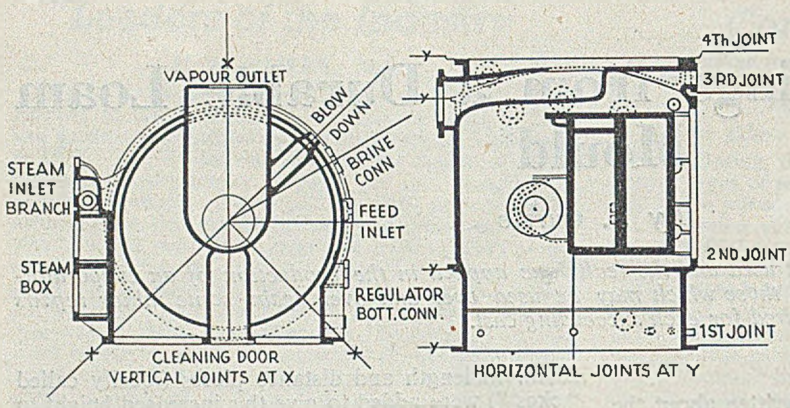


FIG. 2.—*Detailed Sectional Plan and Front View of the Evaporator Body.*

tions of the mould. With this end in view it was decided to have two downgates one at each of the vertical joints on either side of the main door and from those downgates to have inlets leading to the mould cavity at the first, second and third horizontal joints, six inlets in all. It was also decided to have two drop-gates, one on either side of the main door—those latter gates to be controlled in a manner which will be explained later.

The downgates—2 in. in dia. were rammed in sand within 4 in. internal dia. mild-steel pipes—12 lengths of 13½ in. and 2 lengths of 12 in. being required to complete the two gates. Provision was made where necessary for the inlets by cutting out a portion of the pipes.

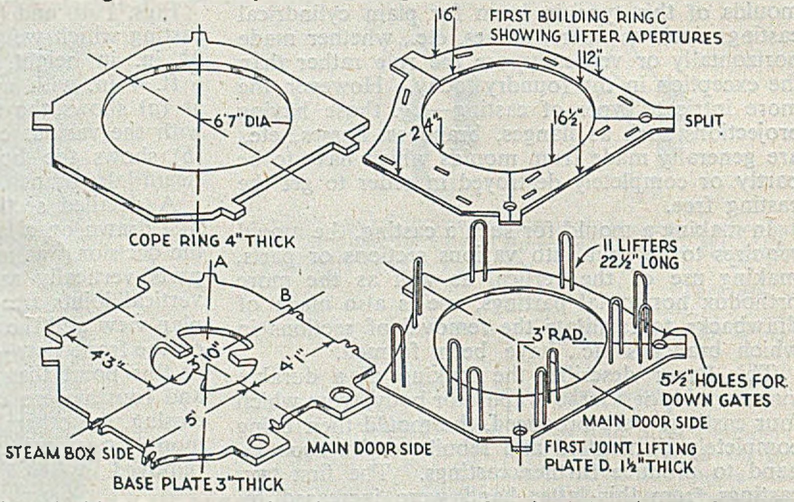


FIG. 3.—*Baseplate, Cope Ring, First Lifting Plate and One of Three Building Rings for the Lower Part of the Mould.*

Layer Casting of Plates

Templates were made of the various plates.

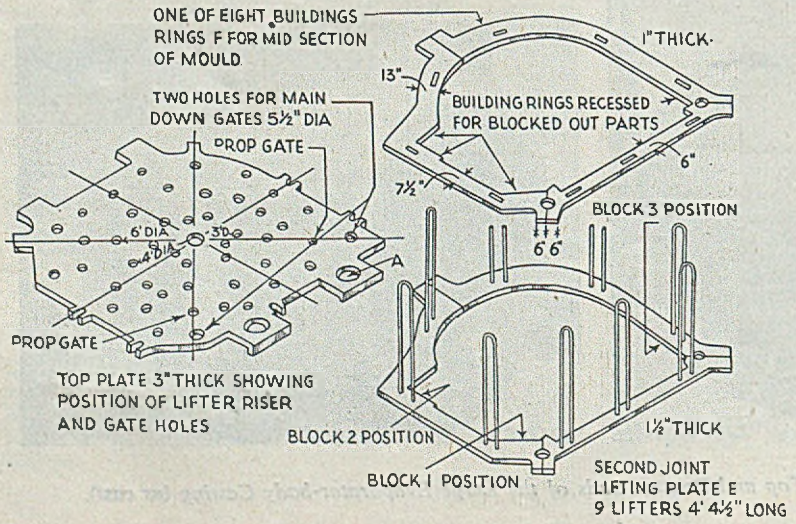


FIG. 4.—*Second Lifting Plate and One of Eight Building Rings for the Mid-part of the Mould; the Top Plate is also shown.*

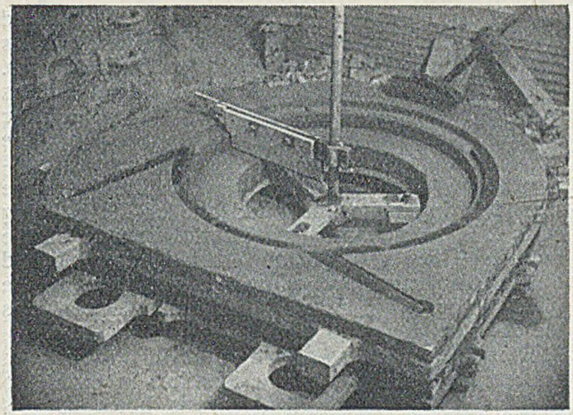


FIG. 5.—*Mould Foundation Completed, the Bottom Inlets and Some of the Flange Segments are in position.*

required—the baseplate, cope ring and top plate, each moulded and cast complete, while the lifting plates and building rings were each moulded and cast in three sections, split to suit the position of the vertical joints. All the plates were cast in open-sand moulds, deep moulds being made for the 1 in.-thick building ring sections, to allow several of them to be cast, one on top of the other.

Keen interest was shown regarding this method of producing several plates from one mould, so that an explanation seems called for. Assuming that four 1 in.-thick plates of approximately the same shape are required from a mould, the mould is made 5 in. deep, then marked off by pushing brads into the sides of the mould at the 1, 2, 3, and 4 in. thicknesses. A narrow inlet, the full depth of the mould is then made or cut at one end, and the first plate cast to the brads indicating 1 in. Parting sand is then dusted on the plate while it is still molten, the plate is allowed to set and the second plate then cast to the brads indicating 2 in. This procedure is carried out until all the plates are cast.

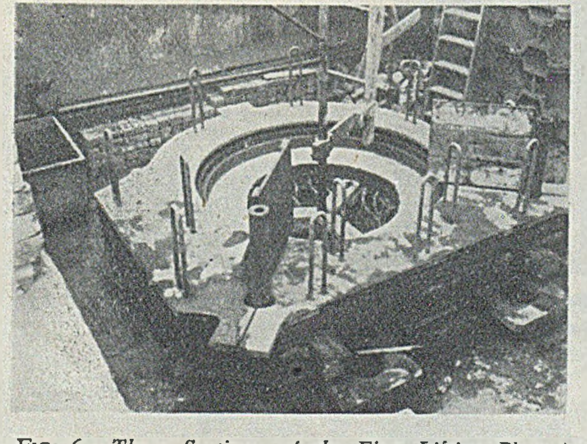


FIG. 6.—*Three Sections of the First Lifting Plate in position. Note the End Boards and the Bottom Portion of one of the Downgates.*

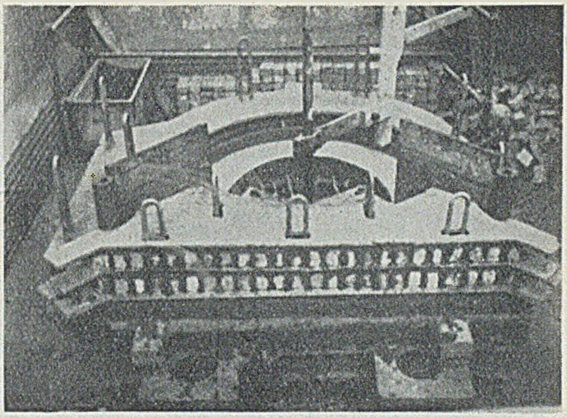


FIG. 7.—*Section under Main-door position partly built.*

Fig. 3 illustrates the baseplate, cope ring, first lifting plate and one of the three building rings which formed the bottom portion of the mould. Provision was made on the baseplate, cast 3 in. thick, for lifting lugs " A " and bolting lugs " B," also three internal lugs " L," protruding into the 3 ft. 10 in. dia., central hole, those latter lugs " L " being required to support the spindle seat.

Other Tackle

Provision was also made for four lifting lugs on the cope ring, this ring, having a 6ft. 7 in. dia. central hole, was cast 4 in. thick. The lifting plates and corresponding building ring sections were made from the same templates, the position of the lifters on the plates, being indicated by oval holes in the templates, those holes also indicating the position of similar holes cast in the building rings. Exact positioning was necessary since the lifters were intended to pass through the holes when the building rings were located in position above the lifting plates during building operations.

All lifters were made from 1 in. dia. mild-steel

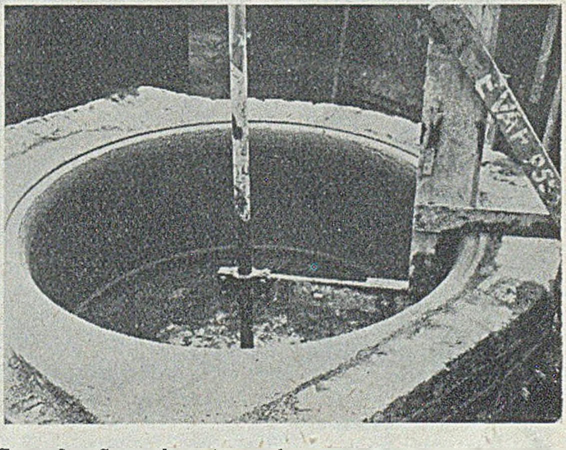


FIG. 8.—*Second Joint, showing Horizontal Board attached to the Main Board, the Sweep Seat for the Cleading Flange and Main Door.*

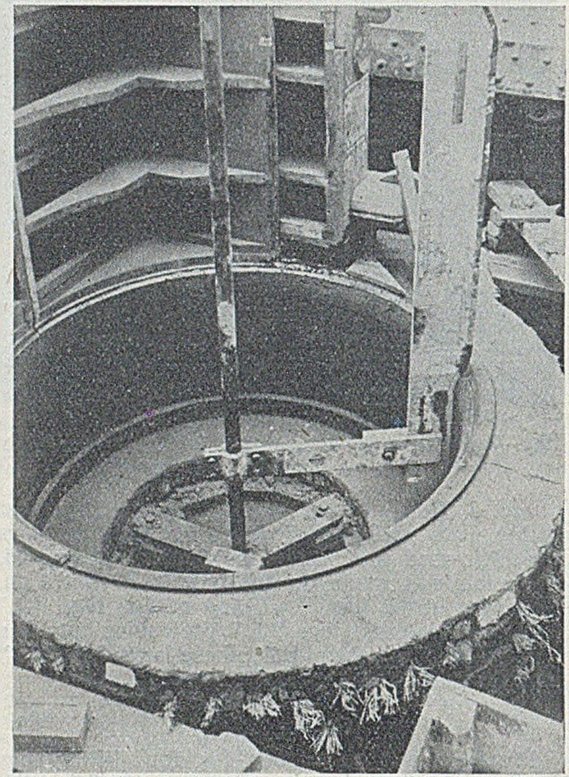


FIG. 9.—*Second Joint with the Main Door, Steam Box and Cleading Flange in position.*

rod, the length of the lifters on the first lifting plate being 22½ in. and those on the second lifting plate 52½ in. The position of the downgates is indicated by the 5½ in. dia. holes, one on either side of the main-door position. (Plate "C" and "D." Fig. 3.) The extensions shown at the splits were utilised later for binding the sections together.

The lifting plates were cast 1½ in. thick, the plates and rings retaining the same outer shape, the inner shape only changing with the mould face, or where it was intended to have drawbacks. Some indication of this is given in Fig. 4 which illustrates the second lifting plate "E" and one of the building rings "F," which formed the mid portion of the mould. Three parts of the mould were blocked out in this section and allowance was made on the plate and rings for those blocks at the positions indicated.

The top plate is also shown in this illustration; this plate, cast 3½ in. thick, was identical in profile to the baseplate, but had numerous holes at predetermined points cast in it. The central hole, 10 in. dia., was intended to take a metal pipe leading from a portable drier, when the mould was being dried. The other holes varied from 7½ in. to 4½ in. dia., as required for the gates and risers, etc.

No prods were cast on this plate, since it was intended for "opposite hand" as well as "as drawn" castings; instead, gratings were made to carry the loam and brickwork. Since the success of the mould hinged on the comparatively easy withdrawal of all the sections from the castings, it was decided to block out those parts which would tend to make the withdrawal of certain of the sections difficult. As will be seen, those parts which were blocked out would have had to be rebuilt in any case.

Building of the Mould

Having cast sufficient tackle to take the mould up to the third or main joint, a start was made on moulding, the baseplate first being set level on stools on the concrete floor of a 6-in. deep pit. The spindle seat, set loosely on the internal lugs of the baseplate, was then bolted tightly after packing had

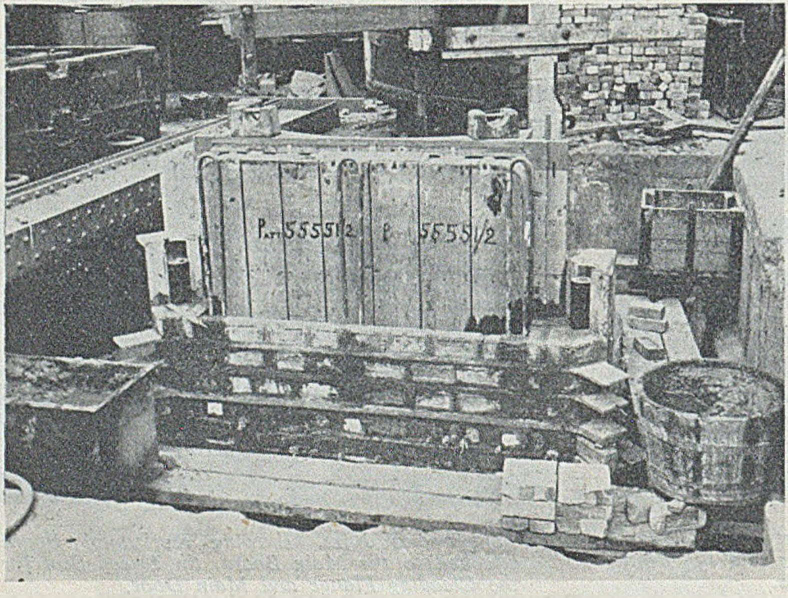


FIG. 10.—*Mid-section behind Main Door partly built-up. Note the Downgates.*

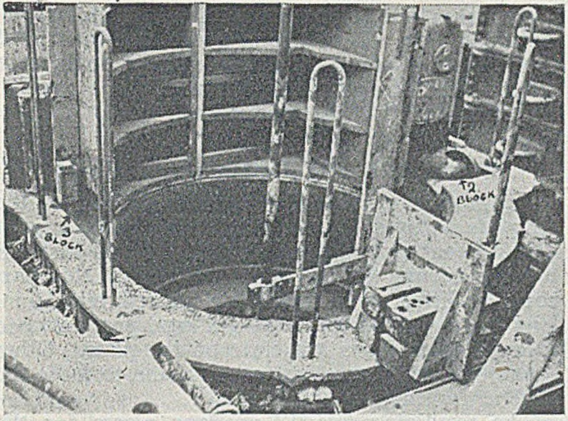


FIG. 11.—*Another view of Mid-section, showing Lifting Plates in position.*

been placed under the arms to make plumb the 2½-in. dia. spindle. A course of bricks was now laid in loam on the plate and on top of those the cope ring, used in this instance simply as a building ring, was bedded down, its outer edge coming in line with the outer edge of the baseplate. The first sweep was then fixed, after setting with size stick, to the spindle arm.

This sweep was made to form the main core print, the seat for the sectional bottom flange (set 4 in. above the bottom of the print) and the foundation for the first horizontal joint. A further course of bricks having been placed on top of the cope ring, the two bottom inlets 24 in. long by 3¼ in. by 1⅞ in. at the flange end and 2½ in. by 1¼ in. at the downgates, were set tangential to the flange. Fig. 5 shows the foundation completed and some of the segments of the flange placed in position.

