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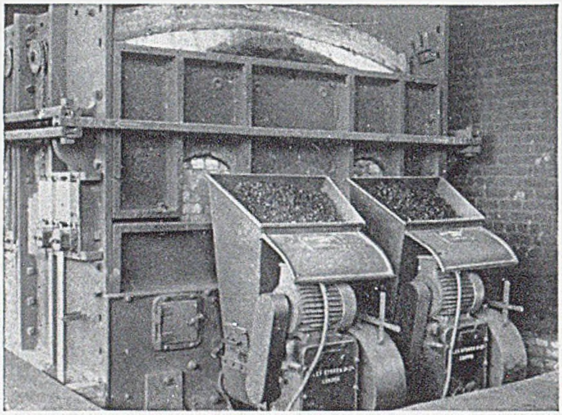
R.34



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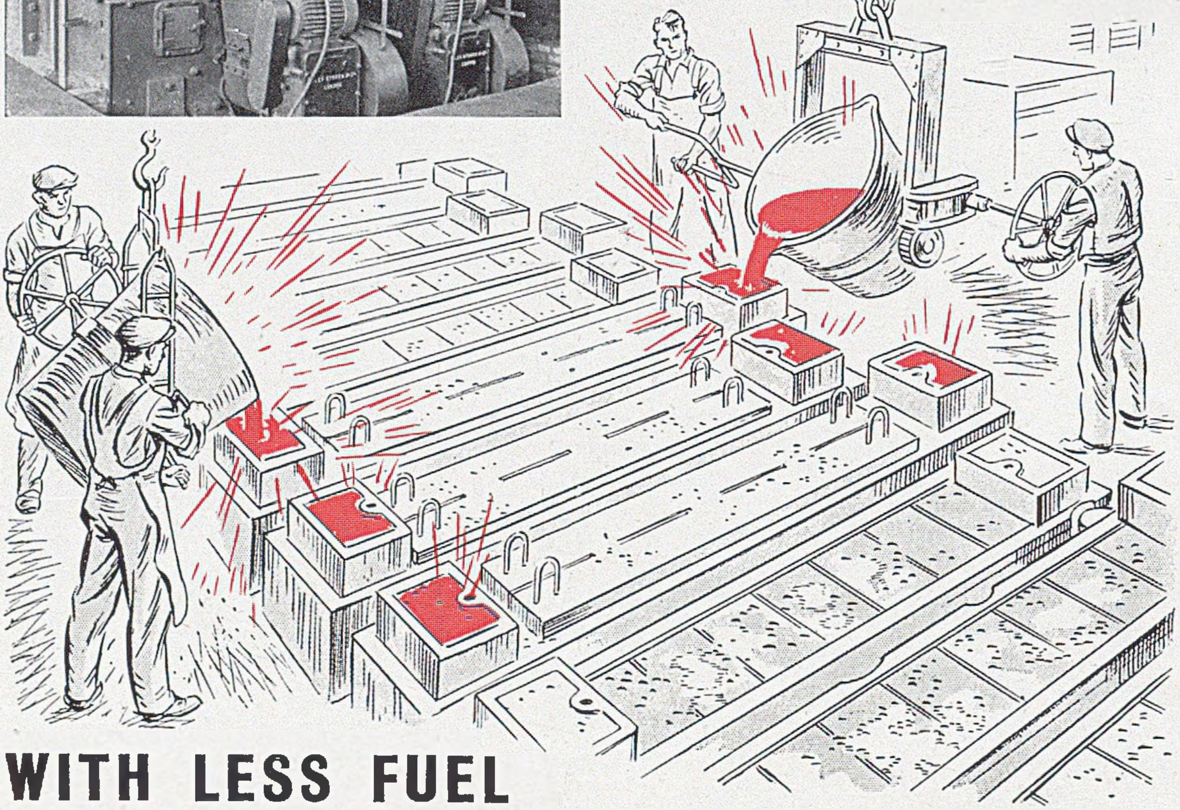

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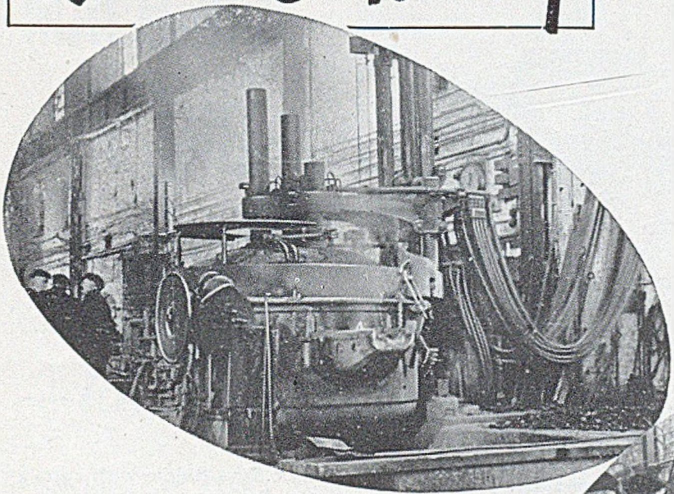
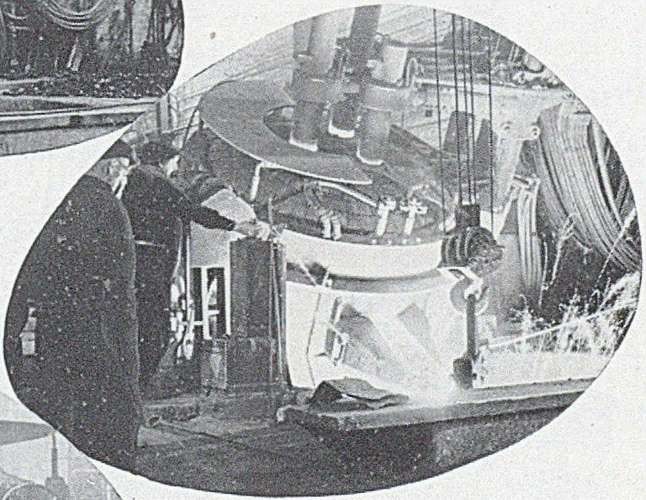
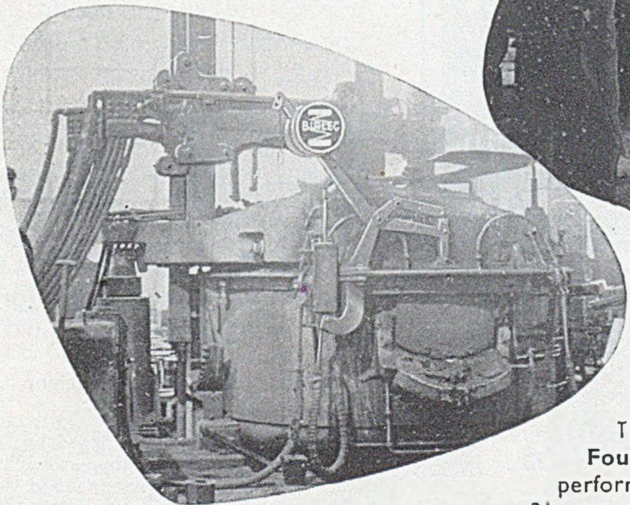


The 1500 kVa, model PQT Birlec Lectromelt shown here is a medium size furnace suitable for many foundry needs. Standard sizes are, however, available up to; 150 tons in capacity can we send details?





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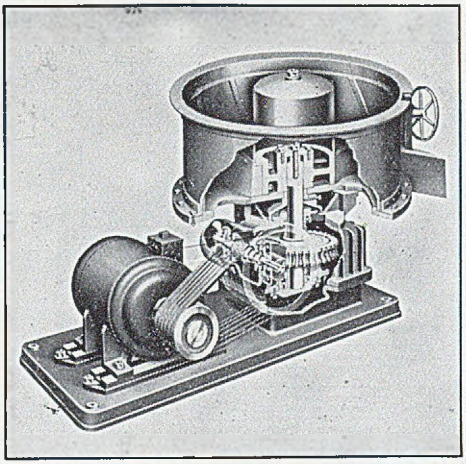

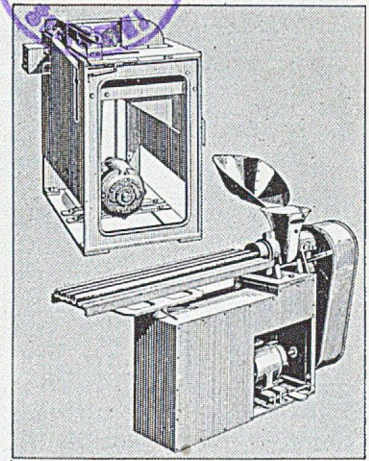

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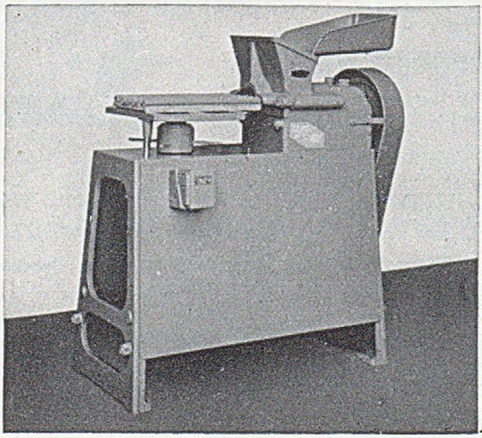

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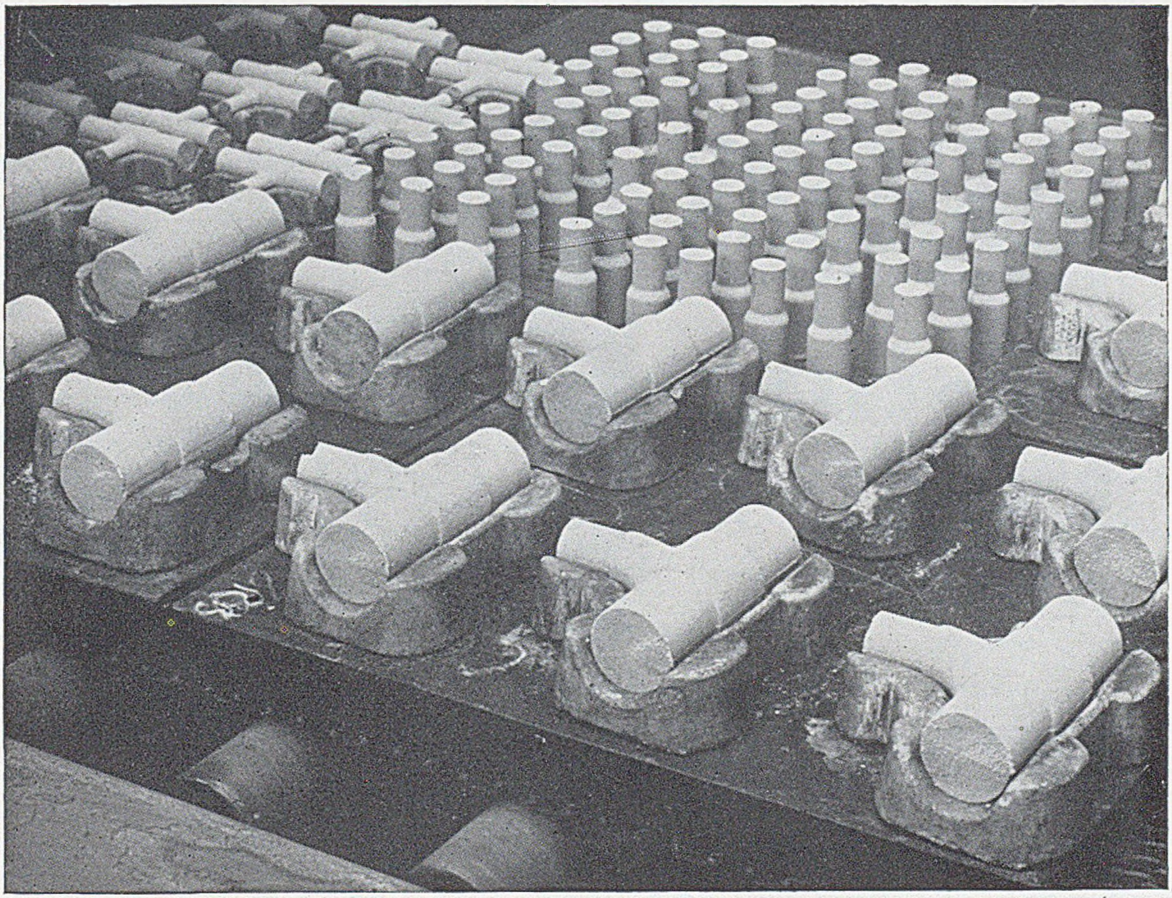

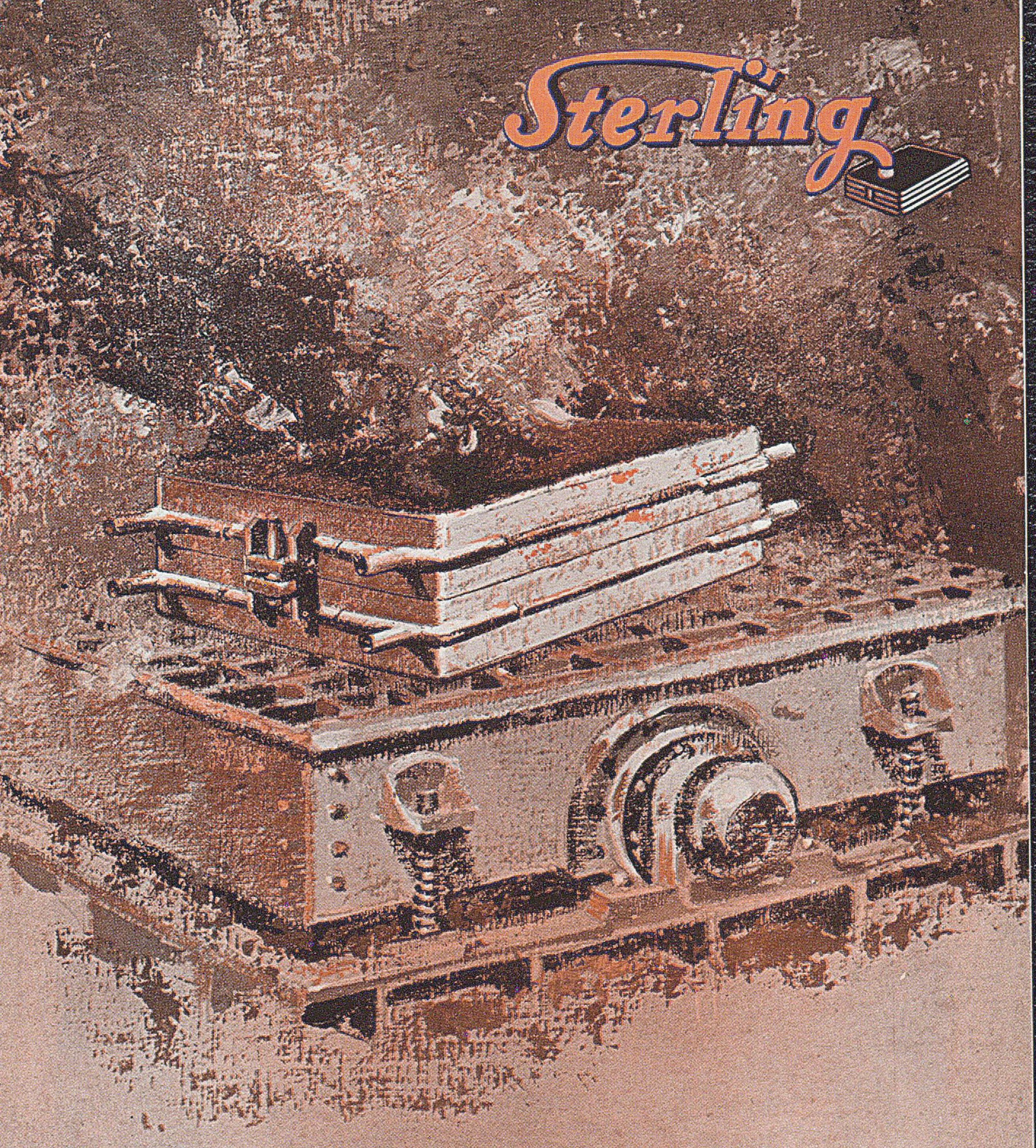

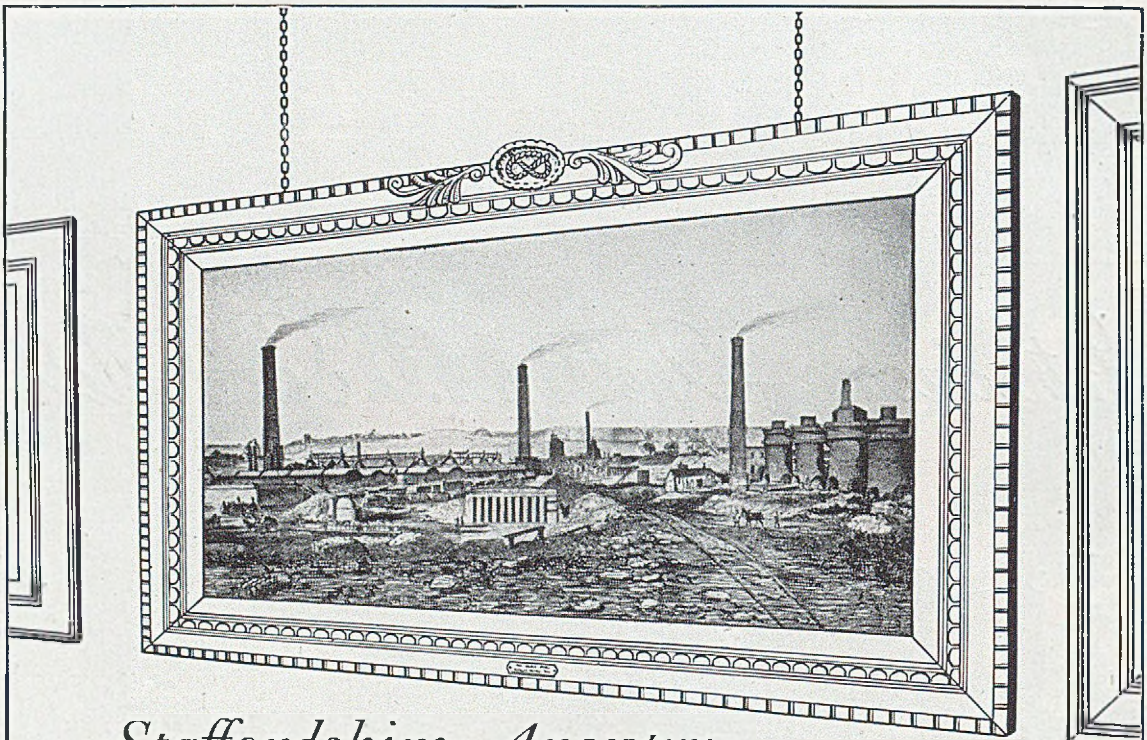

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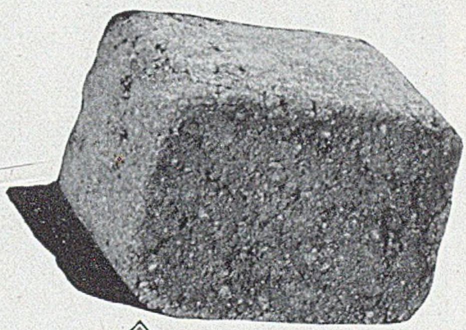

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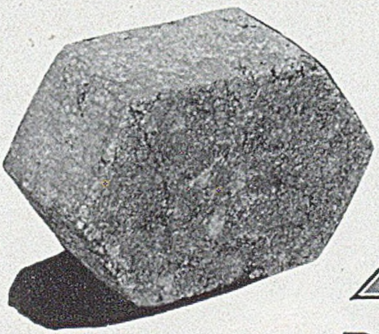

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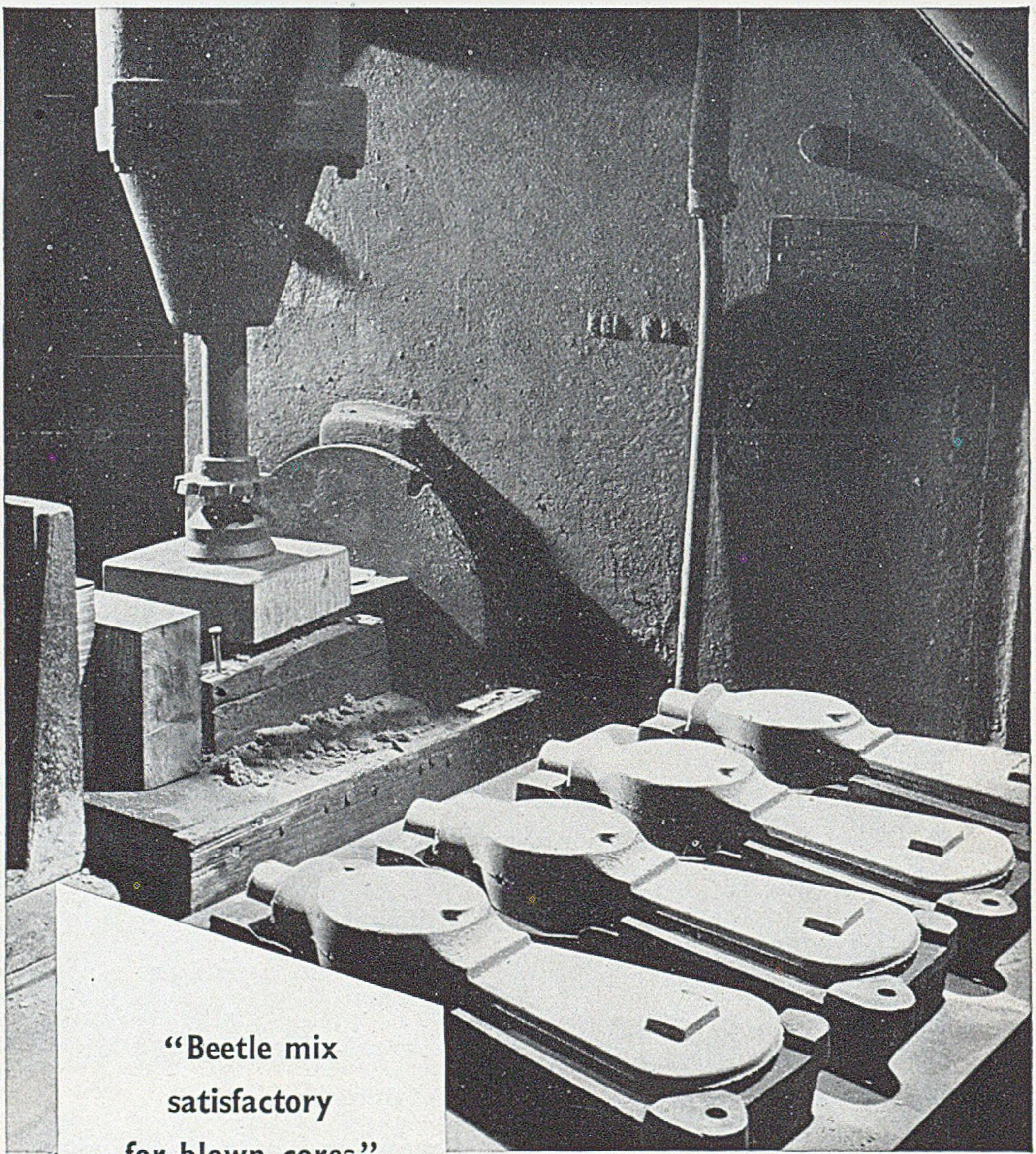

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Machine-tool Productivity Report

The Report* issued by the productivity team which visited America on behalf of the machine-tool industry contains some extraordinary statements and recommendations. The impression received at the Press conference introducing the Report, at which representatives of the sponsoring industry were present, was that the recommendations would not receive the entire blessing of their industry. This perhaps does not detract from the interest of the Report and, indeed, may enhance it. It was pleasing to learn that the industries of the two countries are "much of a muchness," with slightly higher general productivity going to the Americans. It was revealed that inspection was carried out on a much more realistic basis than is customary here. The steps taken are sensible and may well be applicable to the foundry industry. Time reduction is effected by the use of statistical control and, where certain dimensions or properties are recorded day-after-day as satisfactory, then only periodic sampling should be necessary.