This part was now allowed to stiffen, while the first sweep and spindle were removed, a second spindle being fitted into the spindle seat and the main board then set with size stick to sweep the vertical wall or cope to the required diameters.

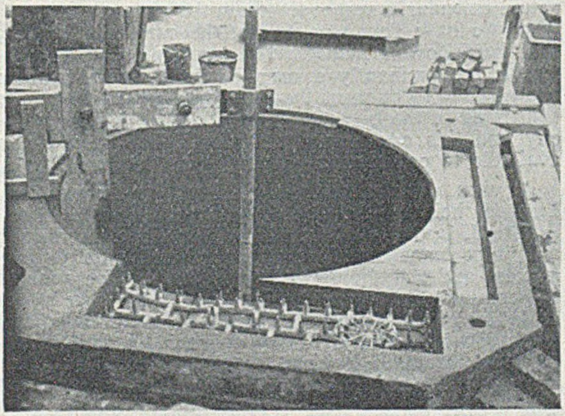


FIG. 12.—*Position of Drawbacks at the Steam Box and Main Door. (Third or Main Joint.)*

Building Bottom Part of the Vertical Wall

Loam was next spread evenly over the joint face of the foundation, parting sand was dusted on it and the three sections of the first lifting plate bedded firmly down in position (Fig. 6). The bottom portion of the downgates, having previously been prepared and now located in position over the bottom inlets, were cut in such a manner so that the ends of the inlets were completely enclosed.

Two end boards were set as shown to hold the downgates in a true vertical position and also to form the vertical joint on either side of the main door position. Commencing with the wall directly under the main door position, a course of bricks was laid in loam on this section of the first lifting plate, the space between the bricks being packed with loam and an occasional piece of straw rope to assist the drying and venting of this lower part. Loam was then spread over the brickwork and the appropriate building-ring section of the circle was bedded in position, the four lifters of the plate coming through the four holes provided in the ring section.

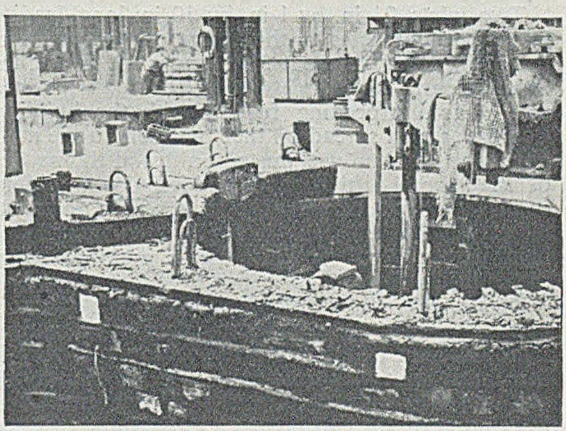


FIG. 13.—*Top Part of the Mould partly Built-up.*

After bedding the section down, the lifters were wedged in the holes, this procedure being carried out throughout the building of the wall to ensure that no movement took place during casting or dismantling of the mould. Each course of bricks was followed by a ring section, bedded and wedged as previously described, finishing off with a course of bricks to just below the level of the second joint. The inner row of bricks on this course was made of loam to offer less resistance to contraction at the cleaning flange. Fig. 7 shows this section partly built up with the end boards and downgates in position.

The end boards were now removed from this built section, the vertical joint thus made dusted with parting sand, and the other two sections of this part of the mould built up. Applying the same method as with the first section, the vertical joint directly opposite the main door was made between those parts. To form the second horizontal joint a horizontal board was now fixed at an indicated position to the main board, loam was applied to the

Intricate Castings from a Durable Loam Mould

face of the mould and also the joint, and the board then rotated to sweep the loam to the diameter required for this part—namely, 5 ft. 10 in.

The seat for the cleading flange and the main door was formed at the same time (Fig. 8). All facings, bosses, etc., on this lower part of the mould were either bedded in position or built in as the building proceeded. The average wall thickness at this stage was 16 in.

Building the Mid Part of the Mould

A seat was now made for the steam box, this level being 4¾ in. above the seat for the main door, the door, steam box and cleading flange parts were then located in correct position in the usual manner. As shown in Fig. 9, the parts used were taken from the existing evaporator-body pattern, but those parts were later replaced by the usual skeleton parts when the mould was re-assembled to produce further castings.

Two inlets, 2¼ in. by 1 in. by 10 in. long, leading from the downgates to the flange on either side of the main door, were cut 3 in. under the flange, the exposed parts of the inlets being covered with sheet steel before proceding further with the building. Loam was next spread on that part behind the main door, parting sand was dusted on it and this section of the second lifting plate bedded down. Metal collars were placed over the ends of the downgate pipes, two further 13½-in. lengths were added, then held in a vertical position, again making use of the end boards previously mentioned.

This section was built up as before, by a course of bricks followed by a building-ring section wedged tightly to the lifters, until a position mid-way to the third joint was reached. Fig. 10 shows this section partly built up, the two downgates retained in position by the end boards, clearly shown, as also the projecting lugs for bolting the sections together. A grating was now made for the part to be blocked out between the main door flange and the steam box and the block was built up to include the five strengthening ribs on this part. The block was later tied back to the main structure (Block 1).

The other two sections of the second lifting plate were then bedded down and this section of the mould built up mid-way, level with the first part. Before completing this part of the mould the two remaining parts to be blocked out were built up (Block 2), to include the steam-inlet branch, ribs, and coil drain, and (Block 3) to include the five strengthening ribs with the various connections, etc. The second block was split at the steam-inlet branch to allow easy access for finishing. Those blocks were also tied back to the main building. Fig. 11 shows this part of the mould being built up.

Two further 13½ in. lengths were added to the downgates, a metal collar was again included overlapping the joint, and the three sections of the mid part of the mould were then built up in turn to the third joint. Since the top of the print for the main door core and also the core prints and top of the steam box were below the level of this joint, drawbacks were made at those parts to bring the joint level all round (Fig. 12). A joint board was then fixed to the main board and the whole swept up in loam to complete this part of the mould. The average wall thickness at this stage was 13 in.

Building the Top Section of the Mould

Again making use of the three sections of the template as used for the first lifting plate, a joint and stiffener grating was marked off and cast for the top section of the mould. So that this part could be lifted away to the top plate, lifters 11 in. long were cast on the joint gratings, positioned to correspond to holes left clear on the plate. Other lifters 8 in. long were cast on also, and to those the stiffener grating was toggled.

The remaining two 12 in. long pieces for the downgates were now added and the dropgates positioned, one on either side of the main door. Loam was then spread over the joint and each section of the joint grating bedded down in turn. As shown in Fig. 13, that section above the main door was built up first, to be followed by the section opposite the steam box, and finally the section above the steam box, the usual vertical joints being made between the sections. Having built all three sections to just below the level of the fourth joint, a horizontal board forming the top flange and joint was fixed to the main board, and the mould and joint face were swept up in loam to complete the building.

(To be continued)

SIR RONALD MATTHEWS, D.L., J.P., has recently been appointed chairman of the board of directors of Turton Bros. & Matthews, Limited, consequent upon the death in December last of Major Durham S. Matthews, O.B.E., J.P. MR. A. S. MATTHEWS succeeds Sir Ronald as vice-chairman. MR. A. J. SPITTLE who for the past 23 yrs. has been secretary of the company retires from that position and has been elected to a seat on the board. He is succeeded as secretary by MR. E. S. VICKERS.

THE EYRE SMELTING COMPANY, LIMITED, Tandem Works, Merton Abbey, London, S.W.19, have sent us a copy of an illustrated calendar of unique type. The actual calendar is suspended from the picture and gives, what we have found so useful, the current, preceding and the following month. The centre-piece of the picture is predominantly a map of Surrey with banners showing the location of the interesting places which are illustrated in the border. Maps are always good publicity and this one is no exception. The calendar is available to our readers on writing to Tandem Works.

AT THE ANNUAL GENERAL MEETING of Jowett Cars, Limited, held in the Great Northern Victoria Hotel, Bradford, last week, Mr. Harry Woodhead, chairman and joint managing director, announced gifts to employees and shareholders to mark the jubilee year of the company. For the employees £10,000 is being set aside from the net profit of £48,612 for a recreation and welfare fund. The Ordinary shareholders are to receive an increased dividend of 12½ per cent. (last year 10 per cent.)—a total of £23,394. Mr. Woodhead announced that he would shortly be retiring as joint managing director and that Mr. A. F. Jopling, at present also joint managing director, would become sole managing director.

Correspondence

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

Testing the Metal or the Casting

(*From Mr. J. W. Bolton, the well-known American Metallurgist*)

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—The Paper "Testing the Metal or Testing the Casting", by E. O. Lissell (F.T.J. Nov. 9, 1950, *et seq.*) is interesting, and also is informative in some of its details. Unfortunately, neither its data nor its conclusions provide a sound solution of the broad problem it proposes. Its conclusions (1), (2), (3) and (4) have been understood and accepted for many years. The recommendation (conclusion (5)) will not provide the answers the Author evidently seeks. Conclusion (6) needs clarification and more exact statement to become acceptable.

The Author (p. 362) refers to the causative factors listed by Bolton in 1931 which determine the physical properties of castings. The Author arrives at a stated difference of opinion, ignoring the simple fact that his objections are based on apparent non-consideration of principles inherent in Bolton's statements. For example, causative factor (4) lists "Thermal and mechanical history—furnace spout to cooled casting."

The Author states, "Such factors as section sensitivity, volume sensitivity and skin factor must, however, not be overlooked." Causative factors (1), (2) and (3) impart to the molten metal a number of inherent potentialities, including those above quoted from the Author. Causative factors (4) and (5) include all subsequent environment. It is surprising that the Author "is of a somewhat different opinion." The writer does not believe the Author really has stated a different opinion. The Author makes no direct reference to causative factor (5) wherein lie most of the sources of complication in interpretation of test-bar data in terms of casting performance. Engineers and metallurgists are interested in test-bar tests in so far as these possess practical or usable significance. Most would agree that a major interest is the serviceability of the casting. Specifications are a device or factor helpful in attainment of proper and uniform serviceability. They are, however, but one factor. Let us face the problem with candour. To avoid becoming highly prolix, let us neglect concurrent problems of economics, etc., and stick to casting serviceability, and the basic virtues and shortcomings of specifications.

Many years ago it was held that the only proof of serviceability is actual service history. In the absolute sense, this remains true. Yet, over the years, scientific advancement has led to greatly expanded knowledge, and to the evolution of many tests and correlations which have been applied successfully toward attainment of improved and more uniform castings. The writer would be the last to maintain that progress to date has been adequate. Indeed, his contention is that Mr. Lissell's proposed approaches toward progress are inadequate and restrictive. Some thirty years ago, many felt that a test-bar could represent only "the quality of iron in the ladle", to use Moldenke's phrase. In Great Britain and in the United States, as well as in some other countries there were groups who felt that cast-iron specifications should reflect at least some of the possibilities of the iron in the castings, and that separately-cast test-bars could be helpful in this direction. Research and study led to promulgation of the forerunners of the multiple bar specifications of the B.S.I. and the A.S.T.M. Careful study of the many papers of that period will reveal that various workers were well aware of the limitations. They did bring out in measurable fashion that mass (or more properly, "thermal history—furnace-spout to cooled casting") must be considered and evaluated for intelligent specification. In simpler cases, a practical correlation between test-bar and metal strength in the controlling section of casting may be arrived at by V/A considerations. As stated in A.S.T.M-A48-6 (*b*) such a correlation "is only approximate and may need modification for complicated castings". This may be established by agreement between the manufacturer and the purchaser. (It is suggested that specification A48-6 be read in its entirety.) The conclusion (suggestion) of Lissell's, (5) is one among a number of methods which may be used for correlative purposes and for selection of bar size.

Both British and United States investigators were quite familiar with direct tests of metal from castings, including the trepanning procedures ably used by French and other workers. Such direct tests of metal in castings were used in studying correlative procedures, and still are used occasionally. May we not say here that the British and other specifications have served and still serve a useful purpose in the selection and control of iron in castings? Mr. Lissell, in part, argues that this approach should be extended and modified in detail, in so far as metal tests are involved. He states (p. 357) that consumers are interested in specifications for design purposes as well as for inspection purposes. Despite this stated objective and despite the title part, "testing the casting", the Author almost totally avoids reference to or data on testing the casing! Let it be made clear that the "strength of the iron in the casting" (as determined directly, or as controlled by correlative means) by no means tests the casting. The strength of the iron in the casting is a correlative means or factor, just as a test-bar strength is.

To make my meaning clear, may I quote a preliminary illustration from another field before commenting about grey-iron castings. My firm provides steel castings for use in steam at 1,050 deg. F., (565 deg. C.), at pressures to about 2,500 lb. per sq. in. Under these conditions, the metal is

Correspondence—Testing the Metal or the Casting

actually red hot and it is plastic. An inadequate casting, say, for a 12 in. valve body could well cause disaster, a serious explosion, and a shut-down in power generation in a huge central station. It is safe to assume that under such conditions consumers and producers have great interest in the characteristics of the casting. What is done? The specifications prescribe the chemical and tensile-test characteristics, as is done for cast iron. Mass effect (different size bars?) is not prescribed. However, heat-treatments are prescribed, for the same general reasons that different bars are prescribed in iron specifications, *i.e.*, to provide some correlation of effects of thermal history. Studies of steel castings show that this correlative procedure has some inadequacies, just as is the case with cast-iron procedures.

Radiography with or without magnetic-particle inspection usually is employed; pressure tests are mandatory, whilst bend tests are optional. With the exception of radiography (with or without magnetic-particle inspection) and pressure tests, none of the specification tests has any direct significance. They are purely correlative. Creep, stress-to-rupture, structural stability, expansion, contraction, weldability, nodular characteristics, state of stress, etc., are characteristics of the materials that must be known and assured. These characteristics have been studied in great detail for the materials specified. By means of S-R studies, etc., of the castings; the probing of castings after long service periods, etc., other effects have been determined. Thus, despite the fact that the specification requirements are mostly correlative only, there is every reason to have confidence in the serviceability of the castings. The castings, or the assemblies in which the castings are used are studied in their entirety. Parts or segments are removed for examination. Behaviour in service is followed carefully.

Turning back to cast-iron castings, it appears to be the opinion of Lissell (as judged by the data offered and the references cited) that ultimate strength is the major casting property, and that the casting strength can be determined by ascertaining the strength of specimens trepanned from castings. (I believe this is a fair interpretation, since the Author frequently uses the term "casting properties.") Actually, the strength of metal, as determined either by trepanning or established by test-bar correlative practices does not reveal the properties of the casting.

To reveal these properties requires intensive study of causative factor (5) listed by the writer plus many correlative studies of materials properties other than breaking strength. Design or shape factor (over and beyond the effect of "mass" or thermal history) is of tremendous importance. For example, instances have been known where castings have cracked due to internal stresses alone. Trepanned specimens as well as separately-cast specimens would show that the cast material had good strength, yet the useful strength of the casting in the affected region approached zero. (Indeed, cracking in castings of high material strength may be more likely than in soft iron castings.) For some conditions, thermal stress-relief is used to increase the usable casting strength.

Resistance to deformation is an exceedingly important consideration. Many years ago (1937) the writer demonstrated the basic mechanisms of deformation, both plastic and elastic, in grey cast irons. Others later added much information that is useful. Incidentally, pre-stressing at times is used to remove or minimise undesired plastic components. Although irons could be tested or set regularly (trepanned or separately-cast) to establish the probabilities, this hardly would be acceptable as a routine specification procedure.

Damping is a useful characteristic for some applications. It is established or attained in castings by correlative selection of materials of suitable chemical composition and microstructure plus control by separately-cast bar tests which give bases for adequate correlation and control of uniformity. "Growth", corrosion resistance, and wearability are among characteristics that must be controlled for castings—yet are not prescribed directly in specifications. Chemical analyses and test-bars are used as practical correlative and control devices. Stress-corrosion characteristics are of vital import in some applications of grey irons, particularly the austenitic types. Control again is through correlative provisions, analyses and test-bars.

Something must be known about creep, at room or at elevated temperatures, according to service requirements. After all, this is one of the real measures of the usable strength of the material. It is not prescribed directly in any specification.