A most important statement is that machine-tools are too expensive and that they must be made cheaper by company amalgamations; by the standardization of parts, so that bits and pieces by the various makers are interchangeable; by putting bigger batches through the shops and by using a finish that is serviceable and not exquisite. It is germane to remark that, like many other industries, 90 per cent. of the output is in the hands of relatively few people, so that by technical co-operation, the resolution of many of the problems could be effected without financial integration. Then comes this question of surface finish, and we recall our admiration of the appearance of the machine-tool exhibition. There, the exhibits were of such a character that those who were destined to operate such machines could not help but feel proud of them and take more interest in their work. The suggestion of reverting to "war finish" or even something just a little better, simply will not do, as, in future exhibitions, the well-finished Continental machines would stand out so strikingly, that only the most horny-handed sons of toil would interest themselves in the design features of poorly-finished machines. It was stated that "super finish" accounts for three to four per cent. of the total costs. In our personal economics, we attach much less importance to price margins when purchasing capital goods than when buying consumable supplies, and this rule very largely applies to industry.

Naturally, at the Press conference we tried to ascertain something of American foundry practice and received the following replies, though it was stated that but few such departments were visited. The American machine-tool industry seemed to be satisfied with the castings supplied to them. They were of a more open-grained texture than the British. The castings were neither heat-treated nor weathered, but were left in the mould till cold. A lower Brinell hardness was in vogue, and welding on shearways was frowned upon. The authors of the Report include much of a controversial character and we await with interest comment by the industry.

* Issued by the British Productivity Council, 21, Tothill Street, London, S.W.1; price 3s. 6d., post free.

Correspondence

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

SHELL MOULDING*

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—With reference to the article on shell-moulding development published in your issue of December 4 and the letter from Mr. Jarvis concerning this article (December 18). Replying to question (1), it is necessary to use a clay-free sand of a particular grain grading, though not of a particular grain size; there are a number of sands in the country which are quite suitable for shell moulding. Concerning the way in which the sands are used, it has been the practice to date to use the sand once only, consequently such problems as ash content and grain breakdown do not arise. One of the main features of the process is the consistency of the mould and the high permeability, which is, of course, largely obtained by using the sand once only. Mr. Jarvis is quite right in assuming that the cost of the sand should be included, and this in fact has been done, though unfortunately this was not made clear.

In question (2), Mr. Jarvis refers to the securing of the two half-moulds by means of clips or soft-iron nails. Surprisingly enough, the hydrostatic pressure does not burst these apart and it is common practice to pour moulds 16 in. by 14 in. size and from 3 in. to 6 in. deep with a metal content per mould varying from 8 to 30 lb., in such metals as iron, copper-base, and light alloys. It was the practice in Johannes Croning's original process to bury the mould in iron shot, but the Polygram process eliminates this method of mould support.

Concerning question (3), I assure Mr. Jarvis that patternmaking costs have not been glossed over in any way; in fact, it is quite true to say that an ordinary foundry cast matchplate can be used quite successfully; the only factor to be borne in mind is that the casting can never be superior to the pattern. Therefore, if castings to tolerances of ± 0.002 in. per in. are required, the necessary work will obviously have to be put into the equipment. Up to now, all wooden and low-melting-point white-metal patterns have been found unusable, but in this field development work is in hand.

Regarding the temperature at which the pattern plate is operated, this is of no consequence when calculating pattern dimensions, as the coefficient of expansion of the moulding mixture is very similar to that of cast iron. There is some variation when using non-ferrous pattern equipment, but the dimensional differences are so slight that in practice it has not been found necessary to make any allowances for them.

When producing metal patterns to tolerances of ± 0.002 in. per in., it is sometimes advisable to have them made in the tool-room and, of course, in such instances the costs quoted by Mr. Jarvis are approximately correct. In many other instances, however, close tolerances are only required at one or two points of a casting and in such cases it is often quite satisfactory to machine a cast pattern at the points requiring close dimensional tolerances and to hand-finish at the remaining unimportant dimensions, thus greatly reducing the costs of pattern production. There are numerous cast matchplates in production and it is true to say that the costs of this equipment were unquestionably competitive with similar equipment produced in wood.—

Yours, etc., J. FALLOWS,

Polygram Casting Company, Limited. Director.

* Slightly abridged by the Editor.

German (Pre-war) Trade-marks

Disposal by Custodian of Enemy Property

At the outbreak of war in 1939, there were over 4,000 trade-marks on the United Kingdom Register of trade-marks, the proprietors of which were German enemies. Except in certain special cases, these marks remained on the register during the war in the names of the German proprietors and have since been vested in the Custodian of Enemy Property for England. Subject to the protection of British and other allied interests, it is now intended to clear the register of such of these marks as need no longer remain registered, and to return most of the remainder to the former German proprietors or their successors in title. A Board of Trade announcement made yesterday indicates the procedure which will be followed to achieve these ends and sets out the action to be taken by the former German proprietors or by others interested in particular marks or desirous of objecting to their return to the former proprietors. The marks will be treated individually; the Custodian will consider each case on its merits and makes no general promise that any particular mark will be cancelled or returned.

Broadly speaking, the procedure is that the former German proprietors of certain categories of marks, or their successors in title, should, if still interested in their marks, request the assignment of the marks to them by the Custodian. An opportunity will be given to British and other allied interests to object to any such assignment before the Custodian acts on the requests. If a *prima facie* case is made out against the return of a mark to the former German proprietor or, in any case, if the mark in question was registered in part (A) of the register since September 3, 1932, the Custodian, failing an acceptable agreement between the parties concerned, will not assign the mark to the former proprietor, but the latter can in such a case attempt to recover the registration by applying to the Register of Trade Marks for re-registration of the mark, and the Custodian will consider cancelling the existing registration to allow the application to proceed. Full details are given in a notice published in the Trade Marks Journal and the Official Journal (Patents) of January 28, 1953.

"Number 1900."—The number on this week's issue of the JOURNAL is 1900 and a complete bound set of the ninety-two volumes would take up about 20 ft. of shelving. For the first eighteen years of its life, from 1902 to 1920, it was a monthly magazine. As a mere "toddler," at two years old, it came into the ownership of the present proprietors, and since then it has made straight-line progress. To-day it is the only weekly technical journal in the world serving the foundry industry. Last year it celebrated its golden jubilee and a special issue was produced giving its history and that of the industry it serves.

WITH A WEEKLY AVERAGE PRODUCTION of 50,460 tons in December, the North-East Coast achieved a total output of 2,600,800 tons of pig-iron in 1952, compared with 2,337,500 tons in 1951. Last year's production of steel ingots and castings was 3,238,000 tons, which exceeded the 1951 total by 17,100 tons.

MR. H. T. HAIGH of Bradford, who, as reported in the *Obituary* column on page 134 of this issue, has died as the result of an unfortunate accident, was a member of the West Riding of Yorkshire branch of the Institute of British Foundrymen, having joined in 1950. His brother MR. HUBERT HAIGH, also a foundryman, joined the Institute in 1946.

"Push-button" Control of Metal Composition Envisaged

Novel System Installed at Croydon Foundry

The foundryman's dream of having metal of the correct composition and quantity at his disposal merely on the pressing of a button is brought one stage nearer by the cupola-charging system described. Details of the theory and practice of working are given and six months' operation has shown the expected advantages have in fact been realized.

One of the most revolutionary systems of mechanical cupola charging,* which it has been the writer's fortune to witness, and one that bids fair literally to give the ironfoundry foreman push-button control over the metal composition, has just been completed at Croydon Foundry, Limited It is the personal invention of the managing director, Mr. S. J. Smith, who has long held it desirable for his class of work for the man on the shop floor to be in " command " of the cupolas, and be able to tap the metal laid down for a job at the right time to suit the shop. The device obviates the necessity for any delay to work out new mixtures or for the charging to be supervised.

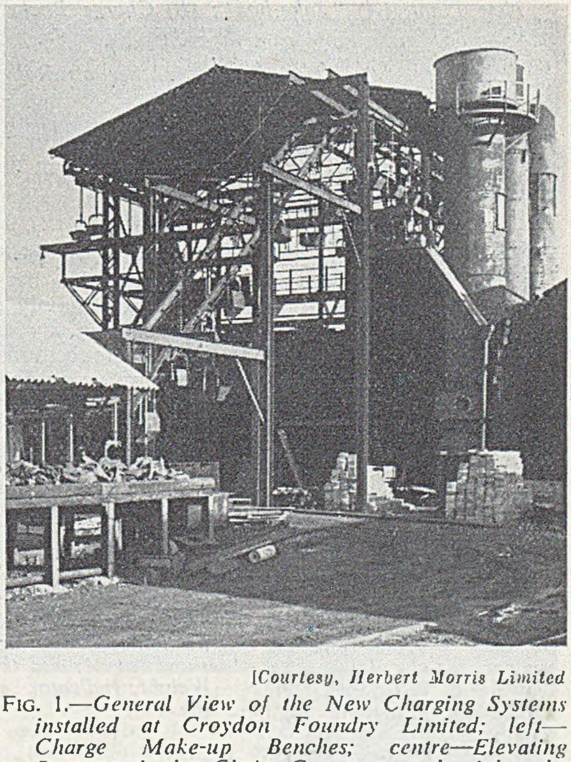
Briefly, the system (Fig. 1) is one of pendulum buckets, carrying at fixed centres portions of the charges on an endless chain conveyor from the stockyards at ground level up to and past the charging points of the cupolas. Automatic discharge of the bucket's contents into the cupola shaft is arranged by a trip mechanism, when the bucket is opposite the open charging door, and the empty bucket proceeds back to the stockyard.

Selector Gear

What makes for the beautiful simplicity and novelty of the arrangement is the system for ensuring that the appropriate charge load from the correct bucket is emptied into the respective cupola or cupolas in use. The pendulum system of each bucket carried from the moving chain consists of a vertical suspension-bar or bale, three or four feet long, on to which striker pads are bolted at predetermined locations. Then, at the cupola to be charged (and there are six at present envisaged in the circuit), there is a " juke box " (Fig. 2). This is arranged on either side of the pendulum suspension bale and holds the " analysis jig-bars," which carry pre-set triggers at intervals. These bars in pairs are rotatable and are arranged so that the triggers engage the striker pads only on the bales of the buckets selected for discharge into the cupola being used. The rotating jig-bar electrically actuates a " thruster "; the latter disengages a safety catch on the tip-up bucket, which then swings on its trunnions and empties itself by gravity. The empty bucket proceeds on the normal circuit of the chain, back to ground level at the stockyard, to receive a further charge.

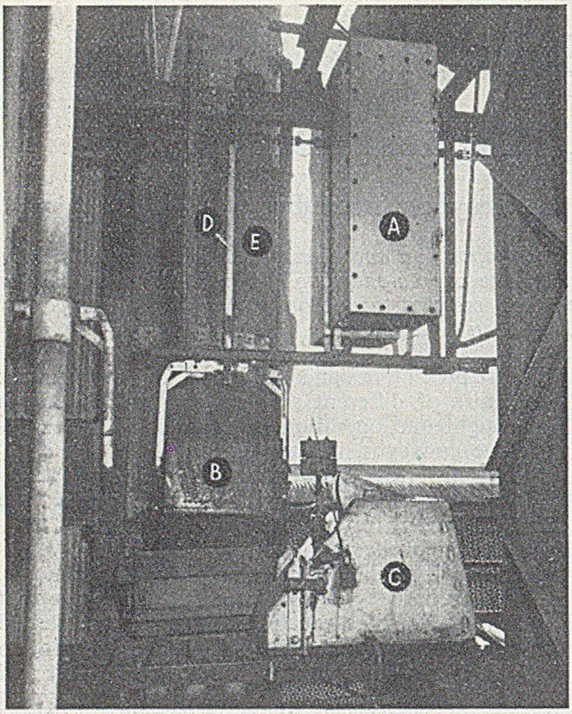
* Patent application No. 15457.

As at present designed, each " juke box " carries four pairs of different analysis jig-bars which can be brought into operation or changed without stopping the conveyor, by turning a wheel. Later, remote control for this change will be arranged by push-button at floor level, probably inside the moulding shop, for operation by the foundry foreman. Each bucket is provided with a spring weighing device (Fig. 3) for regulating its contents. Although this device is recognized as somewhat crude and could be much improved, it has turned out to be reasonably accurate in practice, bearing in mind that errors are always likely to be positive and that each bucket contains a quite small component (150 lb.) of the total unit charge. Coke and limestone are also carried in appropriate buckets and



[Courtesy, Herbert Morris Limited

FIG. 1.—*General View of the New Charging Systems installed at Croydon Foundry Limited; left—Charge Make-up Benches; centre—Elevating System of the Chain Conveyor and, right—the Three of the Four Cupolas at present installed and Served by the Plant.*



[Courtesy, Herbert Morris Limited

FIG. 2.—*One of the Furnace Charging Points of the New Plant: (A) "Juke-box"; (B) Charge Bucket; (C) "Thruster"; (D) Suspension Bale of the Bucket, and (E) Cupola Shaft. The "Thruster" is moved from One Furnace to Another on Roller Track.*

tipped and charged by the same mechanism, but in this case quantities are measured and placed in the buckets and not weighed.

Croydon Installation

Having outlined the theoretical concept of selection charging, it is germane to see how it has been applied at Croydon Foundry. This is mainly a jobbing foundry producing iron castings in a wide variety of weight ranges and metal compositions, sometimes even semi-repetition lines are being produced. The particular objects for which Mr. Smith designed his charger were therefore as follow:—

(1) To provide a mechanical charging system capable of serving any two cupolas of a battery of six (so giving a flexible melting rate of 3 to 14 tons per hr.);

(2) to make charging automatic, cut out the human element as far as possible, and simulate the metal distribution in the furnace which is normally only given by hand charging;

(3) to be able to replace or alter a cupola without interfering with the charging arrangements;

(4) to instal the stockyard remote from the cupolas, and site it so as not to bottle-up foundry;

(5) to provide supports for efficient spark arrestors and space for hot-blast equipment to be installed in the future;

(6) to provide for easy change of composition and control of the foundry floor, and

(7) to save labour.

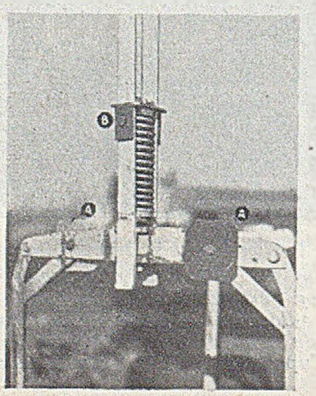


FIG. 3. — *Suspension and Weighing Gear of a Charge Bucket. The Coloured Identification Tabs are shown at (A) and the Weight Indicator at (B).*

[Courtesy, Herbert Morris Limited

Melting Plant

To cater for a melting rate of from 3 to 14 tons per hr., allow idle time for efficient patching, and make it possible for the conveyor to feed any two cupolas simultaneously at one speed, it was necessary that the cupolas should have a definite relationship one to another. It was decided to instal six cupolas, as follow:—Two of 41½-in. dia., two 36 in., and two 29 in., that is, having cross-sectional areas of 135, 101 and 66 sq. in., the melting rates being in the proportion of 4:3:2. The charges are then as shown in Table I and the combinations of cupolas to give desired melting rates are given in Table II.

TABLE I.—*Charge Make-up for the Three Sizes of Cupola.*

	Lb.	Lb.	Lb.
Iron	1,200	900	600
Coke	141	106	70
Limestone	32	24	16
Air (cub. ft. per min.)	4,000	3,000	2,000
No. of charges per hour	12.5	12.5	12.5
No. of buckets per charge (plus coke)	8	6	4

TABLE II.—*Output from Various Cupola Combinations.*

	Cwt. per hr.
One cupola of 29 in. dia. gives	75
,, ,, ,, 36 in. ,, ,, ...	110
,, ,, ,, 42 in. ,, ,, ...	145
Two cupolas of 29 in. dia. give	150
One cupola of 29 in. dia., together with one of 36 in. dia. give	185
Two cupolas of 36 in. dia. give	220
One cupola of 36 in. dia, together with one of 42 in dia. give	255

Conveyor Design and Capacity

The selection of the chain conveyor was limited by the cost and delivery offered from conveyor suppliers,† the cost of the supporting steelwork, etc. Also, as this was probably the first attempt ever made to charge cupolas in this manner, it was decided not to be too ambitious. If successful, it was visualized as possible to adapt the idea for heavier loading, using a stronger chain. The conveyor installed provides four sequences of 20 buckets at

† Herbert Morris Limited, Loughborough.

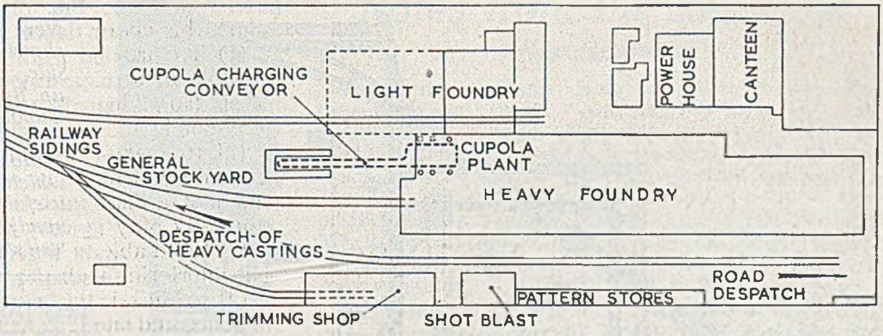


FIG. 4.—*Plan of Croydon Foundry, showing the Relative Positions of the New Charging Plant, the Foundries, Cupola Furnaces, Stockyards and Sidings. (The Heavy Foundry is approximately 300 ft. long.)*

5-ft. 4-in. centres (426 ft. 8 in.) and is rated for 3-cwt. loading at each 5-ft. 4-in. centre. The loading chosen was to allow for the weight of the bucket, say 100 lb., and the weight of the contents, 150 lb., a total of 250 lb. Each sequence of 20 buckets provides enough material for any normal composition for any two cupolas, and as 12.5 charges are required per hour, the normal speed of the conveyor becomes $\frac{12.5 \times 106 \text{ ft. } 8 \text{ in}}{60}$ ft. per min., or 22 ft. per min. (approx.). A variable-speed gear-box is embodied in the chain-conveyor drive, permitting a 50 per cent. increase or reduction.

Marking of Buckets.—Buckets are numbered from 1 to 20, and there are four series (that is, there are four No. 1's, four No. 2's, etc.). They are marked by coloured labels (Fig. 3) for their standard loading, as follow:—

Code.	—	Colour.
3 per cent.	3 per cent. Silicon pig-iron	Blue
2 per cent.	2 per cent. Silicon pig-iron	Yellow
S	Steel	Black
OH	Own hard scrap	Green
OS	Own soft scrap	Brown
BB	Bought scrap	Red
B	Bought scrap and steel ..	Red and black (bought scrap 100 lb. with steel 50 lb.)
C	Coke 70 lb.	Aluminium (plus limestone 16 lb.)
C2	Coke 35 lb.	White (plus limestone 8 lb.)

Standard and Special Loadings.—Standard loadings of the bucket sequence are as shown:—

Buckets and Charge Code.									
1,	2,	3,	4,	5,	6,	7,	8,	9,	10,
3 per cent.	3 per cent.	3 per cent.	3 per cent.	2 per cent.	2 per cent.	S	S	OH	OH
11,	12,	13,	14,	15,	16,	17,	18,	19,	20,
OS	OS	OS	BB	BB	BB	B	C	C	C2

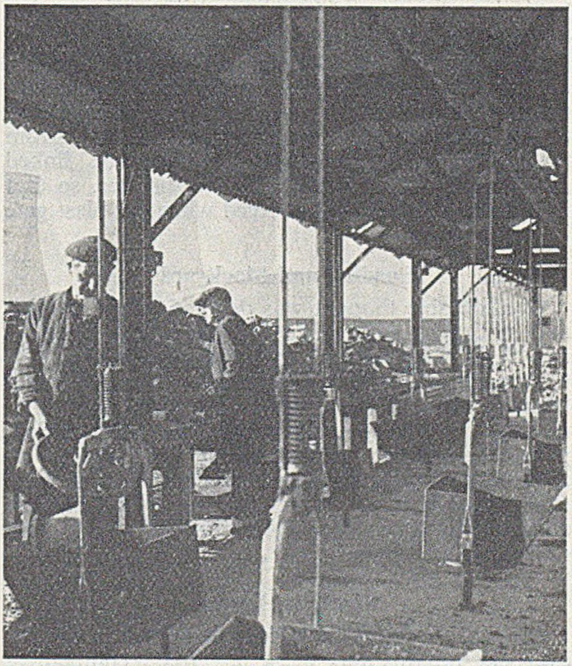
This sequence provides the foundry's requirements at the moment, *viz.*:—

	Silicon (per cent.).	Phos. (per cent.).	Bucket Nos.
On the 29-in. cupola (one mix only) ..	2.25	0.35	1, 2, 11, 12, 18
On the 36-in. cupola (four mixes):—			
No. 1	1.9	0.75	3, 4, 13, 14, 15, 17, 19, 20
No. 2	1.6	0.75	5, 6, 13, 14, 15, 17, 19, 20
No. 3	1.6	0.35	3, 5, 6, 7, 9, 10, 19, 20
No. 4	1.35	0.25	3, 5, 6, 7, 8, 9, 19, 20

If the standard loading given earlier will not provide a composition required, it can be easily altered for the day's run. Croydon Foundry use a "jig board," which is a simple wooden template providing visual means of checking whether the conveyor can deliver the materials required. Of course, if the standard loading is altered, the labels on the buckets are altered to suit. At normal speed, the 20 buckets in each sequence carry 2,550 lb. of metal past the cupola every 4.8 min., and give an infinite variety of choice.