Reverting to testing castings, in recent years it has become increasingly and painfully apparent that in many cases the old idea that the stresses in castings can be computed from formulæ, which include knowledge of the strength of the materials, is quite fallacious. (Hence the factors of safety of 10-1 and thereabouts!) Yet the stress patterns can be established accurately by strain-resistance gauges (SR). (The techniques necessary for cast iron are different from steel, as shown by an early Paper from this laboratory.) Points or areas of maximum intensity may be determined by brittle laquers. These methods provide more knowledge of the strength of a casting than all tests either of separately-cast bars or of trepanned specimens can ever do.

May I recapitulate as follows? Mr. Lissell's Paper adds to our knowledge of correlative possibilities attainable through testing of separately-cast specimens, or of specimens taken from castings. The statistical approach is one that has had some use, and his suggestion that it be extended is sound. However, the end possibility envisaged in the Author's conclusion (5) is not attainable through the means he recommends.

I have tried to emphasise:—

(*a*) Test data from trepanned specimens do not and cannot indicate a casting's strength properties. Direct and accurate methods are available.

(*Concluded on page* 393.)

Grey Iron Founders Productivity Report

Discussion at the I.B.F., East Midlands Branch

At the East Midlands Branch of the Institute of British Foundrymen there was recently held a further discussion on the Grey Iron Founders' Productivity Report; Mr. S. H. Russell and Mr. H. B. Farmer were in attendance and Mr. K. Docksey presided.

Mr. S. P. Russell asked if Mr. Farmer had obtained any impression from operators of cupolas in the United States of the relative merits of side skip charging and drop-bottom buckets, especially as to the distribution of charges.

Mr. H. B. Farmer said he understood from one of the experts in the States that when the charges reached 3 ft. from the cupola charging mouth, there was no difference in the distribution of the charges in either system. He favoured the cone drop-bucket type, as there was less erosion of the cupola.

Mr. Docksey asked what time was taken using the Bondactor machine for cupola patching as compared with the ordinary method.

Mr. Farmer said the owners claimed a saving of £12 10s. per day on four cupolas, but they were large cupolas. One could not use such a machine on a 3-ft. dia. cupola, as there would be no room to operate the nozzle. One man could attend to the machine and do the whole job, whereas by the ordinary method three men would be required. The minimum size of cupola on which this machine could be used was not less than 4 ft. dia.

Objectives

Mr. Butters said he understood the object of visit to the States was to study the methods of production and to report back to the British industry, and for British industry to take advantage of any new methods. After reading and hearing the Report and seeing the slides one must bear in mind that what one saw on the slides had to be judged with comparative foundries in this country, although they were not all like that in America. He asked Mr. Russell if the foundries in America using mechanical charging were of comparative size with those using mechanical methods in this country. Probably all foundries in America did not use them. Reference was made to the coke bed being 60 in. high; on small cupolas there would be very little room left to add any burden. Reference was also made to the size of charge being larger owing to the softer nature of the coke. This was opposite to what one would have thought.

Regarding American iron being the more easily machinable, their natural iron is softer and stronger than that in Great Britain, but one might alter the structure of the iron by the method of melting. It was also stated that the cupolas were bigger than necessary, and were lined down to the size required in such cases; were the tuyeres altered? He did not know whether he was right in assuming that when a cupola was blowing a soft blast, one tended to get a softer iron. Rootes-type blowers delivered the amount of air into the cupola regardless of any restrictions.

Mr. Farmer had mentioned and showed slip flasks; it was obvious that to use these one had to use a high ratio of sand to casting produced. There must, therefore, be a fairly good mechanical method of mixing sand, which was a big problem. With reference to the service of the moulding operators, what was the ratio of indirect labour to the foundry operator.

Finally, when charging with a vertical skip hoist with the ordinary platform type of scale and using charges which varied, such as high-phosphorus iron, hematite and steel, how was there a saving of labour, as it could not all be put on the scale at once. Using a jolt-roll-over machine for 24 moulds 48 in. by 36 in. from four men (*i.e.*, six moulds per man per day) did not appear very high production.

Mr. Russell, referring to the sizes of foundries using mechanical methods, said the team visited 25 foundries, and eight or ten were small foundries employing fewer than 80 men all told. Out of the 25 foundries, 24 used some kind of mechanical charging device. Labour in America was extremely expensive compared with British, the lowest form of labour having a starting rate of $1.3 per hr., which was equivalent to 10s. per hr. In America, it more quickly became economic to instal mechanical equipment, because their machinery was relatively cheaper, and their labour dearer, than ours.

He understood they had a very high coke bed in every cupola, and the bed was always 60 in. deep. As to cupolas being lined down, he believed they did not reduce the tuyere area, so that the blast would be relatively softer. The question of iron having a low-phosphorus content was a geological feature of the country, and was just one of those things with which the United States were favoured. The team heard frequent references to high-duty iron, but this proved a long way below what was considered to be high-duty iron in this country. They called anything above 15 tons per sq. in. tensile "high-duty iron," whereas here one would say 22 tons per sq. in. tensile was a minimum. As to serviceing the moulding operators, if reference was made to the Report, it would be seen that a breakdown of the labour had been made, but the proportion of non-productive to productive workers was not shown. There was quite an adequate pool of labour in the United States.

This serviceing was always done by the time the team reached the foundries in the morning. It may have been done by a night gang. American foundries certainly had an excellent method of getting lifters straightened and returned previously sorted for the moulders to re-use.

Mr. Farmer stated that the consistent machining qualities of American irons was achieved by the

Grey Iron Founders Productivity Report

low-phosphorus and high-carbon content, with the flake graphite correctly distributed. All cupolas seen had a blast-volume control and recorded the correct volume going into the cupola. In America, they used their sand instruments to fine purpose, and kept their sand under strict control. An additional service, carried out by the night gang, was reconditioning of the sand by the sand cutter. Some of the mechanical equipment was amazing in its simplicity. There were many labour-saving aids in the usual type of jobbing foundry, such as monorails, etc. As to cupola chargers, the team saw four different systems; the magnet went along to the stock pile, and the operator appeared to have the knack of picking up almost the exact amount of metal required. As to the production of 24 moulds 48 in. by 36 in., this was a very intricately-cored job, and 1½ men were engaged on coring-up. It was not one of the best production examples. Mr. Russell mentioned the case of two men turning out a casting in 4 hrs., for which casting we should require 14 to 16 hrs. The men in America certainly knew how to work. Productivity was due to their willingness to work irrespective of mechanical equipment.

Pitch-bonded Sand

MR. TOMKIN, referring to the use of pitch in facing sand, said it was mentioned, when the mould had been skin dried, the pitch formed a type of waterproof skin which prevented "strike back." What effect would pitch have on the permeability of the sand facing?

MR. RUSSELL said that with pitch the real advantage was the high temperature at which the mould could be dried.

MR. FARMER said that one firm in this country was using pitch in natural sands on a mechanised plant producing green-sand moulds, and the permeability had increased in that particular case. They started by using 3 per cent. pitch, and found it was only necessary to add 1½ per cent. pitch. They had done away with the use of coal-dust altogether, and had been very successful in producing castings with a clean finish.

MR. L. HEARNSHAW asked how the Americans dealt with the obnoxious fumes which were inherent with the use of pitch.

MR. RUSSELL said that, with the larger moulds, the pitch did produce a fume which could be unpleasant. Good ventilation was necessary.

MR. FARMER added that in one foundry the moulders said they liked it, as it smelled like tar.

Moulding Problems

MR. HAYDEN asked when using the slip-off flask, whether there was any reinforcement used on the outside of the mould. If not, what were the dimensions of the sand from the casting to the outer part of the mould.

He felt that given all the mechanical aids, the Americans possess, the British would get the same results.

MR. FARMER said the reinforcement of moulds was obtained with the usual type of casting jackets, the degree of taper being exactly the same as on the pop-off flask, which did support the mould. The question of sand allowed around the pattern varied. In one case where there was a deep pulley being made with a solid centre web, this was cast in a box 14 by 14 in., the sand cod being 4 in. deep, and no reinforcement bar was used.

As to British workmen *versus* American workmen, he thought this was where incentives entered. In England, some men did not want to earn more money, because it was taken away in taxation. If British manufacturers would give the men as many labour aids there was no doubt about the result, if one could remove all those deterrents to hard working.

MR. HEWITT asked for data as to the relative fettling costs.

MR. FARMER answered that the team was amazed at the cost in America. In one case, where the skin finish was originally quite good, the customers insisted on the castings being ground all over. The fettling costs were enormous, 15 to 20 per cent. of the personnel were employed on this work.

Contrasting Viewpoints

MR. GARDOM said he felt that he must speak in personal defence, and thought he could put up a very good case for this country. About 95 per cent. of what had been seen on the slides had been previously done here. Some 15 years ago, he saw a Sandslinger towing machines down a foundry, and this machine had then been working for 10 years. As to the light-section roofs, the installation of these was not permissible in this country. With reference to the design of furnace-charging equipment to suit foundry buildings and site conditions, many designs similar to those shown by Mr. Farmer had been offered to the British Foundry industry, but none had yet been accepted. Volume control of the cupolas was a necessity in America owing to the wide changes in atmospheric humidity. Pitch has been used for a very long time in this country. Mr. Russell quoted the example of two men making two large castings per day; what was the total cost of wages, including servicing the labour in making the two moulds, as compared with what could be expected in this country?

Foremen Training

How did the Americans train their foremen? did they give them any training or emulate the British by throwing them into the jaws of the men in the shop? The British foreman had his sympathy. Mr. Russell mentioned technical schools with fully-equipped foundries. Where did they sell the castings? Technical schools in this country were not allowed to sell any of their production. He believed in France they were allowed to sell to their Government. Emphasis had been laid on the value of discussion on the foundry floor, and with this principle he agreed.

MR. FARMER in reply said he was aware that moulding machines had been towed by a Sandslinger in Coventry 15 years ago, but this did not mean that the rest of Britain knew. One major problem was that people were unaware of what was being done even by neighbouring foundries. American concerns were permitted to do many things not allowed here. Factory inspection was on a different basis. He thought an effort should be made to get the Government to accept these lighter structures. He thanked Mr. Gardom for remarks as to the need for volume control on American cupolas. Climatic conditions were different over there; it was, for instance, necessary to have storage facilities for supplies of sand to last out the winter. Pitch and also wood-flour were used in this country but every foundryman did not know that he could use pitch or wood-flour and it was the team's object to inform them.

Very Little New

MR. RUSSELL said the team in the Report had stressed that it had seen very little new, though possibly the Bondactor was the exception. The system for the selection of foremen was ruthless. If a man was not a success, there was invariably another man anxious to take over. There was keen competition for jobs, and as a result, there was no hesitation in sacking a man. There was close co-operation between management and foremen, and adequate training was given to the foreman if he would take it. Management knew more than in this country what transpired on the shop floor and were familiar with the men's background.

Planning

MR. ROXBURGH said that last autumn he visited the States, and was privileged to visit eight of the highly-mechanised foundries in the country. Unlike many people, he felt one could learn much of real value. One thing emphasised initially was the planning of the job. Many patterns were made by outside patternmakers, and they sent to these firms the pattern drawing, together with the sizes, etc., of the runners and feeders. This system should be emulated in order to increase national productivity. Though all foundrymen had their own ideas as to the running of castings, no one had ever devised a workable formula. Several foundries in America had one man specially set aside for investigation of that aspect of the foundry. Instead of trying to discredit what the Americans had done, we should try to learn all one could from them. Their mechanised plants were very efficient, as was also their control of sand, metal and the like.

Could any information be given on water-cooled cupolas? What was the minimum amount of refractory which one could use inside the water-cooled cupola running 16 hrs. per day? Also, could details be quoted of the types of water-cooled casing and the dimensions of the water passage?

MR. FARMER said the team had attended a conference on water-cooled cupolas at Cleveland, and Dr. Angus gave an informal lecture on the subject. No American had heard of them.

A.E.I. Abandons Employees' Issue Scheme

Because the difference between issue price and market price would have been subjected to tax, the directors of Associated Electrical Industries, Limited, have abandoned their proposed scheme for giving employees an interest in the business by participation in the capital.

So far as the raising of further ordinary capital from existing shareholders is concerned, the board intends to defer the matter "until conditions permit the ordinary stockholders to follow their present investment and the fortunes of the company without paying an excessive premium for the new shares," said Mr. Oliver Lyttelton, chairman, at the recent meeting. He gave a report on applications made to the Capital Issues Committee and the results obtained.

Permission was refused to an application to convert the preference stock on terms already announced and issue £330,760 new 4½ per cent. preference shares; to issue £799,228 ordinary shares to employees at £1 per share; and £2,400,000 ordinary at £1 on a two-for-five basis to ordinary stockholders. The C.I.C., however, approved an application to convert and issue the preference and to issue £699,228 ordinary shares to employees at £2 per share, which it was not now intended to do.

Permission was refused in the case of a further application to issue £1,000,000 ordinary shares to ordinary stockholders at £2 on a one-for-six basis. The board will, therefore, recommend the conversion and issue of preference stock. The proposals are to reduce the 8 per cent. preference to 4½ per cent. and to issue to present preference holders 330,760 new 4½ per cent. £1 preference at par. In return for the cut in dividend rate, preference holders will have the right to subscribe for 800,772 £1 ordinary shares at par in the ratio of three for ten.

Correspondence—Testing the Metal or the Casting

(*Concluded from page* 390.)

(*b*) It would be much more significant (and, incidentally, more economical) to correlate the properties of separately-cast test-bars to direct tests on castings.

(*c*) When considering quality of iron, the ordinary tensile, transverse, hardness and shear tests are in themselves very inadequate.

In engineering selection, many other characteristics must be considered. (I agree with the general implication of the Author's suggestion (6) that it is desirable and, in many cases, necessary, that supplementary data should not be included in specifications, although I hardly agree that there should not be some usable correlative data in specifications.)

Interesting and valuable though the Author's Paper is, I do not feel that he proves his contention that the basic principles of the B.S.I. and A.S.T.M.-A48 specifications are incorrect. These specifications and their engineering usefulness can be improved, but means other than those proposed by the Author will be required.

Yours, etc.,

The Lunkenheimer Company, J. W. BOLTON.
P.O. Box 360,
Cincinnati 14, Ohio, U.S.A.

March 21, 1951.

A.F.S. Congress Papers

THE AMERICAN FOUNDRYMEN'S SOCIETY announce that for the Buffalo meeting to be held from April 23 to 26 the following Papers are to be presented:—

Aluminium and Magnesium

"Melting Aluminium and Magnesium-base Alloys," by L. W. Eastwood, Battelle Memorial Institute, Columbus.

Brass and Bronze

"Melt Quality and Fracture Characteristics of 85/5/5/5 Red Brass and 88/8/4 Bronze"—A.F.S. Research Report, by R. D. Shelleng, C. Upthegrove and F. B. Rote, University of Michigan, Ann Arbor; "Refining Secondary Copper Alloys," by Marvin Glassenberg and L. F. Mondolfo, Illinois Institute of Technology, Chicago, A. H. Hesse, R. Lavin & Sons, Inc., Chicago; and "Effects of Certain Elements on Grain Size of Cast Copper-base Alloys," by R. A. Colton and H. Margolis, American Smelting & Refining Company, Barber, N.J.

Educational

"Development of Foundry Courses in High Schools and Trade Schools," by R. W. Schroeder, University of Illinois, Chicago, and "What the College Graduate can do for the American Foundryman," by C. J. Freund, University of Detroit, Detroit.

Costing

"Specification Sheets and Their Various Uses," by John Taylor, Lester B. Knight & Associates, Inc., Chicago.

Grey Iron

"Influence of Silicon Content on Mechanical and High-temperature Properties of Nodular Cast Iron," by W. H. White, Jackson Iron & Steel Company, Jackson, Ohio; L. P. Rice and A. R. Elsea, Battelle Memorial Institute, Columbus; "Structure and Mechanical Properties of a Mo/Ni/Cr Cast Iron," by A. E. Loria, formerly with Mellon Institute of Industrial Research, Pittsburgh; at present with the Carborundum Company, Niagara Falls, N.Y.: "Isothermal Transformation Characteristics on Direct Cooling of Alloyed White Iron," by F. B. Rote and G. A. Conger, University of Michigan, Ann Arbor, and K. A. DeLonge, International Nickel Company, Bayonne, N.J.; "Improvement of Machinability in High-phosphorus Grey Cast Iron, Part II," by W. W. Austin, Southern Research Institute, Birmingham, Ala.; "Basic-cupola Melting and Its Possibilities"—Official Exchange Paper from The Institute of British Foundrymen, by E. S. Renshaw, Ford Motor Company, Limited, Dagenham; "Effect of Phosphorus Content on Mechanical Properties of a Nodular Cast Iron," by J. E. Rehder, Dept. of Mines and Technical Surveys, Ottawa, Canada; and "Some Effects of Temperature and Melting Variables on Chemical Composition and Structure of Grey Irons," by E. A. Lange and R. W. Heine, University of Wisconsin, Madison.