Control of Charging

As mentioned previously, the normal speed of the conveyor provides the correct number of charges per hour, as pre-selected by the management to suit the melting rate of the cupola. However, it is hoped later to fit an electrical device on the charging sill



[*Courtesy, Herbert Morris Limited*

FIG. 5.—*Filling the Charge Buckets at Ground Level, the Chain Conveyor doubles back on itself at this Point. Materials are stored on Raised "Decks" or Benches.*

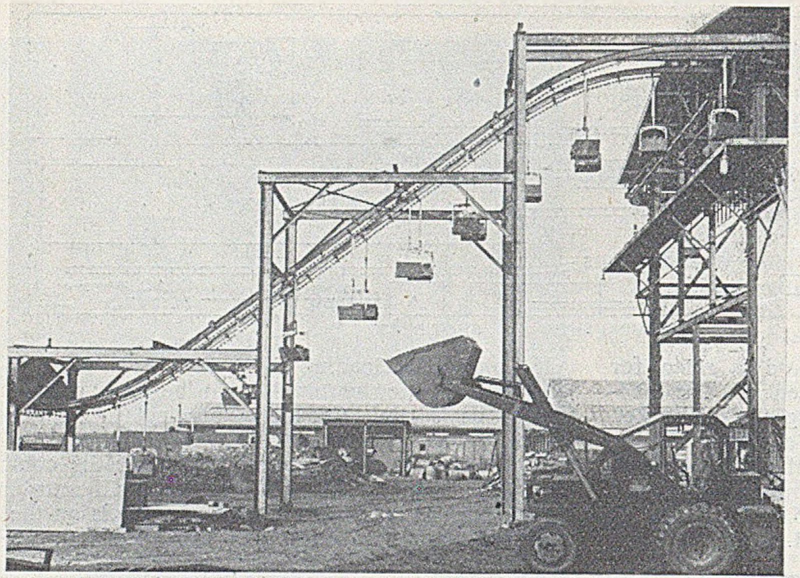


FIG. 6.—*Another View of the New Bucket Charging Plant, showing the Chain Conveyor in Side Elevation with the Make-up Benches on the left and the Cupola Installation on the right. In the foreground is the Motor-driven Stacking Truck which has proved extremely useful about the Foundry for handling Sand and Castings, as well as Pig-iron.*

which will show the level of the materials in the cupola. Until this is in position, it is necessary to observe the level visually, but it is expected eventually that there will be no necessity for anyone at the charging-door level, particularly as the bucket size, being small, necessitates small-size pieces, and thus reduces danger from " bridging " of charges in the cupola shaft.

Should the charger and the cupola get out of balance, the conveyor can be speeded or slowed down, or the " thruster " can be switched off and buckets allowed to free-wheel past one cupola, without upsetting the charging of the other. The cut-out for the thruster as well as the speed regulator of the conveyor will eventually be controlled from floor level, and the blast gate may be linked mechanically or electrically to the thruster, so that if desired no material is charged when the blast gate is closed.

Loading and Stockyard

Considerable thought was devoted to the loading and stockyard components of the system (Figs. 4 and 5), as it will be seen that with a melting rate of 9 tons per hr., one bucket must be loaded every 21 secs. It has been found in practice, however, that two men have easily coped with the situation, provided materials were properly pre-arranged on the loading banks, which are replenished daily from main stockpiles by steam crane, by mechanical shovel (Fig. 6), or wherever possible direct from railway truck or lorry.

Working Results

Croydon Foundry have had the system in use for over six months and, being a " free " competitive foundry, have found it particularly successful in dealing with their requirements for producing nearly 100 tons of engineering quality castings weekly, covering a very wide range of size (max. box size 20 by 15 ft., max. weight 7 tons, and metal thickness from $\frac{1}{4}$ to 8 in.). During some periods, continuous casting is used, with a low melting rate spread over 8 hours, but at other times the requirements of large castings necessitate the furnishing of large quantities of metal as quickly as possible, and it will be seen that this single charging system is flexible enough to provide for these extremes. Further elasticity is conferred on the selection of metal composition, permitting simultaneous charging of two or more cupolas with different mixes. The decision on the charging programme for the day's cast can remain " fluid " in the hands of the shop floor management until the last moment, a great advantage to a jobbing foundry making sizeable castings, and in these days of short supply of steel and pig-iron, bought scrap can be used with much more discretion. Supervision is entirely unnecessary, as, once set, the charging is continuous.

The charges being made up and automatically weighed at ground level saves the cost of heavy cupola platforms and provides for easier and more efficient control and supervision. This making-up of the charges at ground level is effected without the cost of expensive and delicate weighing machines. In practice, the melting has been remarkably even; the small increments as fed to the cupola are not very far removed from the ideal concept of hand-charging, and provide a distinct improvement over the old single-skip system in use previously. The simple method of weighing has proved quite efficient; it comprises a compression-type spiral spring and, when this is compressed to the mark on the bale carrier (Fig. 3), the correct load is in the skip. If, owing to size and weight of pieces of material, one spring is compressed slightly beyond the mark for correct weight, the operator puts a little less in the next skip. This weighing device also acts as a shock absorber when heavy pieces of scrap or pig-iron are being dumped into the bucket. The latter, indeed, show little sign of wear after six months' use.

Additional Features

At the moment, four cupolas (out of the ultimate battery of six) are erected at Croydon. The thrusters can easily be moved on roller track to whichever cupolas are in use for the day. With regard to loading, it will be noted that the men have only to fill any empty buckets with the correct material according to the coloured label and nothing else. The rule is that no bucket must be allowed to pass empty from the loading benches; *all* buckets must be charged. The conveyor with its double line of buckets runs between two raw material stock benches (Fig. 4), consequently, if owing to difficulties of handling any particular metal, the loader has to miss a bucket on the arrival "leg," he gets another chance of filling it on the return "leg" before it goes up to the cupola. As a standby, there is a limited amount of platform space at cupola charging level and this area is served by an inclined hoist. Thus, in the event of a major breakdown on the chain conveyor, emergency running can be arranged by using this hoist, assembling weighed charges sufficient for a day's cast and charging from the platform.

The idea of using small coke charges in *each* skip along with a metallic load, that is, 18 lb. of coke to each 150 lb. metal, has been experimented with, and although no decision has yet been made as to the value or otherwise of this method, there is no doubt that the conveyor charger lends itself very well to adaptation of this kind.

In normal operation over the whole period the saving in labour has been considerable. There are no "expensive" crane drivers, and two men are well able to fill the buckets at the aggregate rate of 9 tons per hour, which is the highest rate the Croydon concern has used up to the moment. With regard to power requirements, although probably one-third at least of the load on the conveyor is by-passed and returned unused, the power consumed, namely, 3 h.p., is ridiculously low, and is believed to be much lower than any other mechanical system having the same capacity. The dual combination of capacity and flexibility is also considered unmatched by any other system. Saving in coke since the system was installed has been remarkable. It has cut out the "extra shovel-full for luck" which previously appeared to have cost the company nearly 5 tons of coke per week.

Record by Ford Furnace

The Ford blast furnace, affectionately known as "Josephine," has broken a national record by exceeding a figure of 1,553,766 tons of iron produced without relining. This has been accomplished in only 8¼ years —nearly 2 years better than the previous record. The achievement is the more remarkable for the Ford furnace has been producing iron of a high-silicon content as opposed to basic iron on which the old record was established and has done so using less coke per ton of iron produced.

"Josephine," which is the only blast furnace in the South of England and is situated only 12 miles from London, began operating in 1934 and in 19 years has produced well over 3,000,000 tons of high-quality iron. Mr. T. L. Nuttall, O.B.E., manager of the Manufacturing Services Division of Ford Motor Company Limited, recently congratulated his men when they passed their own previous record (at the time another national record) set up in 1944.

Notes from the Branches

Birmingham

The annual dinner/dance of the Birmingham, Coventry and West Midlands branch of the Institute of British Foundrymen was held on January 22 at the Botanical Gardens, Edgbaston, at which there were 250 present (members and ladies). The principal guest was Sir Percy Mills who, in proposing the toast to the branch, recalled the fact that Mr. Robert Buchanan, the first president of the Institute was, at one time, foundry superintendent at W. & T. Avery Limited, of which firm Sir Percy is chairman.

Sir Percy referred to the development which had taken place in the foundry industry over the years and to the important place of that industry in the national economy, stressing the point that the foundry industry was one of the basic industries. He went on to refer to planning and said that planners love to plan basic industries and it was probably because of this that planners found it impossible to decontrol the iron and steel industry without bringing the foundries under control. Sir Percy made it clear that he was not saying whether planning was a good thing or a bad thing, he was merely making a statement of fact.

Mr. E. Hunter, president, in reply to the toast, said it was very encouraging to hear someone with so vast an experience and so wide a knowledge express the same faith in the industry that was held by members of the Institute. They were very proud of the manner in which the Institute had helped the foundry industry, not only in this country, but in all parts of the world. It was no mere coincidence that since the formation of the Institute 49 years ago the foundry industry had made enormous progress and it was indisputable that no voluntary organization had ever contributed more to the success of any industry.

In achieving this success, the Institute had not been a soul-less system of efficiency, but had developed rather along the lines of a friendly debating society—an organization where members were encouraged to bring their problems or to talk of their successes. Meetings were conducted in a keen but very genial atmosphere and, though members might disagree violently with each other on technical problems, the discussion was always on a friendly and courteous basis.

The reference to Mr. Robert Buchanan was interesting, as his grandson, Robert Gameson, was now assistant secretary of the branch. Referring to the Iron and Steel Bill, Mr. Hunter said if those politicians who wished to control founders, and those from the other side of the House who threatened to devour them, had been active members of the Institute, they would have learned sufficient commonsense not to allow industry to be dragged into the political arena. They also would have learned that foundrymen were the most co-operative fellows in the world, but they would never bow their heads to mass regimentation or to the bondage of unnecessary controls. He was pleased to see that commonsense had prevailed in dealing with the Private Members' Bill, called the Health & Safety Bill, which he understood had been withdrawn, and the provisions in the Bill would now be incorporated into the factory regulations.

Dr. H. T. Angus proposed the toast of "the guests" and Dr. C. J. Dadswell, national president of the Institute, in reply referred to the fact that the English Steel Corporation had, last week, made history by producing the heaviest steel casting ever made in Britain, and he thought possibly in Europe. The casting had taken more than 200 tons of liquid steel.

Iron and Steel Bill Amendments

Below is printed the substance of a circular letter issued to members by the National Ironfounding Employers' Federation clarifying the recently announced Government-sponsored amendments to the Iron & Steel Bill. It appears that the statement on page 90 of the JOURNAL of January 22 dealing with this matter was not quite accurate.

The Federation has obtained from the Minister's office the text of the amendments which have been tabled by the Minister and the following summary is an attempt to translate the purpose of these amendments into simple language:—

(a) *Joint Consultation:* This is not to be limited to consultation with workers only, but may also include consultation with trade union representatives.

(b) *Duplication of function in the case of "tied" foundries:* Provision is made to enable a "tied" foundry to be excluded from the proposed Iron and Steel Board's duty to supervise health, safety, welfare, training and joint consultation. This will operate when such a foundry, in consultation with trade union representatives and the Board, can show that machinery already exists for dealing with these matters and that official arrangements exist to deal, not only with the engineering workers but the foundry workers as well. (There is no provision for the exclusion of research from the Board's supervisory duties under any circumstances.)

(c) *Exemption from submission of development schemes:* Foundries are to be entirely exempt from the duty to submit development schemes to the Board for approval.

(d) *Prices:* The Board shall have power to fix the prices of castings and forgings only where monopoly conditions or restrictive practices exist and where the prices are, as a result, unreasonable. (Even then, the Board will have to apply to the Minister of Supply for an order.) These conditions are only considered to exist when at least one-third by weight of the total output in Great Britain of the products of a particular class is produced by one corporate body. (Of course, those items which are already controlled in some way will continue to be controlled.)

(e) *Contributions to the Board:* Contributions to the Board are to be assessed by a method which takes into account the output or capacity of the producer for iron and steel activities and will not take into account engineering or other activities.

(f) *Limitation of Board's expenditure:* The Minister will be able to lay down limits which the Board may not exceed—this is to prevent extravagance.

(g) *Information about production:* The Board will continue to be able to ask for information about production—presumably of the type at present called for on forms C.25. C.90, etc.

(h) *Information about costs:* The Board cannot ask for information about costs except where the Board has price-fixing powers.

It would appear that most foundries will not come within the Board's power to fix prices and their cost records will, therefore, continue to be entirely private.

(i) *Penalties for failure to supply information:* The penalties will not include imprisonment.

(j) *Board's power of Inspection:* The Board's power to inspect property has now been removed and the Board no longer has a general power to inspect books except in the rare instances of price-fixing.

(k) *"Rolling" and "Forging":* These have been re- defined so as to make it clear that the Board's supervision shall not extend to bending, shaping, pressing, etc., which are really engineering activities.

The full text of the amendments and the explanatory notes tabled by the Minister cover seven pages of foolscap and it cannot, therefore, be guaranteed that the foregoing précis is comprehensive.

Dinner

WORSHIPFUL COMPANY OF FOUNDERS

The Livery Dinner of the Worshipful Company of Founders was held last week at Drapers' Hall. The Master, Mr. Kenneth H. Adams, A.C.A., presided and supporting him at the high table were:—The Rt. Hon. The Lord Mayor, Sir Rupert de la Bere, M.P.; the Rt. Hon. Viscount Davidson, P.C., G.C.V.O., C.H., C.B.; Sir Cyril Norwood, M.A., D.LIT.; Sir Frederick Minter, K.C.V.O., J.P.; Mr. F. C. Mason, M.C.; Brigadier A. R. W. Low, C.B.E., D.S.O., T.D., M.P.; Mr. Stanley Robson; Mr. Arthur Watson; Admiral Sir Denis Boyd, K.C.B., C.B.E., D.S.C.; Captain Cyril B. Tidd, R.N.; Rear-Admiral Sir Arthur Hall, K.B.E., C.B.; Mr. E. W. Bridge; Mr. George B. Cotton, F.R.G.S., J.P.; Maj. General A. H. Hornby, C.B., C.B.E., M.C.; Rear Admiral Sir Cecil P. G. Wakeley, BT., K.B.E., C.B., LL.D., F.R.C.S.; Mr. A. Stanley Bell, C.C.; Mr. Geoffrey Parker, D.S.O., M.D., F.R.C.S.; Mr. Harry Hughes; Mr. Hugh S. Stannus, M.D., PH.D., F.R.C.P.; Mr. A. S. Henderson, C.C.; Mr. Reginald Payne, M.D., M.S., F.R.C.S.; Sir Wilson Jameson, G.B.E., K.C.B., M.D., LL.D., F.R.C.S.; Sir Ernest Pooley, BT., K.C.V.O., LL.B., LL.D., M.A.; Mr. Francis D. Ley; Flt. Lt. D. S. East; Sheriff Sydney J. Fox, C.C.; Rev. R. B. R. Walker; Mr. G. W. Ilsley, A.C.A.; Ald. and Sheriff G. H. Gillett, C.C.; Mr. J. E. Allanson and Mr. R. G. Harrison, J.P.

The toast to the guests was proposed by Dr. J. E. Hurst, and replied to by Brigadier Low and Admiral Sir Denis Boyd. The Company was proposed by Sir Cyril Norwood.

Realistic Policy Advocated

The most important factor in industry today was for everyone "from the boss downwards" to work to increase production if Britain was to survive her economic difficulties. So declared Mr. J. W. Hair, director and secretary of Middle Docks, South Shields, ship repairers, speaking at the annual dinner at South Shields of Hebburn, Jarrow and South Shields district of the Foremen and Staff Mutual Benefit Society, when about 250 members were present. It was only too apparent, he declared, that the period of abnormal and artificial prosperity which had been enjoyed by most industries in the past few years was rapidly nearing an end. The industry was getting back to the much more healthy and normal conditions where quality and service counted and when competitive conditions abroad forced firms to produce their very best efforts in order to survive. He believed that by leadership and example much could be achieved, and he asked those present to impress upon their men the urgent need for the maximum effort being put forward, "for in the next few years it can make so much difference to the continuity of employment on the one hand or the dreadful consequences of slump conditions on the other."

Mr. G. H. R. Towers, managing director of John Readhead and Sons, South Shields, spoke of the difficulties of getting apprentices in the shipyards, particularly in the iron trades. He appealed to foremen to do all they could to encourage boys to enter the industry.

Present Developments and Future Trends in the Cast Iron Industry*

By John McGrandle, A.I.M.

In a broad survey of the cast iron industry the present developments and trends are indicated and the interdependability of all factors involved in an industry are stressed. The forces governing present tendencies are discussed and an attempt is made, while considering the latest developments in technique and practice, to indicate how far these developments may affect the ironfounding industry.

Introduction

The three main factors governing the future of an industry are men, means at the disposal of the industry, and the demands made on that industry. Men includes all personnel involved, from the managing director to the man on the floor or at the bench. Means at the disposal of the industry involves raw material, plant, availability of further capital for investment, and the technical knowledge and ability available. The demand on industry may be in terms both of quality and quantity in all the variable aspects appertaining to such an industry as the making of castings. Change in any one of the above factors has an influence on the other two, and until the necessary adjustments are made an unbalanced condition remains in the industry.

However, an industry which is not static can never achieve complete equilibrium, but if the three factors mentioned above are not correlated the industry may get out of joint. With the vast amount of information flowing through technical societies and other channels, and the pressure and pace of modern industry, one is apt to skip over or ignore any developments which are not of immediate concern and treat developments in isolation from any general tendency. In doing this the connection between seemingly unrelated issues and their effect on the long-term developments of the industry as a whole may be missed.

Improvements in Cast Iron

In the development of grey cast iron during the last twenty years the mechanical properties, as implied by the tensile strength, increased from 10 to 26 tons through such materials at Lantz hot-mould iron, Emmel iron, Meehanite and general high-duty iron produced by good cupola melting practice. The use of inoculants to achieve high-duty irons became more popular, theory of graphitization became better understood, and now the most recent achievement is spheroidal-graphite cast iron.

The outstanding mechanical property of this cast iron above all others is the elongation, up to 20 per cent. in the annealed condition, and the resistance to fracture by impact. When the matrix is acicular (by reason of alloy additions) or of tempered martensite (by hardening and tempering) tensile strengths of 60 tons per sq. in. have been achieved with appreciable elongation. The fact that a definite yield point between 20 and 40 tons per sq. in. is possible places this cast iron in a class by itself.

Of the two main methods for producing spheroidal-graphite in cast iron, *i.e.*, by cerium and magnesium additions, the most successful in industrial development has been the magnesium addition. S.G. iron, as it has been named by the patenteees of the magnesium process, can be obtained from a wider range of composition of base irons using magnesium than by the cerium process. The cerium process requires for satisfactory results a hyper-eutectic iron very low in sulphur. Magnesium additions, plus, of course, an inoculant such as ferro-silicon, will produce the spheroidal-graphite structure with a wider range of carbon and sulphur in the base iron. The phosphorus and manganese must, however, in all types of spheroidal-graphite irons be kept low, to develop the maximum tensile strength, elongation and impact resistance of which the material is capable. Phosphorus should not exceed 0.2 per cent., manganese preferably below 0.4 per cent., and sulphur 0.10 per cent.

Compositions and Raw Materials

Various magnesium-containing alloys have been developed to introduce the magnesium to the melt safely and efficiently. These include nickel/magnesium, copper/magnesium, iron/silicon/magnesium alloys and briquetted compositions of magnesia, calcium oxide and silicon. The alloys giving the most consistent results so far are 80/20 and 90/10 nickel/magnesium. The cost of magnesium and carrier alloys are high, particularly in the 90/10 Ni/Mg alloy, but the lower effective yield of magnesium from less-expensive alloys and their unreliability in commercial practice weighs heavily in favour of the 90/10 alloy at present. The technique of producing this cast iron from the cupola under large scale working has already reached a high level and a fair tonnage has been produced in this country and in America.

The problem of obtaining suitable raw material should not be overlooked. Even low sulphur and phosphorus irons may not achieve consistent results due to the sensitivity of spheroidal-graphite formation to traces of various elements sometimes occurring in pig-irons. The scarcity and high cost of nickel, the most suitable carrier for the introduction of magnesium, will have an adverse effect on the rapid industrial development of S.G. iron, but will perhaps hasten the search for alternative

* Paper presented to the Scottish Branch of the Institute of British Foundrymen (slightly abridged).

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methods or materials suitable for the industrial prosecution of the process.

Such cost figures as have been quoted[1] show the cost of producing spheroidal-graphite iron compared to malleable or steel castings to be not quite so favourable as iron foundrymen may have hoped.

Since the amount of Mg alloy required to produce the spheroidal-graphite iron is to a large extent dependent on the sulphur content of the tapped metal, the drive for a more economic production of this iron seems to be in the direction of obtaining initially a low sulphur content (each 0.01 per cent. S requires approximately 0.36 per cent. of the 80/20 Ni/Mg alloy for sulphur removal before the spheroidizing effect occurs). The mechanical and physical properties of spheroidal-graphite iron not only show this material to have intrinsic qualities of its own, but to be a strong potential competitor to malleable and steel castings. The extent to which spheroidal-graphite iron will develop as an alternative to these materials will depend on relative costs of production and the founders' ability to produce sound castings free from shrinkage, etc.

Melting Practice for S.G. Iron

The need for lower sulphur content has brought forward again the use of basic refractories in the cast-iron foundry. First, in the development of of basic-lined ladles for more efficient desulphurizing with soda ash. The short life of basic-lined ladles and the difficulty of patching has been a deterrent to their use, but recently greater effort has been made in the improvement of basic ladles using stabilized dolomite bricks. The patching of such material is, however, not completely satisfactory.

Secondly, in the advances made by basic-lined cupolas. Basic cupolas have been in operation in this country since 1942, but the number of cupolas so used is still low and has only been applied to largest and most up-to-date foundries.

The difficulties involved in the running of such a furnace has long been realized and not until the economic necessity for a very low sulphur iron from the cupola is strong enough will large-scale development be a commercial proposition in the average foundry. The work carried out by the Institute's Technical Committee and by Renshaw and Sargood[2] and others has culminated in the basic-lined, water-cooled cupola at Lynchburg.[3] The average cast-iron foundry has had a dread, not only of the cost of basic refractories in the foundry, but also of the need to control the temperature and analysis of the slag within narrow limits. A bulky fluid slag at a high temperature and basicity of 40 to 50 per cent. CaO is required to desulphurize efficiently. The Lynchburg cupola melting 60 per cent. steel scrap produces at the spout 0.02 per cent. S and 0.25 per cent. P at a temperature around 1,600 deg. C.