Heat Transfer

"Heat Flow in Moist Sand"—Progress Report, Heat Transfer Research, by V. Paschkis, Columbia University, New York; "Freezing of White Cast Iron in Green-sand Moulds," by H. A. Schwartz and W. K. Bock, National Malleable & Steel Castings Company, Cleveland; "Solidification of Steel Against Sand and Chill Walls," by H. F. Bishop, F. A. Brandt and W. S. Pellini, Naval Research Laboratory, Washington, D.C.; and "Solidification of Grey Iron in Sand Moulds"—R. P. Dunphy and W. S. Pellini, Naval Research Laboratory, Washington, D.C.

Malleable

"Oxidation/Reduction Principles Controlling the Composition of Molten Cast Irons" (in two parts), by R. W. Heine, University of Wisconsin, Madison; "Relative Effects of Chromium and Silicon Contents on Rate of Anneal of Black-heart Malleable Iron," by J. E. Rehder, Dept. of Mines and Technical Surveys, Ottawa, Canada; "Modern Core-sand Practice," by R. H. Greenlee, Auto Specialties Mfg. Company, St. Joseph, Mich.; and "Malleable Cast Iron Annealing Furnaces and Atmospheres," by O. E. Cullen and R. J. Light, Surface Combustion Corporation, Toledo.

Plant and Plant Equipment

"Dimensional Checking and Pressure Testing of Grey-iron Castings," by K. M. Smith, Caterpillar Tractor Company, Peoria, Illinois; "Choosing Equipment for Non-destructive Testing," by C. H. Hastings, Watertown Arsenal, Mass.; and "Equipment and Methods of Straightening and Dimensional Inspection of Malleable-iron Castings," by L. N. Schuman, National Malleable & Steel Castings Company, Cleveland.

Refractories

"Ladle Refractories and Practice in Acid-electric Steel Foundry," by Clyde Wyman, Burnside Steel Foundry Company, Chicago.

Sand

"Recent Advances in Die-electric Core-baking," by J. W. Cable, Thermex Div., Girdler Corp., Louisville, Ky.; "Metal Penetration"—Report, Mould Surface Committee, by S. L. Gertsman and A. E. Murton, Dept. of Mines & Technical Surveys, Ottawa, Canada; "Compaction Studies of Moulding Sands," by R. E. Grim and W. D. Johns, Jr., State Geological Survey, University of Illinois, Urbana; "Scab Defect on Grey-iron Castings"—Report, Physical Properties of Ironfoundry Moulding Materials at Elevated Temperatures Committee, by V. M. Rowell, Kordell Industries, Inc., South Bend, Ind.; "Effect of Sand Grain Distribution on Casting Finish," by H. H. Fairfield and James MacConachie, Wm. Kennedy & Sons, Limited, Owen Sound, Ont., Canada; and "Testing of Sand Under Impact," by W. H. Moore, Meehanite Corp., Cleveland Hts., Ohio.

Steel

"Effect of Vanadium on Properties of Cast Chromium/Molybdenum Steels," by N. A. Ziegler, W. L. Meinhart and J. R. Goldsmith, Crane Company, Chicago; "Pre-coat Materials for Investment Casting," by W. F. Davenport and Adolph Strott, Wright-Patterson Air Field, Dayton, Ohio; and "An Investigation of the Penetration of Steel into Moulding Sand"—Official Exchange Paper from Metallografiska Institute, by Holger Pettersson, Stockholm, Sweden.

Timestudy and Methods

"Fatigue Data Summary"—Report No. 2, by M. E. Annich, American Brake Shoe Company, Mahwah, N.J.

Notes from the Branches

Wales and Monmouth

About a hundred members, visitors and their ladies attended the Annual Dinner of the Wales and Monmouth branch of the Institute of British Foundrymen at the Royal Hotel, Cardiff, on February 17.

The chief guest was Mr. J. J. Sheehan, the president of the Institute, who was accompanied by Mrs. Sheehan. Other guests were Mr. T. Makemson, M.B.E., Mr. Robert James, principal, Treforest Technical College, and Mrs. James, and Mr. Tedds, president of the Bristol and West of England branch. Mr. and Mrs. Hares of Bristol were unavoidably absent through illness. Mr. E. G. Amos, branch president, presided and Mr. R. G. Williams acted as toast master. Following the loyal toast Mr. James proposed the toast of the Institute.

He said that if education was to do the right thing by industry and it was to turn out the right type of people for the right type of job, there must be the closest co-operation between industry and the technical colleges. In was in his view a joint job which must be tackled by both sides. Training in the works was supplemented by training in the colleges.

Responding to the toast, Mr. J. J. Sheehan, B.SC., president of the Institute, said that the Institute was indebted to the universities and the technical colleges. Through their research departments they unearthed facts on technology that were invaluable to the industry. They sorted out this information and it was spread out to all the members. Industry could not do without the help of these people.

Presentation

Making a presentation of a wallet of notes on behalf of the branch to Mr. A. S. Wall (branch secretary) the general secretary of the Institute, Mr. T. Makemson, M.B.E., said that Mr. Wall was a most popular and efficient secretary. A great deal of the progress which the branch had made was due to the hard work, the efficiency and the enthusiasm of Mr. Wall. The members of the branch who knew him even better than he did need not be told of Mr. Wall's sterling qualities, his worth and character. He doubted if anyone in the foundry world was held with greater respect in this part of the country. The branch thought it was time they said "thank you" to him in a most emphatic way. On their behalf he was presenting him with a wallet of notes which they hoped would remind him of the happy times he had spent and would continue to spend and also as a record of the high esteem with which he was held by the members. Very few jobs he had done had given him greater pleasure or greater joy than to make this presentation.

Mr. Walls, replying, thanked Mr. Makemson for his very kind and generous description of his activities in the service of the Institute as branch secretary. He knew, however, that the Institute had been served faithfully and well by branch secretaries throughout the country for longer periods than his own. Indeed, the Institute had been most fortunate in this respect.

He attributed this to the fact that branch secretaries find in the general secretary, Mr. Makemson, and his staff at head office, such goodwill and encouragement in their work, that it became a real pleasure to be associated with them. He was sure that there were few organisations of a similar nature that enjoy a happier relationship between its head office and branches than did the Institute of British Foundrymen.

He thanked the members and particularly the branch council for their support and assistance in keeping the branch alive and progressive, and for this kindly gesture in making this presentation.

It was just 16 years ago that night that he was deputed to meet a visiting lecturer at the railway station and pilot him to the University College, Newport Road. That night the branch listened attentively to a talk on "Synthetic Moulding Sand" and the lecturer was none other than the national president, Mr. John Sheehan. Since then he had made much progress and to-day they honoured him in the highest position in the Institute.

In conclusion it would be ungenerous it he failed to mention his employers whose support of the Institute was well known to many. On every occasion they had granted him the necessary time and facilities for carrying out his duties and his thanks were due to them for their assistance in this direction. He added, however, that it had not been all work, for the Institute had a happy way of inserting little relaxations between deliberations and he treasured many happy memories of such occasions. To young members his dictum was, continue to be active in the Institute; it may possibly mean the recognition of personal qualities that would otherwise remain in obscurity; in any case you will improve your knowledge of foundry technique and practice and at the same time obtain a host of friends within the industry.

Mr. Makemson proposing the toast of the Wales and Monmouth branch said he was very pleased to see that it was maintaining its position in the Institute. This gathering was an indication of the interest and enthusiasm of its members. He coupled his toast with the name of Mr. Amos, branch president, who suitably responded.

The Toast to the ladies was proposed by Mr. A. J. V. Williams in a humorous speech and responded to by Mrs. Sheehan on their behalf and she also presented a diamante brooch to Mrs. Wall on behalf of the branch, which Mrs. Wall acknowledged briefly. Professor W. R. D. Jones proposed the Toast of the visitors and Mr. D. F. B. Tedds, Bristol branch president, responded. A very pleasant musical programme was thoroughly enjoyed by all present, thanks to the efforts of Mr. R. G. Williams who organised this section of the programme.

Productivity Discussion

At the January meeting of the branch, Mr. A. Kirkham of the Lancashire branch of the Institute opened a discussion on the report of the Productivity Team on Grey Iron Founding. In his opening remarks, illustrated with a series of lantern slides, he picked out the salient points from the report. These gave to the meeting a very clear idea of the work of the team in America, and provided ample material upon which to base the discussion that followed.

Points such as the trade-union relationships, mechanical aids, incidence of taxation, jobbing work, training and education, and foundry supplies were ably dealt with among the remarks which ensued, similar conclusions being reached as have been recorded elsewhere. Finally, a vote of thanks was accorded to the lecturer on a proposition made by Mr. Gordon Jones, seconded by Dr. Bryn Jones, to which Mr. Kirkham suitably replied.

London Branch—Slough Section

The annual general meeting of the Slough section of the London branch of the Institute of British Foundrymen was held in the Lecture Theatre, High Duty Alloys Limited, with an attendance of 35.

The following office bearers were elected for the next session:—

As *president*, Mr. E. Raybould; as *senior vice-president*. Mr. J. Pike; as *junior vice-president*. Dr. E.

Notes from the Branches—Slough Section

Scheuer; as *members of council*, Mr. R. B. Templeton, Mr. R. Blandy, Mr. T. Evans, Mr. S. B. Michael, Mr. S. J. Williams, Mr. J. P. P. Jones and Mr. I Ross; as *hon. secretary*, Mr. P. Hoesli.

The directors of High Duty Alloys, Limited, were accorded the thanks of the section for the excellent facilities provided, and the librarian, Mr. L. L. Edwards, was thanked for his assistance in arranging meetings.

Foundry Mechanisation

A Paper on "The Economics of Foundry Mechanisation" by Mr. J. Blakiston, M.I.MECH.E., was then presented. In brief but apposite remarks, Mr. Blakiston showed the necessity for mechanisation, in order to compete with the high costs of installations and materials. The cost of building installations had risen five times since 1914. Prices had risen 3 to 4 times since 1929, and it now required £1,000 per ton per week each for buildings and materials.

Two films were then presented, showing an American foundry before and after mechanisation, illustrating clearly the saving in time and labour, the minimising of manual effort, and the higher degree of workmanship attained through mechanisation. The films were followed by a series of slides dealing with the historical development of founding, and showing examples of mechanisation in various foundries. Mr. Blakiston ended by pointing out the necessity for this country to achieve maximum productivity in view of the high degree of development and efficiency attained in countries such as India and Malaya, and agrarian countries like Holland who have had to turn to industry to help balance their economies.

Discussion

Mr. Templeton remarked that the jobbing foundry which was in highest proportion in the industry and which employed the most skilled craftsmen, was the biggest problem for mechanisation, and was the criterion by which success or failure might be judged.

Mr. Boon was concerned with the cooling of hot sand, and asked if dropping from the hopper gave sufficient cooling.

Mr. Blakiston replied that a chimney on the elevator was of some assistance in this respect and also helped to remove fines. He recommended a gentle cascade in a soft air current to prevent undue loss of fines, and it was well to ensure that the system was kept full of sand.

Some general discussion then took place on Mr. Blakiston's reports of very high rates of moulding obtainable with efficient mechanised equipment, and Mr. Parsons queried whether the only advantage of snap flasks was in their application to automatic knocking-out.

In reply Mr. Blakiston said that there must be a high degree of finish if snap flasks were to be useful for other purposes. He thought that the future would see a greater development in their use.

Mr. Boon thought that a roller conveyor would cause too much bumping to the snap flask.

Mr. Blakiston replied that this would only be so if the conveyor was too heavy and inflexible. In this country, we did not appreciate sufficiently the high degree of maintenance required.

Mr. Templeton asked how much the adoption of the recommendations of the "Garrett" report on amenities would cost. In reply it was stated that it would require, if fully adopted, about £100 per employee.

Mr. Chambers said he would like to hear more on mechanisation in the pure jobbing foundry where an infinite variety existed from ½ cwt. to 1 ton in weight.

The essentials, Mr. Blakiston replied, were a good knock-out and a Sandslinger, the latter being best situated in a central position to be used radially, thus giving the optimum distribution, and least delay.

Mr. Templeton queried the possible effect of mechanisation on the shortage of apprentices.

Mr. Blakiston replied that his experience proved that boys of secondary education, when given proper training with a guarantee of a skilled job, could undertake any work by the age of 21. Too often he found that apprentices were given only odd jobs and no proper training. Personal interest and encouragement with proper awards were essential conditions to improve this situation.

Mr. Templeton asked if scrap was proportional to the increase in productivity.

Mr. Blakiston replied that this was not so if a foundry's production did not exceed its designed capacity. Important, too, was the need for skilled technical supervision on the spot.

At the closing of the meeting Mr. Blakiston was cordially thanked for his Paper.

Book Review

Standard Methods of Analysis of Iron, Steel and Ferro-Alloys (Fourth Edition). Published by the United Steel Companies, Limited, Westbourne Road, Sheffield. Price 17s. 6d.

This very reliable work of reference has now reached its fourth edition; this has given ample opportunity for revisions to be made. Chemists are pernickety people and probably the best way of attaining analytically sound methods is through committee work, which system has been used in the preparation of this text book. Actually, five laboratories were represented on this committee. Readers should realise that the book makes no special attempt to cater for the cast-iron or non-ferrous laboratories, though, of course, many of the methods detailed are applicable. The book gives a method of analysing fluorspar, a matter which set for the reviewer an unsolved problem many years ago. He seems to remember that he suspected contamination with apatite—calcium phosphate—but a method to determine this is not set out. No methods are included for estimating either oxygen or hydrogen as they have not yet reached the stage when they can be handled in the ordinary works' laboratory. At 17s. 6d. the book is inexpensive (though the last edition was 7s. 6d.), and is a worthwhile inclusion in any ferrous foundry laboratory library. V. C. F.

New Recruitment Pamphlet

The British Steel Founders' Association have just issued a small brochure setting out the prospects of the steel foundry as a career for youth. Unlike most, there is a decision that all boys must start on the foundry floor. Through over-condensation perhaps, there is no reference to cores or core-making in the section "How a steel casting is made." Yet "cores" are mentioned in the section "The training." A very good notion is incorporated in outlining the careers of the leaders of the industry. It is a very difficult job to write interestingly for reading by youth. In this case more is done by photography than by letterpress.

The amount of space devoted to the subject is correct—too much matter is not appreciated these days. By and large, the pamphlet has well fulfilled its objective.

Castings for Internal Combustion Engines

Discussion of a Paper and Film Show given by C. R. van der Ben and H. Haynes

At the January meeting of the East Midlands branch of the Institute of British Foundrymen, under the chairmanship of Mr. K. Docksey, a film showing the production of castings for internal-combustion engines at the works of the National Gas & Oil Engine Company, Limited, Ashton-under-Lyne, was shown with a commentary by Mr. C. R. van der Ben and Mr. H. Haynes. The film began with a general view of the foundry and then showed in sequence the handling of raw material; melting furnaces; refined pig-iron making and laboratory control. The production of a simple casting, including scenes in core-shops, machine moulding and casting of small green-sand castings, as well as plate-moulding of green-sand flywheels, were next illustrated, followed by crucible furnace uses; the main machine-moulding section; mould drying; assembling and casting of moulds; concluding this section with the knock-out and sand plant. Finally, the making of some large castings was screened, the castings being followed through to the fettling and machine shops.

Discussion

MR. S. P. RUSSELL asked for information on the skin-drying of moulds. It was stated they were in the stove for half an hour; how far did the drying extend into the mould, and how long could one leave them without danger of striking back?

MR. HAYNES, in reply, said the mould dried to the extent of 1-in. depth, and the method of drying was most successful. They had been left for three days before casting. (The stoves and some dried moulds are shown in Fig. 1.)

Sands Used

MR. RUSSELL asked whether normal or a pitch-bonded sand was used.

MR. HAYNES said he used red rock sand, either the Staffs or Manchester Ship Canal variety. The dry sand was 50/50 or 60/40 ratio, according to the strengths of the sand. Manure or spent hops were incorporated, but no coal dust. The green sand was a 50/50 mixture carrying up to 7 per cent. coal dust, reduced to 5 per cent. coal dust for small work.

MR. HAIGH inquired as to whether plumbago was used in facing sand.

MR. HAYNES replied that he found coke dust to be more effective than plumbago.