Two further developments in cupola design is the use of water cooling at the melting zone, and the hot blast. The rising cost of cupola coke and its increasing decline in quality has forced the hot-blast cupola upon the industry; particularly on the Continent is this so, Germany being most prolific in design and application. Until recently all designs for hot blast using the latent and sensible heat of the gases escaping up the cupola stock had two major weaknesses, the high initial cost and the choking up of the heater tubes by the fine dust from the hot gases. The choking up of the heater tubes reduces the efficiency of the system rapidly and blast temperatures tend to drop slowly throughout even a short run. The continual cleaning of the tubes is both troublesome and expensive. Recently a new design of hot blast by Schark and described by Evans[4] promises improvement in these respects.

In one system described by Braidwood the blast heater normally stands between two cupolas and is used for either cupola. The combustion space and heat exchanger are in one, and consist of a large-diameter heat-resisting steel cylinder. The combustion of the hot gas takes place in this cylinder; the heat is transmitted through the thin metal wall. The incoming blast travels down through a narrow annular space between the cylinder and the outer insulating wall. The air is deflected in a spiral movement round the cylinder by means of sheet-metal guides. The temperature of the air going into the cupola is around 350 deg. C. This installation is low, both in initial cost and upkeep, compared to previous types, and is suitable for the smaller sizes of cupola.

The development and design of water-cooled cupolas, as indicated by Renshaw and Sargood, point the way to increased life of refractories and the possibility of a continuous acid or basic cupola. A few water-cooled cupolas have been in operation in this country in some larger foundries for a number of years.

The future of water-cooled, hot-blast and basic cupolas is closely connected. The present quality of coke and the desire for low-sulphur irons points to the basic furnace with hot melting conditions and the hot blast produces more ideal conditions in the melting zone for the reduction of sulphur. The water-cooling at the melting zone increases the life of refractories and allows the use of basic material on long melting runs.

Both the hot-blast and water-cooling methods have the most favourable opportunities where long melting runs are in operation. Their further development, therefore, is dependent on the use of mechanization.

Until the advent of continuous casting and knock-out systems, the length of time of a cupola blow was limited by factors inherent in general foundry practice, and this still applies to the majority of smaller foundries. The cupola could not be started until a sufficient number of finished moulds were on the floor. The necessity of emptying boxes and clearing up for the following day's cast prevented realization of the possibilities of continuous working. Mechanization, and the possibilities of long melting runs in the cupola, as suggested by the recent developments, are preparing the minds of foundry executives for the day when moulding and casting may be a continuous 24-hr.-day process. The high capital investments now involved in mass production in the foundry, force on industry the economic advantages to be accrued from using that equipment for 24 hours instead of 8 hours per day. The labour scarcity, of course, and other factors militate against this idea.

The cupola which has never been in danger of being replaced by any other type of melting unit in the cast-iron foundry in spite of early slow developments, will be, with the improvements mentioned above, of necessity a more closely-controlled melting unit. In the more ordinary run of foundries the knowledge, technical and practical, which has been collected over the years on the control of the cupola is slowly being applied to produce a more satisfactory and consistent metallurgical product. The variations in raw material supplies has forced the more backward foundries to adopt such elementary procedure as the measurement of volume and pressure of the blast, and the weighing of charges. It is the general trend to treat the cupola more as an efficient controllable melting unit, and less as a stack where coke, iron and limestone go in at the top and metal runs out at the bottom.

The use of steel scrap in the charge having increased, due to its availability and price, and the scarcity of pig-iron, has assisted in the commercial use of inoculants to the metal in the ladle. Where such a practice is carried out, a more careful control of melting, analyses, etc., is usually employed. The increasing use of the control wedge tests, as recommended by the Technical Report[5] of the Institute of British Foundrymen in the Proceedings for 1945-46, in conjunction with ferro-silicon or other inoculant additions to suit various sections and types of castings, is assisting the general rise in quality of cast-iron products.

Sand Development

The improvement in sand control has been most obvious in the mechanized foundries. The systematic control of sand is more easily carried out where the sand mixing is centralized. Deficiencies in the sand are much more obvious under these conditions than when sand is not controlled from a central point. Where moulders' sands were mixed on the floor, and foundries had heaps of sand every few yards, sand testing and control were most dissatisfying tasks. The result was that although sand technology had developed in theory, in practice foundry personnel gave it only lip service. Where there is mechanization of moulding and sand distribution, there is sand control in real operation. Where sand mixing is not even partly centralized the tendency is for sand control to be almost non-existent.

The use of moulding machines has increased the tendency to use synthetic sands. The greater permeability obtained compared to natural sands and the increased control possible have proved their superiority on most machine-moulding operations.

The use of semi-synthetic sands has arisen due to two separate factors (*a*) the desire to obtain a compromise between the virtues of synthetic sand, *i.e.* the facility of control and the economy in new sand on the one hand and the ease of sand moulding and patching due to the extended moisture range of natural sand on the other, and (*b*) the second factor, the increased use of knockouts and dust extraction which tends to remove the fine silt and clay from natural sand. Due to the large bulk of natural sand required to replace the bond and the expense of removing excess sand, colloidal clays are added to keep up the green strength. The accumulation of silica sand from organic bonded cores further increases this tendency. The result is the sand eventually becomes, to all intents and purposes, semi-synthetic.

The use of wood flour and pelleted pitch instead of coal dust has been strongly influenced by the above tendency to produce incidentally or otherwise a semi-synthetic sand. Wood flour makes this sand more mouldable and amenable to patching and reduces the liability of synthetic sands to rat tails and scabbing, due to expansion of the sand grains. Pelleted pitch is more economical than coal dust, giving a better skin finish, but some difficulty has been experienced with high dry strength at the knockout. Provided, however, the pitch content does not exceed 1.5 per cent, the dry strength should not be troublesome. The use of pelleted pitch and its dry strength is involved in another foundry development, the skin drying of moulds.

The use of dry sand moulds is an obstacle to increased production in any foundry, bottlenecks being created and drying stoves or valuable floor space being occupied. Pitch, which to a large extent prevents the striking back of moisture to a skin-dried surface and gives a high dry strength, has been used extensively for skin-dried moulds replacing stove-dried moulds.

Core Sands

The increasing cost and scarcity of linseed oil during and since the war caused wide-scale search for a substitute. The main development was in the use of extenders such as petroleum extracts, used as dilutants with linseed oil. This material, sold under a variety of trade names, proved fairly satisfactory, but few foundrymen would not welcome the return of linseed oil at a reasonable price, which seems, however, very unlikely. The most promising development has been in the use of U.F. and P.F. resins.

The objection put forward in recent years to synthetic resin binders regarding the obnoxious odour evolved in baking the core and casting has to a large extent been overcome. The economies which can be obtained compared with linseed-oil base cores has placed this material as the future corebinder. A cereal binder is usually used for green strength. Unfortunately the moisture in these synthetic-resin mixtures is rather critical and dried sand for mixing and a close moisture control is required. The lower drying temperature or shorter drying time compared to linseed oil, and the ease with which the cores can be removed from the casting further enhance this material. In the near future this material may prove superior to linseed-oil base material as a core binder.

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"C" Process

The plastics industry has here also contributed to a new foundry development. The C process[6] has been adequately described in recent literature and space does not permit a description here. Only such points as may indicate the effect on the foundry will be discussed.

The thin shell-moulds produced by this method have a very high permeability and the rate of cooling may be partially controlled by the type of backing used to support the shell. The half moulds are easily stored in limited space and are resistant to moisture absorption. The cost of the resin sand mixture necessary to produce a strong shell-mould (about 8 per cent. Urea or 5 per cent. Phenolic resin) may appear expensive, but since little of the mixture is required to produce a mould, compared to sand moulding, the material cost will not be excessive and total cost of production should compare favourably with sand-mould castings. The advantages of easy storage, low bulk handling, ease of knockout and dressing can be appreciated.

The dimensional accuracy obtainable in the casting (0.003 in.) approaches the tolerances possible with the lost-wax process. Due to the high permeability of the mould, very thin sections can be run and sharp contours produced. The space required for production is less than that required for sand-moulding practice and quite inexpensive equipment will produce a fast rate of production when using several patternplates on one machine. A very elaborate semi-automatic machine, however, has been developed in America[7] where rates of production are approaching a mould per minute and it is hoped eventually to produce a complete mould every 30 seconds. The close tolerances obtained will save machinery costs on finished articles and any added cost in the casting will be covered by this saving. The economic advantages stated above should make this process applicable to light and medium repetition castings.

Gating Practice

Since Taylor and Rominski published their paper on the feeding and gating of steel castings in 1942,[8] the impetus given to the study and practice of gating and feeding, in all metals, has been obvious from the number of papers delivered on this topic in recent years. While progress was most obvious in the steel castings industry, the cast iron industry developed the original ideas of Williams, Taylor and Rominski to suit their own particular needs.

The blind atmospheric riser using a core insertion in the riser was not a complete success in cast iron due mainly to the relative permeability of hot cast iron to gases in relation to steel. However, since then several new gating and feeding techniques have been developed. The principle of gating through a swirl gate and feeder into the casting is now widely practised.

The better understanding of the effect of atmospheric pressure on shrinkage has shown the danger of such an effect where a core is almost completely surrounded by metal. Where such a core may be in contact with a hot spot in the mould, or a sharp corner of a core acts as an atmospheric feeder core, shrinkage is likely to occur. The general idea of directional solidification has further been extended in the use of slow top pouring, not a new innovation by any means, the Connor runner, and the development of heater pads adjacent to thin sections to regulate the temperature gradient.

The changes which have taken place in the organization and plant in the average foundry and the scarcity of skilled labour has assisted the changing technique of gating, etc. When the moulders are allowed to cut their own gates and risers, hidebound practice and the difficulty of standardizing are obstacles to gating improvements. Now with the increasing use of patternplates, and the necessity to provide standard patterns of gates and risers, partly for production's sake, the control of gating is passing into more responsible hands. More profound thinking by metallurgists and foundry executives are going into the designs of such gates and risers. The control possible under such circumstances removes sufficient variables so that correct conclusions may be arrived at on any problem or alteration to technique. Unfortunately a large number of foundries have not so far made a great deal of use of the information at their disposal.

Mechanization

The development in mechanization over the last ten years has been more rapid than ever before, from large foundries mechanizing almost every operation, to smaller foundries using a limited number of labour-saving appliances. Complete mechanization on an elaborate scale is applicable in a very limited number of foundries. The installation of less ambitious schemes in the general run of foundries has been the most important advance towards increased productivity.

The provision of centralized sand-mixing plants and its effect on the quality of sand practice has already been referred to. The use of roller conveyors, to feed boxes to one or more casting points and mechanical knockouts even on a very limited scale has proved to foundrymen the economic advantages obtainable. The increased production using the same floor area soon pays for the capital outlay.

The realization, brought home by the reports of productivity teams after visiting America, that every idle minute of a machine is lost production, has led to the increased use of more ancillary equipment to facilitate the handling of moulds, cores, etc., with a minimum of waiting time of skilled men and machines. The use of small mechanical lifting and shifting gear is being more utilized in progressive foundries irrespective of size or the degree of mechanization. Due to greater output from foundries the mechanical charging of cupolas is becoming an increasing practice; the shortage of labour is also partly responsible.

The "Garrett Report"[9] recommendations to the ironfoundry industry has and will further affect the future of the industry. The dust problems now assume proportions that never occurred to foundrymen a few years ago. While the dust problem may be most acute where mechanization is installed, the solution to the problem is more easily achieved in such circumstances. The isolation of processes, such as knocking-out boxes by mechanical means, permits the use of efficient dust extraction at the source.

However, the results so far achieved in dust removal have been disappointing considering the energy with which the problem has been tackled. The design of some of the older foundries, and the high capital expenditure required to adapt the buildings to modern requirements has created a problem. The difficulties are, however, more clearly understood, and foundry design and equipment will eventually reduce the dust hazard to limits which will satisfy modern requirements.