MR. RUSSELL said that the flywheels illustrated and made in green sand were run on the top with a downgate on one side, and a riser over on the far side. They did not appear to have a riser on the centre boss. Was it ever necessary to feed the boss?

MR. HAYNES said he had made many thousands of wheels weighing up to 7 tons by the green-sand method (one being illustrated in Fig. 2). In run-

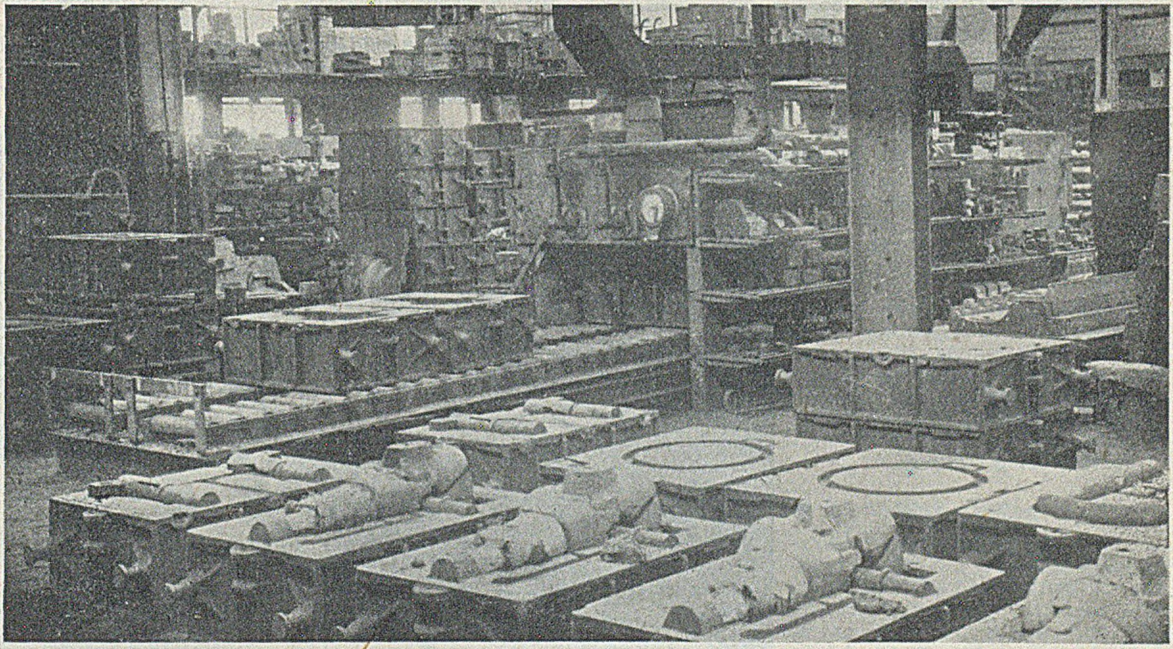


FIG. 1.—*Part of the National Gas and Oil Engine Company's Foundry, showing Mould Drying in a Tunnel-type Oven. Note the Storage Racks for Small Cores along the Sides of the Oven.*

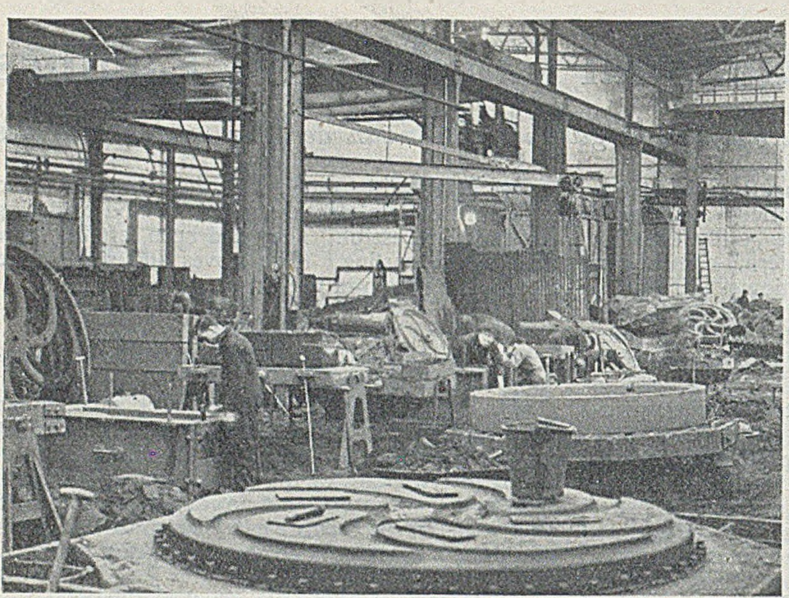


FIG. 2.—*Green-sand Mould for a Spoked Flywheel in course of Preparation. Part of a Pattern is Visible on the Extreme Left of the Illustration. Much of this Part of the Shop is devoted to Flywheel Production.*

ning green-sand flywheels, the size of the runners was very important and varied according to weight. On a five-ton wheel three 1½-in. runners were used associated with one riser only on the rim. On the big loam-moulded wheel he had one riser only on the rim. Mr. van der Ben insisted that 1,000 wheels had been made without one being scrapped. Actually, it was more than that, but people would not accept the fact! The technique of rod-feeding, especially on high-duty iron, was a serious matter, and a possible final solution was the provision of a metal which did not require feeding.

Moulding Methods

MR. S. P. RUSSELL, referring to the big planer-bed with a section of 5-in. (illustrated in Fig. 3) on which it was stated there were no chills, and which was run with special iron, asked if chills were ever used on any castings.

MR. HAYNES said no chills were used. Moulders were instructed as to what to do in respect to speed and pressure of running. Proper pressure would squeeze out the dirt and gases. Even pressure heads up to 3 ft. deep are used with success. He advocated ample pressure where adequate arrangements were made.

MR. P. A. RUSSELL, again referring to the flywheels, asked whether plugs were used on the runners and, if so, what sort.

MR. HAYNES said he used ⅜-in. wrought-iron rod and cast a piece of metal on top, the larger ones being daubed.

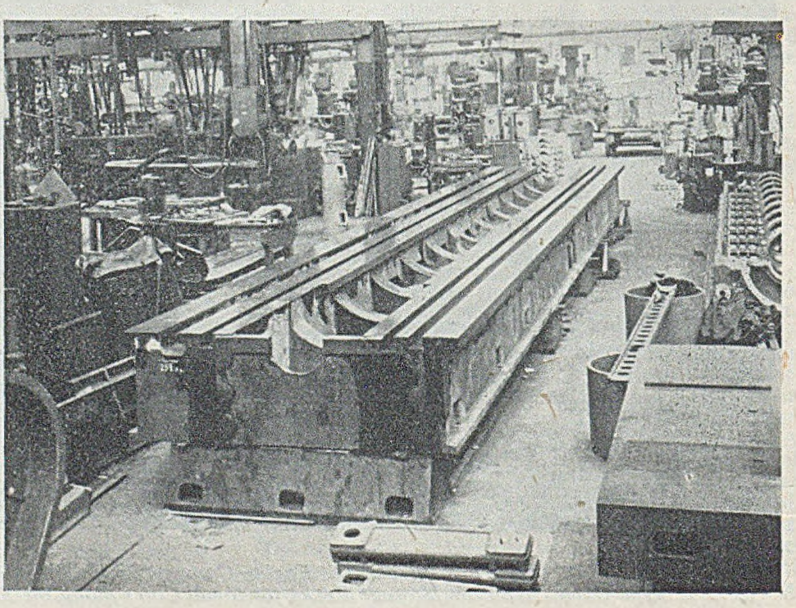


FIG. 3.—*Planer Bed Casting, having a Metal Section of 5 in., which was cast without Chills, a High Head of Metal Pressure during Pouring being Utilised.*

MR. P. A. RUSSELL said he understood that ball stoppers were used to accumulate metal in the head.

MR. HAYNES said that was so; moreover, the head acted as a reservoir.

In answer to a further question, Mr. Haynes gave the following data on the mixing sand used:—Green strength, 2.5 lb. per sq. in.; dry strength, 60 lb.; green permeability No. 65, and moisture, 5½ to 6 per cent. The men were trained in the use of these sands. To work to a formula meant more controls.

MR. S. P. RUSSELL asked whether the moulders cast their own moulds.

MR. HAYNES replied that only on small work they did, but on the large work the senior foreman undertook the task.

Impact Testing of Acicular Iron

MR. P. A. RUSSELL said some figures given by Mr. van der Ven referred to repeated-impact testing. Could an indication be given as to what results for mild steel would be? Were the acicular irons well above mild steel?

MR. VAN DER BEN exhibited some clear data on cast shafts compared with steel shafts, especially the impact values. Two irons of 26 tons per sq. in. tensile could vary very considerably in impact figures. On test-pieces of 34 to 38 tons per sq. in. tensile of carbon steel and acicular iron tested with a blow energy of 0.2 ft.-lb., the steel bar failed at 15,000 blows and the acicular iron at 11,000 blows. Reducing the blow to 0.15 ft.-lb., the steel failed at 60,000, as did the acicular iron. Reducing again to 0.1 ft.-lb., the steel failed at 1,600,000 and the acicular iron was still unbroken at 3,000,000 blows. This bar was re-tested at 0.15 ft.-lb. and the 60,000 blows had increased to 120,000 blows required to fracture. In the early days of the development of acicular iron, he did not believe it possible that the difference as compared with pearlitic irons could be so noteworthy. The tensile strength need not be greater than that obtainable with a pearlitic structure.

Mould Facings

MR. BRICKNELL asked as to what mould facings, if any, were used to finish heavy green-sand moulds, and how were they applied.

MR. HAYNES said that after the mould was blacked, it was washed over with salt water—1½ oz. salt to a quart of water. This put a hard skin on the blacking. The mixture of blacking for all this work was plumbago, blacking and coke dust, made to the following specification:—Three parts (by volume) of plumbago; four parts of common blacking, and one part of coke dust. These were mixed with 0.75 part of water. On heavy green-sand work the plumbago was rubbed in, whilst on small work none was used.

FOUNDRY SERVICES LIMITED, BIRMINGHAM, have made the following appointments: MR. D. H. SNELSON, B.Sc., has joined the Company as research metallurgist; MR. L. T. JOHNSON is at present in India to assist in the development of the Company's business in that country but is due to return to the Midlands towards the end of April, and MR. G. W. BURGER is now a member of the Foseco overseas organisation and visits foundries in Europe.

Iron for Moulds and Dies

Mr. Jean Guillamon, writing in the February issue of *Fonderie*, states that his article has been based on a report sent to a founder who wanted information as to the quality of iron to use for the making of glass-bottle moulds and for dies for use in connection with light alloys.

Glass-bottle Moulds

These should satisfy the following essential conditions:—(1) The liquid glass must not stick to the material used, as it does when steel is used; (2) ease of machining is necessary, whilst the castings must carry a perfectly sound surface and sub-surface, and (3) the castings must be capable of withstanding repeated heating and cooling without cracking.

Several methods have been used to solve these problems. The first consists of utilising a good-quality engineering iron and the second calls for the use of an alloyed iron.

Ordinary Engineering Iron.—In this case, the components are cast against thin chills so as to obtain, for a certain depth, a fine grain, whilst retaining really good machinability. To achieve this and at the same time assuring the provision of a metal resistant to thermal shocks, choice is made of an iron of high carbon and silicon. A classical composition is:—C, 3.40 to 3.60; Si, 2.60 to 2.40; Mn, 0.60 to 0.80; P, less than 0.50, and S, 0.08 to 0.12 per cent.

Alloyed Cast Iron.—The current tendency is to make the moulds to dimensions very close (sometimes within a few thousandths) to the final sizes. In this case, the moulds are generally made in plaster and carry all the details, with no machining allowance, the latter being taken care of in the contraction. The type of process requires that the metal should have a fine grain, so that a skin can be given comparable with that thrown by a chill. To this end, the base-iron composition is adjusted (the silicon content being related to section thickness) with nickel, chromium and molybdenum additions.

(*a*) *Ni/Cr/Mo Iron.*—The following composition, used in America, and with which several tests have been made in France, has given entire satisfaction:—C, 3.50 to 3.80; Si, 2.0 to 1.40; Mn, 0.60 to 0.90; P, 0.01 to 0.15, S, 0.08 to 0.12; Ni, 1.50 to 2.00; Cr, 0.30 to 0.60, and Mo, 0.70 to 0.90 per cent. The Si and Cr contents are varied according to section thickness. Such an iron has a low modulus of elasticity because of the high percentage of carbon. It therefore resists thermal shock satisfactorily. The additions of Ni, Cr and Mo serve to combine highly refractory qualities with a fine graphitic structure.

(*b*) *Austenitic Iron.*—In some cases an austenitic iron is used, as it gives all the advantages of the above alloy as well as a low coefficient of thermal expansion and high resistance to both wear and corrosion. Its composition is as follows:—C, 2.40 to 2.60; Si, 2.00 to 1.00; Mn, 0.40 to 0.80; P, 0.10 to 0.15; S, 0.06 to 0.12; Ni, 34.0 to 36.0; Cu, about 0.50, and Cr, about 0.10 per cent.

Dies for Light-alloy Casting

For this purpose, a fine-grained iron is used, the structure verging on the pearlitic, and the Si content is varied with the sectional thickness. The composition is:—C, 3.10 to 3.30; Si, according to sectional thickness; Mn, 0.70 to 0.90; P, less than 0.60, and S, less than 0.10 per cent. Additional data on this subject were printed in an article by Mr. J. Duport in the November, 1948, issue of *Fonderie*.

Purchase Tax and Export Trade

When the Federation of British Industries made representations to the Chancellor of the Exchequer on the 1951 budget, it was stated that a study had been made of the impact on exports of purchase tax and the utility programme and that the results of that study would shortly be published. The report resulting from this study has now been sent to the Chancellor.

The special committee set up by the F.B.I. to study the question and prepare a report is convinced that the present system is likely, if continued, to have damaging effects upon British export trade, and particularly on exports of quality goods. The most harmful effect of the present system is to force manufacturers to make an entirely artificial distinction between goods subject to purchase tax and those not so subject. Most utility goods find only a limited sale abroad; non-utility goods sell well in the export markets, but sales in the home market are increasingly restricted, due to purchase tax. As a result, production for home and export is becoming divided into two water-tight compartments, which reduces the economies which can be gained by spreading initial costs and overheads over long runs of production; leads to less efficient production by necessitating two different standards of quality in the same production unit; and, by forcing upon some manufacturers standardised production for the home market instead of the more elaborate and wider ranges required for export, causes a permanent loss of export potential, craftsmanship, and initiative.

Marine Engineers' New President

The chief engineering surveyor of Lloyd's Register of Shipping, Dr. S. F. Dorey, F.R.S., who has been elected president of the Institute of Marine Engineers for the ensuing session, was at Owen's School, London, and Durham University before serving his apprenticeship at Chatham Royal Dockyard. After service in the Royal Navy during the 1914-18 war, Dr. Dorey joined Lloyd's in 1919.

His activities extend to numerous technical institutions and committees, covering a wide field in the sphere of engineering. A past-president of the Institute of Refrigeration, he is vice-president of the British Internal Combustion Engines Research Association, the Institution of Mechanical Engineers, the Institution of Naval Architects and the Institute of Metals, and a member of the Mechanical Engineering Research Board and the British Shipbuilding Research Board. A Liveryman of the Worshipful Company of Shipwrights, Dr. Dorey, who is 59 years of age, was awarded the C.B.E. in the 1946 New Year Honours.

Italian Iron and Steel Output

Production of crude steel in Italy last November fell slightly to 200.349 tons, against 205.000 tons in the previous month and 182,320 tons in November, 1949. Production of pig-iron and rolled steel was below the October figure at 37,530 and 175,000 tons, respectively.

The lighting of a new blast furnace at the Ilva works at Piombino, rebuilt with $400,000 E.R.P. funds took place at the end of January. The furnace has an annual capacity of 270,000 tons of iron.

Scottish Engineers' President

At the annual general meeting of the Institution of Engineers and Shipbuilders in Scotland, held in Glasgow on April 3, Sir Andrew McCance, F.R.S., deputy chairman and joint managing director of Colvilles, Limited, since 1944, was elected president for the coming year. One of the foremost metallurgists in the country, Sir Andrew has enjoyed an international reputation for a number of years.

After attending the Royal School of Mines, London, of which he is an associate member, Sir Andrew joined William Beardmore & Company, Limited, Glasgow, as a metallurgist in 1910, and the following year he was appointed assistant armour manager. His association with Colvilles, Limited, began in 1919, and when an associated company, the Clyde Alloy Steel Company, Limited, was formed in the same year, Sir Andrew was appointed its managing director. He is also chairman of British Magnesite Corporation, Limited, and serves on the boards of Bruntons (Musselburgh), Limited, Colville Constructional Company, Limited, Colvilles Clugston, Limited, the Lanarkshire Steel Company, Limited, Metal-Gas Company, Limited, Smith & McLean, Limited, and the Steel Company of Scotland, Limited.

Sir Andrew is connected with many technical societies and associations at home and overseas, and in 1947 he was elected president of the Iron and Steel Institute. A member of the council of the Institute of Welding and a past-president of the West of Scotland Iron and Steel Institute, in 1940 he was awarded the Bessemer gold medal, the highest honour of the Iron and Steel Institute, and three years later was elected a Fellow of the Royal Society.

Physical Society Meeting

For the first time since its formation in 1874 the Physical Society of Great Britain has met in Wales. Under their president, Prof. L. F. Bates, of Nottingham University, an authority on magnetism, who last year received the Holbeck Medal of the *Société Française de Physique*, about 150 scientists assembled at the University College, Swansea, recently for the Society's spring provincial meeting. It took the form of a symposium on "Some Aspects of Discharge Physics," a subject on which considerable research has been carried out at Swansea under the direction of Prof. Llewellyn Jones.

Apart from the many Papers which were read during the meeting, some of the scientists visited the Abbey works of the Steel Company of Wales, Limited, on the Thursday, and on Saturday the visitors were shown round the department of physics at the college and the laboratories of the British Iron and Steel Research Association at Sketty Hall, Swansea.

Summer Welding School

The British Welding Research Association is to hold a summer school on "Welding Design and Engineering" at Ashorne Hill, near Leamington Spa (Warwickshire), from May 25 to June 2. The aims of the school are to acquaint the practical man with up-to-date welding developments, to stimulate the application in industry of experimental knowledge and experience, and to describe what is now known about some of the fundamental welding problems.

Employers who wish to send members of their staff to the school, or individuals who wish to attend, should communicate with the secretary of the Association, 29, Park Crescent, London, W.1, as soon as possible.

Impact of Rearmament

Economic Outlook in 1951

In 1950, the process of post-war recovery was brought near to completion and Britain became fully solvent for the first time since the war. The Government's "Economic Survey for 1951" gives a warning that, in contrast with last year, the country faces in the immediate future a smaller increase in the national output, a worsening of the balance of payments, a fall in supplies of some consumer goods, and a continuing rise in prices.

The execution of a greatly enlarged and accelerated rearmament programme (costing £4,700,000,000 over the three years 1951-54) has now become the first objective of the British Government's economic policy. But it cannot be the sole objective. The military strength of this country depends upon its economic strength. The problem is how to rearm as fast as possible whilst maintaining a strong and healthy economy. A flourishing export trade and a high level of investment at home are both essential conditions of economic strength. It is the Government's policy to shield exports and investment as far as possible, and to shift the main burden on to consumption.

The chief difficulty arises from the fact that the new claims of defence are very largely concentrated on the metal-using industries, the great bulk of the output going to capital investment schemes and exports. Defence orders must inevitably conflict with production of metal goods for export and investment. It will be a major task to ensure not only that the armaments are produced in time, but also that the civil output displaced is of the least important kind. These problems cannot be solved by giving an over-riding priority to arms production; each case of conflict will have to be judged on its own merits. Where necessary, formal controls and powers of direction over production will be used—including allocation of scarce materials, limitation or prohibition of less important end-uses, and requisitioning of factory and storage space.

Transfer of Workers

Over half a million extra workers will be needed for defence production by 1953-54, but the actual movement of workers from one job to another, or from one place to another, will not need to be anything like as great as this. Nevertheless, substantial transfers will be necessary as the defence programme gathers momentum. In particular, 175,000 extra workers are estimated to be required for aircraft factories and Royal Ordnance Factories in the course of the next two years.

The extent to which rearmament will affect the standard of living in this country will depend very largely on what happens to production. Shortages of sulphur, cotton, zinc, copper, and other key materials have already begun to impede production. The sulphur shortage is the most threatening. Domestic action may mitigate the worst effects of shortages, but satisfactory remedies can in many cases only be found internationally.

Very little contribution to increased production can be expected in 1951 from an increase in employment. Output will depend almost entirely on the trend of productivity. Over the last three years productivity has risen by an average of 7 per cent. a year. It could be expected to go on rising at a similar rate if the nation were assured of adequate supplies of materials.

Iron and steel capacity will increase in 1951, and it is estimated that 16.75 million tons of ingot steel could be produced if sufficient raw materials were available. Owing, however, to shortages of imported scrap and

(*Continued at foot of column two*)

rich iron ore, crude steel production this year cannot be expected to exceed 16 to 16½ million tons. Even this may prove to be an optimistic forecast.

In the metal-using trades, which in the "Survey" are grouped to include all kinds of engineering, shipbuilding, the manufacture of electrical goods, rail and road vehicles, aircraft, precision instruments, jewellery, cutlery, hollow-ware, metal furniture, drop forgings, and brassware, production in 1950 was 10 per cent. higher than in the previous year, but it cannot be expected to increase by anything like as much this year, when supplies of steel and non-ferrous metals are limited. The motor industry also will have to devote more capacity to making tank and aircraft components and non-fighting vehicles for the Services.

British Scientific Instruments in Paris

An exhibition of British scientific instruments will be held in Paris from May 11 to 17, simultaneously with the annual French Physical Society Exhibition. The display of scientific instruments is being organised by the British Council at the invitation of the French Government research authorities and under the auspices of the French Physical Society. The exhibition is in the nature of a return gesture for the French Scientific Instruments Exhibition held in London in February, 1950, and will consist of about 40 exhibits, mainly working exhibits designed to illustrate British achievements in the design of scientific research instruments. The instruments are being lent by various industrial organisations and by university and Government laboratories, and have been selected by an advisory committee under the chairmanship of Prof. G. I. Finch, F.R.S., of Imperial College, London.

The exhibition will be opened at the Sorbonne by Prof. E. N. da C. Andrade, F.R.S., and a number of other leading British scientists will give lectures during the exhibition.

A number of new instrumental techniques developed by the British Iron and Steel Research Association and by the British Electrical and Allied Industries Research Association will be shown. Among the industrial exhibits will be the Finch electron diffraction camera for the study of the structure and chemical composition of surfaces. Other exhibits from industry include a wide range of Geiger counter tubes, a dielectric test set, a counter chronometer for the measurement of short-time intervals with the accuracy of a microsecond, an interferometer microscope, a vibrating-reed electrometer of high stability, and a spectrophotometer designed to measure the reflectance of a sample in several narrow bands of the spectrum.

Among exhibits from research stations of the Department of Scientific and Industrial Research, the National Physical Laboratory is exhibiting a demonstration assembly of an electronic digital computor as well as several other items. The automatic ionosphere recorded developed at the Radio Research Station will be demonstrated at the exhibition. Of the three Ministry of Supply research establishments taking part, the Atomic Energy Research Establishment at Harwell is demonstrating four exhibits, including a recently developed machine for the production of quartz fibres of any diameter from 1.5 to 300 microns. A millimetre wave spectrometer is being lent by the Telecommunications Research Establishment. The five exhibits from the Royal Aircraft Establishment at Farnborough include a counting accelerometer.

Obituary

MR. SIDNEY WOLFE, who was until recently chairman of Wolf Electric Tools, Limited, Ealing, London, W.5, died on April 3. He was 79.

MR. WILTON ALLSEBROOK, a former director of Raleigh Industries, Limited, Lenton, Nottingham, who retired five years ago, has died at the age of 75.

MR. HENRY LAKE, for many years a member of the National Executive of the British Iron and Steel Trades Association and the Iron and Steel Trades Confederation and an employee of Park Gate Iron & Steel Company, Limited, Rotherham, until his retirement three years ago, died on April 1 at the age of 68.

MR. D. C. ENDERT, junr., whose death at Noordwijk aan Zee, at the age of 72, is reported, was for more than 37 years a director of the Rotterdamsche Droogdok Maatschappij NV, and delegate director of the Scheepsbouw Mij. Niewe Waterweg. He was very well known in Great Britain in shipping, ship building and repairing circles.

MR. THOMAS OWSTON WILTON, managing director of the Chemical Engineering & Wilton's Patent Furnace Company, Limited, who invented the continuous process for tar distillation now in use by the company, died on March 24 at the age of 66. He was educated at Dulwich College and London University, afterwards joining the City of London Electric Lighting Company, from which he joined the Chemical Engineering Company, in 1917.

MR. E. W. RUSSELL, shipyard managing director of William Denny & Bros., Limited, Dumbarton, since 1932, who died on March 27 at the age of 64, served with several Glasgow ship building and repairing firms before joining the company in 1910 as chief draughtsman. He was appointed outside yard manager in 1932, and in the same year became a director and general manager. Mr. Russell, who was also a director of Ailsa Shipbuilding Company, Limited, Troon, served on the committees of several engineering and shipbuilding organisations.

SIR HOLBROOK GASKELL, formerly managing director of United Alkali Company, Limited, and a director of Imperial Chemical Industries, Limited, from 1934 to 1946, died suddenly on March 31. Born in 1878, he took the Mechanical Science Tripos at Cambridge in 1900 and the following year joined United Alkali Company as an assistant engineer. In 1914 he was appointed chief engineer; he joined the board in 1922, becoming managing director in 1926. On the formation of Imperial Chemical Industries, Limited, of which United Alkali Company was one of the constituent companies, he became chairman of the delegate boards of the general chemical and lime groups.

Wills

CROOK, W. H., of Heaton, Bolton, engineer and ironfounder £10,806

IRVING, J. L., late of Jessop & Company, Limited, mechanical engineers, of Calcutta £14,267

SNOW, A. W., for 45 years North Wales representative of W. & T. Avery, Limited, weighing-machine makers, etc., of Birmingham £292

CLARKE, SIR G. R., a former managing director of Telegraph Construction & Maintenance Company, Limited, and Submarine Cables, Limited, late chairman of Transformer Steels, Limited, Telcon-Magnetic Cores, Limited, a former director of several other companies, and a former president of the London Chamber of Commerce £16,965

Revised output figures for the Japanese iron and steel industry show that production of pig-iron in 1950 amounted to 2,232,911 metric tons, and that the output of steel ingots and rolled steel totalled 4,838,522 tons and 3,277,432 tons, respectively.

Brazilian Manganese

The Export-Import Bank at Washington is to advance U.S.$30,000,000 to aid in financing exploitation of the manganese deposits, with reserves calculated at 33,600,000 tons, at Urucum, near Corumba, in Mato Grosso. The ore has been worked on a small scale under concession by the Sociedade Brasileira de Mineracao, a Brazilian company in which the United States Steel Corporation has acquired a 49 per cent. share-holding. The ore will be mined at two levels, on the surface and by drifts, and will be exported in flat-bottomed vessels over the Paraguay River, through the Argentine port of Rosario. Shipment through the Brazilian port of Santos will not be practicable owing to high transport charges and delays, even when the railway from San Paulo to Corumba is completed.

Negotiations have now been completed for a loan of U.S.$35,000,000 by the International Bank for Development and Construction to accelerate development of the recently discovered deposits of manganese in the Amapá Territory of North Brazil. The reserves are estimated at 20,000,000 tons, and are exploited under concession by a Brazilian company, Industria e Comercio de Minerios, with which the Bethlehem Steel Corporation has become associated. A port and railroad are to be built and equipped to handle 500,000 tons annually, plus the requirements of Brazilian steelworks in the south.

Iron and Steel Values

A further list of iron and steel securities for which values have been agreed with stockholders' representatives was published on April 2 by the Ministry of Supply.

Out of 146 securities, the number now agreed is 123, of which 55 are quoted and 68 unquoted. The remaining 23 securities are all unquoted. The total compensation value in respect of the agreed securities is approximately £229,500,000. The value of the compensation stock to be issued in respect of the present batch of nine securities is £8,600,000. The new list is as follows:—

PREFERENCE STOCKS AND SHARES (£1)

Raine & Company 8% cumulative, 33s.
Skinningrove Iron 4½% redeemable (cumulative from April 1, 1952), 20s.

ORDINARY STOCKS AND SHARES (£1 UNLESS OTHERWISE STATED)

Brymbo Steel Works, 32s. 6d.
Glynhir Tin Plate £50, £450.
Guest Keen Baldwins Iron & Steel, 55s.
Hodbarrow Mining £8, £5.
Lilleshall Iron & Steel, 14s.
Neath Steel Sheet & Galvanizing £100, £500.
Raine & Company, 133s. 4d.

Newcastle's Industrial Development Plan

A development plan covering the next 20 years drawn up for Newcastle-upon-Tyne City Council envisages that within 20 years light industries will find work for another 40,000 people, bringing the number employed in such industries to 100,000. Provision is made for modern factories of the lighter type to be erected in close proximity, but suitably secluded from the residential areas occupied by the employees.

There is a 40-acre site at Fawdon marked for industrial development, and another 20 acres near the riverside at Scotswood has been similarly reserved.

The plan is being submitted to the Ministry of Local Government.

AS FROM APRIL 5, the price in the United Kingdom for antimony English 99 per cent. is £390 per ton, an increase of £30 per ton on the previous figure. There is a similar advance in the price of antimony, crude, 70 per cent., which now stands at £305 per ton.

European Steel Production, 1950

Four Million Tons Increase

European crude steel production (not counting that of the Soviet Union) totalled 60,680,000 metric tons in 1950, according to the quarterly bulletin of the Economic Commission for Europe. This is 10 per cent. above 1949 production and 13 per cent. above the pre-war average.

The bulletin reveals that the output of nine of Europe's large steel-producing countries which reported figures to E.C.E. reached during the fourth quarter of 1950 an annual rate of 54,387,000 tons, which is more than 4,000,000 tons higher than the total production of these countries during 1950. It indicates that their production might exceed 55,000,000 tons during 1951, provided adequate supplies of raw materials are available. The nine producers are Austria, Belgium, France, Italy, Luxemburg, Saar, Sweden, the United Kingdom, and Western Germany.

Europe's Crude Steel Production.
(Thousand metric tons.)

	1936-38 average.	1949.	1950.	4th quarter 1950 (annual rate).
LARGE PRODUCERS REPORTING FIGURES TO E.C.E.:				
Austria	579	835	945	1,032
Belgium	3,121	3,865	3,786	4,592
France	6,950	9,152	8,651	9,804
Saar	2,404	1,757	1,899	2,280
Western Germany	16,181*	9,156	12,121	12,824
Italy	} 2,145	{ 2,055	2,312*	2,424*
Trieste		29	39	39*
Luxemburg	1,976	2,272	2,451	2,836
Sweden	1,033	1,301	1,459	1,584
United Kingdom	11,910	15,803	16,555	16,972
TOTAL	46,299*	46,315	50,218*	54,387*
OTHER PRODUCERS:				
Czechoslovakia	1,862	2,700*	2,943*	—
Denmark	22*	76	123	156
Finland	55	114	103	72
Eastern Germany	1,459*	700	1,155	—
Greece	7*	36*	—	—
Hungary	622	849	1,022	—
Netherlands	44	437	490	528
Norway	59	60	70	76
Poland	1,829*	2,303	2,510	2,612
Rumania	247	459*	558*	—
Spain	371	720	825*	—
Switzerland	12*	124*	130*	—
Turkey	—	103	91	64
Yugoslavia	174	399	—	416
TOTAL	6,763*	9,080*	10,462*	—
TOTAL EUROPE	53,062*	55,395*	60,680*	—

* Estimated figure.

Atomic Energy School

Opening the Ministry of Supply Atomic Energy School at Harwell, which has been set up to teach industrial and medical laboratory workers the use of radioactive materials, Sir John Cockcroft, F.R.S., director of the Atomic Energy Research Establishment, said that radioactive isotopes were becoming the most important new development in science and industry.

At Harwell, he said, they wanted to spread their knowledge throughout British industry and research institutions, and in that respect they were taking on one of the duties which might sooner or later go to the technological university.

Wage Bill Increases

Industrial workers' weekly earnings continue to rise. In the first two months of the year increases granted to over 4,000,000 workers raised the weekly wage bill by an estimated £1,117,500—nearly four times as much as during the corresponding period in 1950.

The "Ministry of Labour Gazette" shows that in October last the average weekly wage for all workers was £6 8s., compared with £6 4s. 1d. in April, 1950. These figures are based on an official inquiry covering 6,500,000 manual workers of all classes in both manufacturing and non-manufacturing industries whose average earnings in October, 1938, were £2 13s. 3d. a week.

Since that time, average weekly earnings for men of 21 and over have risen from £3 9s. to £7 10s. 5d. in the last pay-week in October, 1950, an increase of 118 per cent. For youths and boys, average earnings amounted to £3 3s. 9d. a week at the end of October, 1950, a rise of 144 per cent. since pre-war, while those for women of 18 and over were £4 2s. 7d., an increase of 154 per cent. Highest percentage increase, however, has been for girls, whose earnings have risen by 189 per cent. to £2 13s. 5d. at the end of October. These general averages cover both skilled and unskilled workers, and represent the actual weekly earnings inclusive of payments for overtime, night-work, and piece-work.

Working hours increased slightly in the six months to the end of last October, the average week for all workers being 46.1 hours, compared with 45.6 hours in April, 1950, and 46.5 pre-war. Principal industries and services not covered by the Ministry of Labour's inquiry are agriculture, coal mining, railways, shipping, dock labour, distributive and catering trades, entertainment, commerce and banking, and domestic service.

Government and Dividend Increases

Asked for the Government's view on recent dividend increases, Mr. Douglas Jay, Financial Secretary to the Treasury, said that the Government would prefer to see no increases in dividends "while the rearmament period is with us." He continued: "We would not agree that the increase in dividends in the last few months was in accordance with the policy of restraint. We regret it."

Mr. Jay, who was speaking at a Press conference dealing with the "Economic Survey for 1951," was also asked if the Government regarded recent wage increases as complying with the policy of restraint. He pointed out that the original White Paper of 1948 said that no dividend increases were justified but that some increases in wages in certain circumstances were justified. Therefore, the fact that there had been some increases in wages over recent months did not necessarily prove that there had been no restraint.

Shipyard Holidays Claim

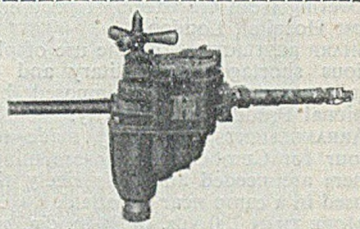
A claim for a second week's holiday with pay was presented to the Shipbuilding Employers' Federation by the Confederation of Shipbuilding and Engineering Unions on behalf of all shipbuilding and ship-repairing workers last week.

By the terms of a national agreement dated February 17, 1938, shipyard workers are at present entitled to one week's annual holiday with pay, and an agreement dated April 9, 1946, entitles them to holidays with pay on six other days in the year.

Holman 1801 1951 150 YEARS

CHIPPERS. Models for all classes of chipping, caulking, etc. Main and auxiliary valve system eliminates vibration. Sensitive throttle.

RIVETERS. For all riveting jobs. Main and auxiliary valve as in chippers. Force of blows easily controlled. Sensitive throttle.



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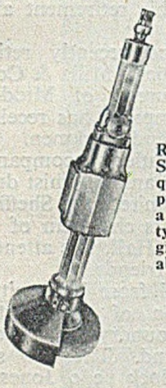

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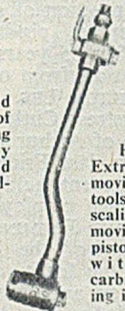

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RAMMERS. Floor and bench types. Piston stroke adjusts itself automatically to height of material. Usual butts and peins supplied.

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BLOW GUN. New well-balanced, easily controlled ultra lightweight tool with an exceptionally high air speed, invaluable for cleaning 'inaccessible' parts.

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Do you regularly receive details of new Holman Pneumatic Tools? Let us put you on our mailing list.

Labour-saving is a term that comes quickly to mind when speaking of Holman Pneumatic Tools—but what, in fact, does it mean? Making harder work for fewer hands—or easier work for an economic number of hands? Any Holman tool—from a rotogrind to a rammer—makes the job easier to do, simpler, faster, more efficient and more pleasant. Why? Because it is designed to be as light as possible in relation to power and purpose. Because it is simple to control. And because it does its job without trouble or fuss—always.

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SUBSIDIARY COMPANIES, BRANCHES AND AGENCIES THROUGHOUT THE WORLD HB.7

News in Brief

Mr. Alexander Grieve, secretary and chief accountant of the Tredegar Iron & Coal Company, Limited, is recovering from the effects of pneumonia at Brompton Chest Hospital, London.

Sharp restrictions on the use of platinum to relieve serious shortages for military and essential civilian requirements have been imposed by the American National Production Authority.

Arrangements are being made to import Italian labour for Cumberland iron-ore mines. About 100 miners are needed and it is likely that they will be housed in a camp near Sellafield.

More than 200 yds. of 24-in. dia. gas main has been laid under 40 close-packed sets of railway lines across the width of Crewe Junction—Britain's biggest railway junction—without once disturbing train timings.

It is announced that the Royal Commission on Awards to Inventors is unable to recommend any award to Mr. W. W. Hackett, of Accles & Pollock, Limited, Oldbury, Birmingham, who made a claim in connection with Sten gun barrels.

The Skefko Bearing Company, of Sweden, which is already using three heavy-duty production grinding machines made by the Newall Engineering Company, Limited, Peterborough, has ordered another £5,000 machine for its Philadelphia factory.

The Treasury has made the Import Duties (Drawback) (No. 9) Order (SI 1951, No. 531), which provides for the payment of drawback of Customs duty on certain roller-bearing and ball-bearing axle boxes, and sand-blast nozzles. The Order came into operation last Friday.

In big firms in Birmingham and district 4,700 accidents occurred in 1950 causing the loss of 579,173 working hours, the frequency rate having been more than halved during the last 20 years. The Birmingham and District Industrial Safety Group is to stage a four-day exhibition at Bingley Hall in May.

An industry will go into production within several weeks at Newhouse Industrial Estate, Lanarkshire, and will ultimately give work to 300 employees. The factory is that of Ranco, Limited, which manufactures temperature controls and electrical instruments. It is a subsidiary of the large American firm of Ranco, Inc., Ohio.

For the third successive year the British Chamber of Commerce of Turkey (Inc.) is organising a British Pavilion at the Izmir International Fair, which is being held from August 20 to September 20 next. Full details of the pavilion may be obtained from the secretary of the chamber at No. 1, Istanbul Han, Hanum Eli Sokak, Asirefendi Caddesi, Istanbul, Turkey (P.O.B. 1190, Galata, Istanbul—cable: Brichamcom, Istanbul).

A fire which broke out in the melting shop of William Beardmore & Company, Limited, at Parkhead, Glasgow, recently at night-time when a ladle with 75 tons of molten metal which was being carried by an overhead crane split in two, was kept under control by workmen until the arrival of the fire brigade. It was confined to the area affected by the scattered molten metal, but damage included the destruction of 200 yds. of electrical cable.

The Board of Trade has announced that increased prices came into effect on April 2 for calcium carbide sold through Carbide Distributing Agency, Limited, 55, Gordon Square, London, W.C.1. The increases are due to a rise in the costs of production. Prices for calcium carbide sold from merchants' warehouses are now on an ex-merchants' warehouse basis and carriage charges to destination are the responsibility of the user and not the Board of Trade.

Personal

Mr. Robert Barber, A.C.I.S., has been appointed secretary of the British Steel Founders' Association and its Research and Development Division.

Mr. F. L. Parkin has resigned his position as chief electrical engineer to Steel Peech & Tozer branch of the United Steel Companies, Limited, to take up the appointment of general manager of Aerex, Limited, fan engineers, of Sheffield.

Mr. W. Tupling, for 27 years east machine shop assistant manager of the English Steel Corporation, Limited, Sheffield, who has retired after 50 years with the company, has received presentations from the management and employees.

Mr. John Spencer, secretary of the Newcastle-upon-Tyne branch of Robert Stephenson & Hawthorns, Limited, locomotive builders, has received a presentation from his colleagues to mark his retirement after 49 years in the company's service.

Mr. T. R. Goldsborough, who recently retired from the position of secretary of Gjers, Mills & Company, Limited, pig-iron manufacturers, of Middlesbrough, after 55 years with the company, has received a presentation from officia's, staff, and workmen.

Mr. Wilton Lee, the Master Cutler, accompanied by the Mistress Cutler, attended the annual whist drive and dance of Arthur Lee & Sons, Limited, the Sheffield steelmakers, last Friday. Mr. Lee is chairman of the firm. The event, held at the Cutlers' Hall, was attended by about 650 employees and their friends.

Mr. David Fleming has resigned from his position as secretary of the Falkirk section of the Scottish branch of the Institute of British Foundrymen, following upon an appointment in England. The new secretary will be Mr. Alexander Bulloch, c/o Jones & Campbell Limited, Torwood Foundry, Larbert, Stirlingshire.

Sir Andrew M'Cance, deputy chairman and joint managing director of Colvilles, Limited, was elected president of the Institution of Engineers and Shipbuilders in Scotland at the annual general meeting in Glasgow on April 3. He succeeds Professor G. Cook. Vice-presidents elected were: Mr. G. Johnston (Lobnitz & Company, Limited, Renfrew), and Mr. A. H. S. Lewis (John Lewis & Sons, Limited, Aberdeen). (Some details of Sir Andrew's career are given on page 400 of this issue.)

Mr. V. A. M. Robertson, who retired from the position of chief civil engineer of the Southern Region of British Railways last Saturday, is to become a partner in the firm of Sir William Halcrow & Partners, the consulting engineers. During his 43 years' railway service he has been responsible for many major constructional projects, including the building of the western extension of the Piccadilly Line and the restoration of bomb damage for the London Passenger Transport Board between 1939 and 1943 and on the Southern Railway from 1943 to 1945. Mr. Robertson was president of the Institution of Civil Engineers for 1949-50.

Board Changes

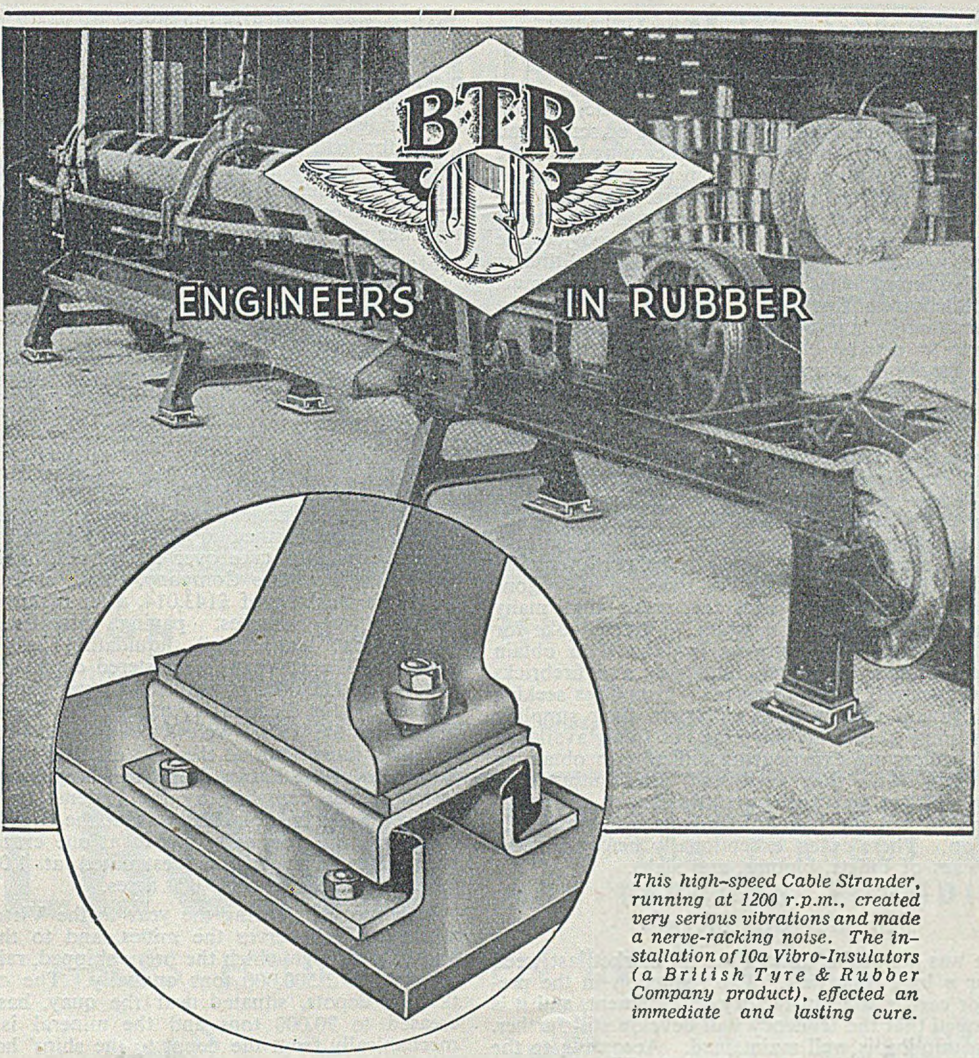
Vent-Axia, Limited—Mr. J. R. Andrew has resigned from the board.

Tilling-Stevens, Limited—Sir George Binney has resigned from the board.

A. C. Cossor, Limited.—Mr. C. I. Orr-Ewing has been appointed a director.

John Bellamy, Limited.—Major H. M. Hudspeth has been appointed a director.

Paterson Engineering Company, Limited—Mr. J. V. Sheffield has been appointed a director.



This high-speed Cable Strander, running at 1200 r.p.m., created very serious vibrations and made a nerve-racking noise. The installation of 10a Vibro-Insulators (a British Tyre & Rubber Company product), effected an immediate and lasting cure.

RUBBER-TO-METAL components such as Vibro-Insulators for machinery, engine mountings, rubber-lined tanks and pipes, valves, bearings, etc., are outstanding products of B.T.R. but part only of its comprehensive service to industry.

Tyres, hose, belting, mouldings, linings and coverings are engineered to pay for themselves wherever rubber can lighten labour, prolong the life of manufactured goods or make their production and usage safer, cheaper, more efficient . . .

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D.B. 18

Raw Material Markets

Iron and Steel

The demand from the steelworks for basic pig-iron is very strong on account of the shortage of scrap, and although additional tonnages are forthcoming from the furnaces recently switched over from the production of foundry iron, still larger quantities are required. Reduced outputs of high-phosphorus pig-iron as a result of furnaces having been taken over to provide the steelworks with much-needed raw material have already seriously affected the foundries using this grade. Reduced deliveries from one source cannot now be accommodated by another producer, so that the foundries have to depend on supplies from their regular source. Stocks at furnaces and at many consuming points are practically non-existent. The engineering foundries find the supply position even more embarrassing, as all the grades used by them are in short supply. Until increased outputs of hematite are facilitated by improved ore supplies, their position will remain difficult. The low- and medium-phosphorus irons are fully absorbed, with production well below demands.

Scrap supplies remain very scarce, and the shortage of pig-iron accentuates the difficulty. Cupola coke is available rather more readily, but shortage of wagons is hindering distribution, with the result that many foundries are still short of supplies. Furnace coke for heating and coke-oven purposes is difficult to obtain in the larger sizes. Ganister, limestone, and firebricks are being received to requirements. Foundries seeking ferro-alloys are usually able to obtain their supplies, although some grades are anything but freely available.

The re-rollers are experiencing difficulty in obtaining all the steel semis they need and their outputs are suffering. Home steelworks are distributing all available supplies, but shortage of raw materials is affecting production. There is an exceptionally heavy demand for all sizes of billets, blooms, and slabs.

Non-ferrous Metals

There was a steadier tone in the tin market last week than for a long time past. The reduction in the premium for cash was a satisfactory development, and it is to be hoped that the tendency will develop still further. Tin consumption is well maintained. According to the Bureau of Non-ferrous Metal Statistics, the February usage was 1,907 tons, compared with 2,164 tons in the previous month. Stock in consumers' hands amounted to 1,659 tons, against 1,571 tons at January 31.

The bureau states that copper consumption during February was 45,849 tons, compared with 53,452 tons in January. The usage of secondary copper showed little change on the month, but consumption of virgin metal in February was 26,740 tons, compared with 31,965 tons in January. There was a sharp fall in copper stocks in the United Kingdom, for the total at the end of February was 94,038 tons, which compared with 101,457 tons at January 31.

Further details announced by the Bureau of Non-ferrous Metal Statistics show that zinc stocks declined from 36,186 tons at January 31 to 32,556 tons at the end of February. These figures relate only to virgin metal. Consumption during February on the basis of primary and secondary metal amounted to 24,770 tons, which was less than 100 tons below the January figure. As might be expected, consumption this year shows a fall compared with 1950. For the first two months of 1951 the advancing total was 50,176 tons, almost exactly 4,000 tons below the corresponding figure in 1950.

There was a sharp fall in stocks of virgin lead in the United Kingdom from 54,591 tons at January 31 to 45,311 tons at the end of February. As in the case of zinc, there was little difference between consumption in the two months, the February figure of 31,666 tons comparing with 31,948 tons in January. The chief outlet for lead continues to be cable making, but sheet and pipe makes a good second. The battery makers are also big users. A lot of scrap lead is recovered and used in this country, and in the above figures some 9,000 tons per month of this type were included.

Metal Exchange official tin quotations were as follow:

Cash—Thursday, £1,250 to £1,260; Friday, £1,280 to £1,285; Monday, £1,295 to £1,300; Tuesday, £1,305 to £1,310; Wednesday, £1,290 to £1,295.

Three Months—Thursday, £1,205 to £1,210; Friday, £1,235 to £1,240; Monday, £1,235 to £1,240; Tuesday, £1,240 to £1,245; Wednesday, £1,220 to £1,230.

Itabira Iron Mines

The 1950 balance-sheet of Brazil's Companhia Vale do Rio Doce, formed in 1942 with mixed State and private capital to take over the concessional rights of the British Iron Ore Company, shows a net profit on the year's working of £143,014, after making statutory transfers to reserves, paying amortisation and interest on loans, and liquidating earlier years' deficits. The company's registered capital is approximately £13,000,000, of which 94.5 per cent. was subscribed by the Federal Treasury. Its fixed assets at December 31, 1950, were valued at £30,258,634, or £347,965 more than at the end of 1949. The former properties of the Itabira Iron Ore Company were transferred to the company by the Federal Union, which received them free of charge from the British Government, and are nominally valued at one cruzeiro. The iron mines, with reserves estimated at 1,000,000,000 tons, cover an area of 19,000 acres.

Improvements during the year to the Victoria-Minas railway, which serves the mines, and to the port of Victoria, through which the ore is shipped, raised export capacity to 1,500,000 tons annually. The capacity of the ore depots, situated near the quay, has been increased to 90,000 tons and the mineral is conveyed mechanically from the depot to the ships' holds at the rate of 1,000 tons per hour.

The mechanisation of the mine installations is practically completed. The Itabira mines produced 732,280 tons of iron ore in 1950 and exported 721,765 tons. The latter figure represents an increase of 249,855 tons over 1949 and is 80 per cent. of Brazil's entire exports during 1950; 81.5 per cent. was shipped to the United States, 10.3 per cent. to Canada, 3.2 per cent. to Holland, 2.6 per cent. to Great Britain, 1.4 per cent. to Germany, and 1 per cent. to Belgium.

South African Steel Venture

The new £50,000 factory of Flather Bright Steels, (Pty.), Limited, was opened recently and the first bright-drawn steel bars to be produced in South Africa are now being turned out. The Sheffield firm of W. T. Flather, Limited, acts as technical advisers to the South African organisation.

The factory covers an area of 25,000 sq. ft. in the Nuffield-Industrial Township in the Witswatersrand, and is equipped with modern British plant. The plant will employ 150 when in full production.

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

(Delivered, unless otherwise stated)

April 11, 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. 6⅞d. 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. 8¼d. 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, £1,290 to £1,295; three months, £1,220 to £1,230; settlement, £1,295.

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., 26⅝d.; wire, 27¼d.; 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., 39⅛d.; wire, 40½d.; rods, 36¾d.; tubes. 42d.; chill cast bars: solids, —, cored, —. (C. Clifford & Son. Limited.)

Nickel Silver, etc.—Ingots for raising, 2s. 4¼d. per lb. (7%) to 3s. 3½d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 2s. 10¼d. (7%) to 3s. 9½d. (30%); to 12 in. wide × .056, 2s. 10½d. to 3s. 9¾d.; to 25 in. wide × .056, 3s. 0¼d. to 3s. 11¾d. Spoon and fork metal, unsheared, 2s. 7¼d. to 3s. 6¼d. 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.

Forthcoming Events

APRIL 16

Sheffield Society of Engineers and Metallurgists

Film Night (details from the Secretary), 6.15 p.m., at the Royal Victoria Station Hotel, Sheffield.

APRIL 17

Production Engineering Research Association

"Economic Advantages of Production Engineering Research," by Dr. D. F. Galloway, Wh.Sch., M.I.Mech.E. (director of the Association), 7.30 p.m., at the College of Technology and Commerce, Leicester.

Institute of British Foundrymen

Coventry and District Students' Section :—Annual General Meeting, followed by "Brains Trust," 7.15 p.m., in Room A5 at the Coventry Technical College.

APRIL 18

London Branch :—Afternoon visit to Guinness Factory, Park Royal, London, N.W.10, numbers limited to first 50 applying. Details of assembly from the Secretary. Visit commences 2.30 p.m.

Birmingham and West Midlands Students' Section :—"Moulding and Scrap Control," by L. Clarke, 7 p.m., at Dudley and Staffordshire Technical College, The Broadway, Dudley.

APRIL 19

Institution of Production Engineers

London Section :—Meeting at Royal Empire Society, Northumberland Avenue, London, W.C.2, at 7 p.m. Paper, "High-frequency Heating in Production," by K. A. Zanstra.

Institution of Mechanical Engineers

Midland Branch :—Meeting in the James Watt Memorial Institute, Great Charles Street, Birmingham, at 6 p.m. Paper, "Education and Training in Engineering Management," by H. G. Nelson.

Institution of Mechanical Engineers

APRIL 20

"Twin Centaurus Power Plant for the Bristol 'Brabazon,'" by J. L. Norton, A.M.I.Mech.E., 5.30 p.m., at Storey's Gate, St. James's Park, London, S.W.1.

Institute of Economic Engineering

"Progress Control," by J. Bailey, 7.30 p.m., at the Greyhound Hotel, Croydon.

APRIL 21

Institution of Mechanical Engineers

East Midlands Branch :—Meeting at the Museum Lecture Room, Priestgate, Peterborough, at 3 p.m. Paper, "Optical Instruments Applied to Precision Measurements in Engineering," by J. W. Harrison.

Institute of British Foundrymen

Bristol and West of England Branch :—Annual Dinner (details to be obtained from the Secretary).

West Riding of Yorkshire Branch :—Annual General Meeting, followed by presentation of the Winning Paper in the S. W. Wise Memorial Competition, 6.30 p.m., at the Technical College, Bradford.

Institution of Production Engineers

London Graduate Section :—Visit to the National Physical Laboratory, Teddington, Middlesex, at 2.30 p.m.

Index to Volumn 89

The Index to Volume 89 of the Foundry Trade Journal, covering the period July to December, 1950, has now been printed. Copies are available to readers on writing to the Publishing Office, at 49, Wellington Street, London, W.C.2. Subscribers wishing regularly to receive copies of indices of future volumes may request that their names be added to the permanent mailing list.

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.

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FOUNDRY MANAGER, 20 years' practical experience in light alloys, requires a position with greater scope.—Box 856, FOUNDRY TRADE JOURNAL.

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SITUATIONS VACANT—*Contd.*

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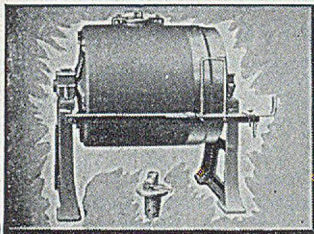

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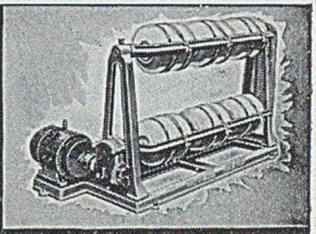

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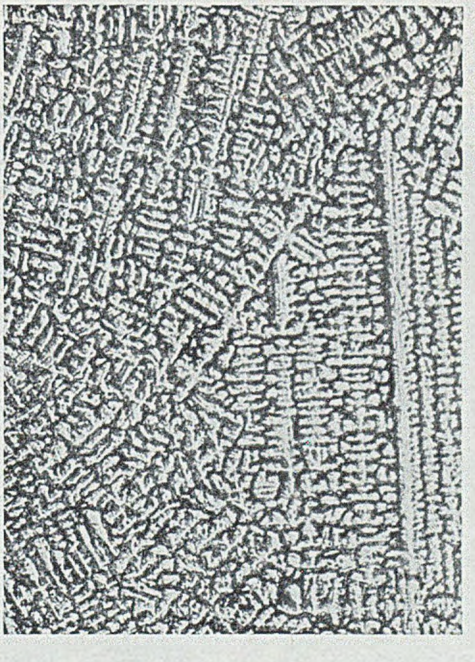

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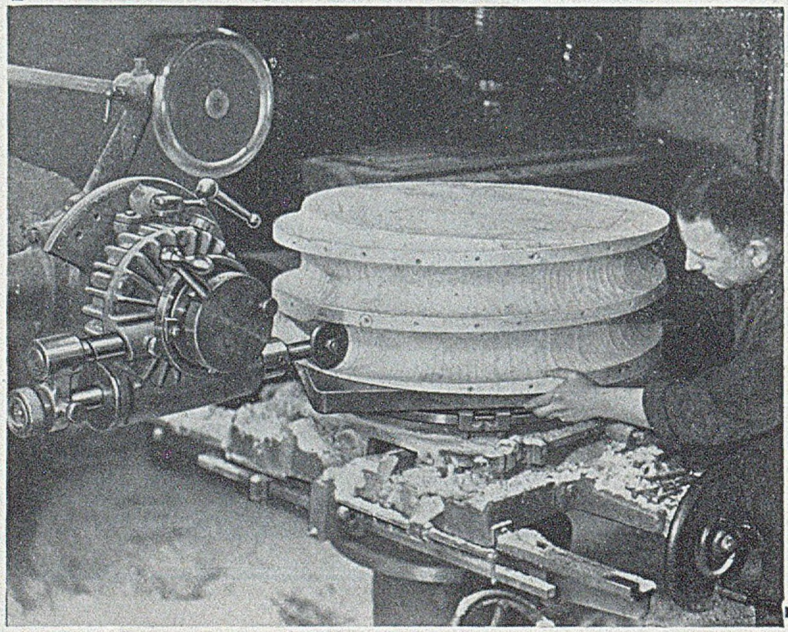

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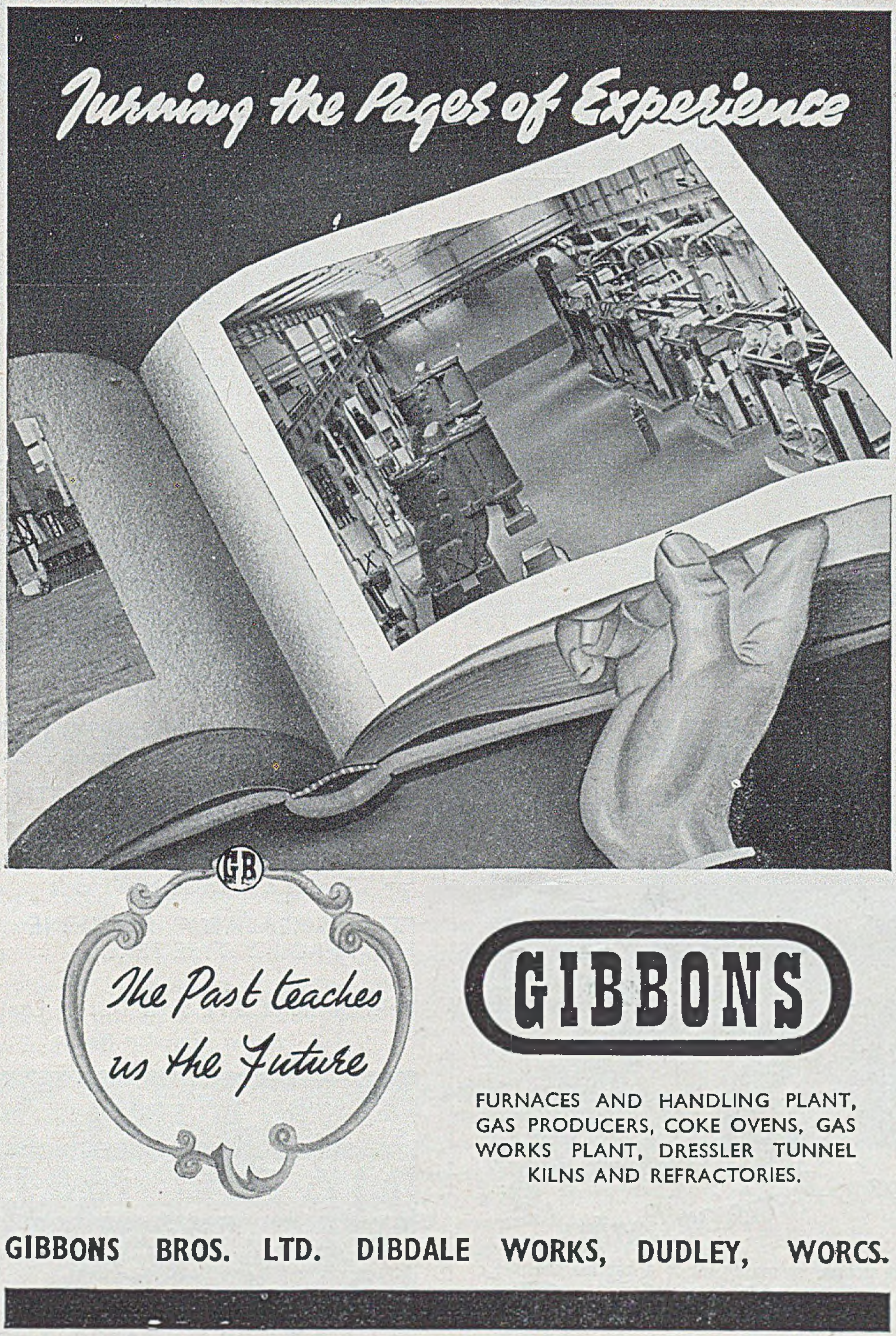
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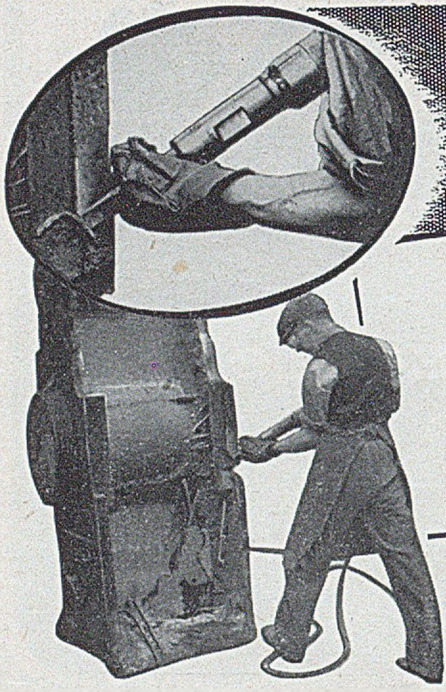

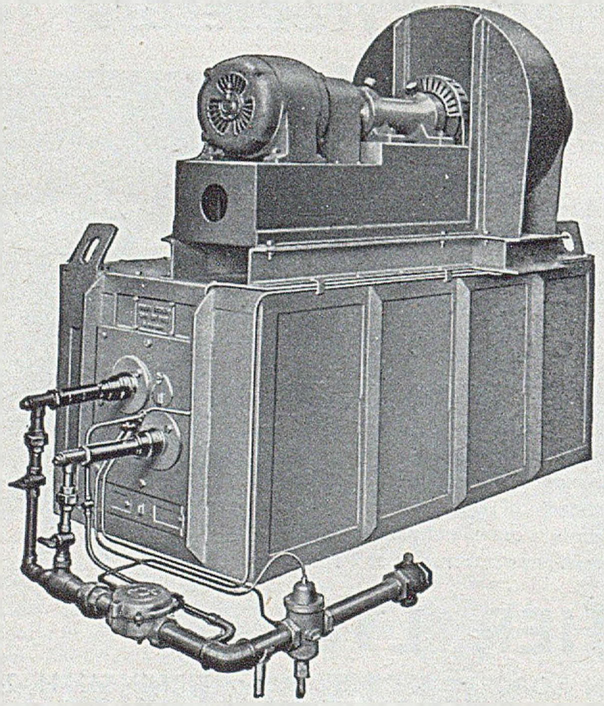

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