The increased use which will be made of dust-extraction equipment is partly due to mechanization and, more important, due to the necessity to clean up the foundry and attract labour of all grades, which is so vital to any industry.

The use of the Hydroblast and the Wheelabrator is solving this trouble to a large extent in the dressing shop, but as shown by a paper[10] at the 1951 conference of the Institute, a great deal more is required to remove the danger of silicosis in this department. The question of dust and attraction of labour to the foundry also implies the necessity for tidiness, and a large number of foundries within the last ten years have gone to great lengths to improve the general appearance of their premises. The cleaning up and organization of equipment repaid the efforts expended both from the human and the production aspect. From this point, of course, follows the increase in washrooms and changing rooms, well designed canteens, etc., and this will continue while labour is scarce and other industries can offer more congenial surroundings.

Costing

The costing systems of the smaller foundries has always been open to certain elements of doubt. The discussions ensuing from the Productivity Teams' reports on American methods of costing indicate that the recommendations of the Institute of British Foundrymen's Costing Sub-committee and other official publications have not been fully utilized in this country. However, the increased complexity in foundry organization is bringing forward the need for more accurate measurements of costs, and the proper sub-division of cost items. The British Cast Iron Research Association is also devoting time and energy to the subject.

Summary

When new demands are made on any industry, *e.g.*, better working conditions, greater output, improvement in products, coupled with increased difficulties in labour and raw material supplies, then some developments such as outlined above arrive irrespective of the attitude of that industry. Any alteration within the industry to meet these demands imposes new conditions which affect other facets of the business.

Mechanization assists in the standardization of equipment and processes. Standardization leads to increased opportunity for practical and technical proficiency and closer control of processes. This standardization limiting the functions of the individual also leads to specialization of labour, skilled and unskilled.

In the higher spheres of responsibility the same process occurs. Here there is the increasing demand, from all types of foundries, for sand technicians, metallurgists, costing and personnel managers, plant and production engineers.

The substitution of high-duty cast iron during the war years in place of steel and other proved material aided in convincing the engineering profession that cast iron could be a reliable material under conditions where normally it would be ruled out. The enhanced reputation cast iron obtained during this period has greatly extended its field of application. The work carried out by the foundry research technical organizations in convincing the designer of the valuable qualities of high-duty iron is thus bearing fruit. The advent of spheroidal-graphite iron has further improved the standing of the cast iron industry in the eyes of the engineers.

Provided that the market conditions remain stable, and raw material supplies are sufficient, although of poor quality, there should be a furthering of all technical control in all foundry operations. In the less developed foundries improvement should be expected in technique and control, and fewer rule-of-thumb methods remain, since the developments in advanced foundries must eventually have their effect on more backward foundries.

The trend towards improved furnace technique will be accelerated by the necessity of using all available materials at the industry's disposal and here the hot-blast and the basic cupola should find fields for expansion where high quality iron is required. The growth of mechanization may in the immediate future be held up by the scarcity of steel and the tendency of the present monetary policy to discourage capital expenditure.

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More Steel this Year

Expansion in Direct Exports Anticipated

British output of steel ingots and castings rose from 15,640,000 tons in 1951 to 16,430,000 tons in the year just closed. This is the official total for 53 weeks; on a 52-week basis the figure would have been 16,138,000 tons. The previous best was 16,293,000 tons in 1950. During 1953, it is expected that available supplies may be better by 2,000,000 ingot tons than in 1952—more than enough to meet home requirements and to permit an increase in direct exports.

The last four months of 1952 each established record levels of steel production. The rate in December of 313,700 tons a week compared with 296,300 tons a week for the previous best December rate in 1950.

The 16,000,000 tons of steel production which it was hoped to achieve in 1952 was actually surpassed in the 52 weeks ended December 27, when the total production amounted to 16,138,000 tons. However, 1952 was a 53-week year ending on January 3, and for the full year total production was 16,418,000 tons. This was due primarily to the progress towards completion of the industry's first development plan drawn up in 1945 and launched in 1946—due for completion by mid-1953. New blast furnaces coming into operation during 1952 under this plan made it possible to raise pig-iron production by 1,000,000 tons to 10,728,000 tons.

December Production

Steel production in December reflected the full effect of both the Christmas and New Year holidays, since 1952 was a 53-week year. The annual rate of production, at 16,314,000 tons, was the highest ever recorded in December and compared with 14,953,000 tons in December, 1951. Pig-iron output, which is less affected by holiday influences, was at an annual rate of 10,728,000 tons in December, compared with 10,281,000 tons a year before.

Pig-iron and Steel Production in the Last Three Months of 1952 and in the Full Year, compared with 1951.

	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1952	Tons.	Tons.	Tons.	Tons.
October	204,200	10,616,000	327,800	17,044,000
November ..	206,800	10,753,000	345,200	17,952,000
December ..	206,300	10,728,000	313,700	16,314,000
Year's total	10,728,000		16,418,000	
1951	Tons.	Tons.	Tons.	Tons.
October	180,700	9,865,000	300,600	15,629,000
November ..	196,000	10,194,000	316,100	16,437,000
December ..	197,700	10,281,000	287,600	14,953,000
Year's total	9,669,000		15,638,000	

Soviet Steel Production

In a recent issue of " Soviet News " it is reported that in 1952 the Soviet Union produced some 25,000,000 tons of pig-iron, or roughly 70 per cent. more than in the pre-war year 1940; some 35,000,000 tons of steel, or about 90 per cent. more than in 1940; and some 27,000,000 tons of rolled metal, or more than twice as much as in 1940. Coal production was about 300,000,000 tons—over 80 per cent. more than in 1940.

Export Volume Down in 1952

It is estimated that the volume of U.K. exports in 1952 was 6 per cent. less than in 1951—the first year since the war that the volume of exports has shown a decrease, although the 1951 increase was very small. Higher export prices and lower import prices, however, which brought about a 7 per cent. improvement in the terms of trade (the ratio of import to export prices) meant that the fall in the value of exports was only 1 per cent. Without this there would have been a significant decline in the value of exports.

Exports of metals increased by £44,000,000, compared with the 1951 totals, and exports of engineering products by £77,000,000. Coal exports yielded a further £26,000,000. These increases were more than offset by the reduction of £157,000,000 in exports of textiles and clothing. The volume of exports of metals in 1952 was probably much the same as in 1951, the 19 per cent. increase in value being mainly the result of higher prices. Higher prices also accounted for the increase of 8 per cent. in exports of engineering products in 1952, the volume being much the same on average as in 1951. Metals and engineering products accounted for 52 per cent. by value in 1952, and 46 per cent. in 1951, of all U.K. exports.

There were substantially larger imports of goods required for rearmament, especially metals and metal manufactures, and machinery, chiefly machine tools, in 1952 than in 1951.

Iron-ore Imports

Imports of iron ore in December and the total for 1952, with comparative figures for 1951, are shown below.

Country of origin.	Month ended December 31.		Twelve months ended December 31.	
	1951.	1952.	1951.	1952.
	Tons.	Tons.	Tons.	Tons.
Sierra Leone	64,820	75,160	624,912	788,347
Canada	61,060	9,550	682,244	622,748
Other Commonwealth countries and the Irish Republic ..	1,781	12,843	43,477	95,451
Sweden	305,435	300,667	3,471,413	3,650,847
Netherlands	1,641	1,210	44,215	40,614
France	31,175	58,240	359,703	439,065
Spain	42,980	43,558	772,003	663,053
Algeria	107,343	139,450	1,413,809	1,706,140
Tunis	44,950	34,800	499,553	558,284
Spanish ports in North Africa	40,770	15,600	346,127	253,113
Morocco	13,950	26,130	278,885	308,350
Other foreign countries	15,119	49,142	211,079	567,852
TOTAL	731,030	766,350	8,747,480	9,693,864

I.B.F. Conference, 1953

The 50th annual conference of the Institute of British Foundrymen is being organized under the auspices of the Lancashire branch, will be held at Blackpool from Tuesday, June 16, to Friday, June 19, inclusive. A number of exceptionally important works visits have been arranged in various parts of industrial Lancashire. Particulars of these and of the programme of papers which is now nearly completed will be announced shortly. At the meeting, on June 17, Mr. E. Longden will be installed as president.

The Lancashire conference committee is under the chairmanship of Mr. R. Yeoman, president of the branch, whilst Mrs. Yeoman is chairman of the ladies' committee. Mr. Keppel F. Massey, managing director of B. & F. Massey, Limited, and Joseph Berry, Limited, is the conference treasurer.

Engineering Maintenance in Iron and Steel Works

General Procedure and Staffing Problems

It has been observed that, while figures for labour consumption rates for maintenance in the American iron and steel industry are better than in Britain, the quality of maintenance work does not appear to be equal to that found in the larger British works. This point, which arose in the report of the Productivity Team from the iron and steel industry, was among those discussed at a conference on engineering maintenance, organized on December 17 by the plant engineering division of the British Iron and Steel Research Association.

SIR CHARLES GOODEVE opening the conference suggested that if maintenance which was a very costly process were to be carried out with maximum economy it was necessary to arrive at some means of expressing the cost of " down time " plus the cost of maintenance per ton produced. This in turn could be broken down for the individual parts of the plant. In short, maintenance work needed to be expressed quantitatively. This would be a considerable help to the industry in its efforts to overhaul American maintenance results. The reasons for their frequently better showing were, he thought, probably due to newer plant in the U.S.A. and to a little more foresight in the layout of the plant.

Plant Recommendations for the Future

MR. BASIL GRAY (English Steel Corporation, Limited), discussing " Plant Recommendations for the Future," confining his remarks largely to cranes, said these were responsible for more than half the mechanical maintenance in heavy industry. Speaking generally on service conditions, the Author said the most useful function of theoretical investigations in this connection was to introduce corrections not by a factor of safety but a factor of wear and tear based on experience the value of which would depend on the frequency of the occurrence of the particular combination of stresses in service and might in some cases be less than unity. B.I.S.R.A.'s work on detailed examination of stress in structures was a case in point, which should be used to the full in improving designs. Cranes developed on those lines could be regarded as complete assemblies and as such removed for overhaul. For this to become possible, however, electrical wiring arrangements would have to be improved, resistance and other connections so far as possible being completed before erection and simply plugged in. Concluding, the speaker said that maintenance engineers should be brought into discussions on the designs of new plant from the very beginning. He also urged that plant manufacturers should be fully informed not only about teething troubles but also about lessons learned from the first major overhaul.

Rotational Maintenance and Quantitative Measurement of Maintenance

Another member of the productivity team, commenting on American maintenance records, during a discussion, pointed out that in the U.S.A. mills were shut for maintenance in rotation, in contrast to the British practice of carrying out most maintenance at weekends. This made for fuller employment of maintenance staff, and avoided premium payments for Saturday and Sunday working. Another point was that British figures often had to include the heavy burdens of maintenance of ore-crushing plant, a process which was usually carried out at the ore quarries in America.

Several speakers took up the point of rotational maintenance. One speaker said that his firm had found it worthwhile, especially in melting shops operating the continuous working week, to go further and to purchase a new crane or a new charger and put it up and then arrange to take one crane or one charger at a time down and away for overhaul.

Sir Charles Goodeve recalled that during the recent war, an investigator examining maintenance organization in the R.A.F. had plotted engine fault frequency against time since last overhaul, taking some thousands of overhauls and aircraft histories as data. By studying the resulting curves he was able to show that the maintenance organization had been so cautious that they were overhauling their aircraft at least twice as often as necessary. They thereupon, as a result, doubled the total number of flying hours of each aircraft between maintenance and raised the availability from 30 per cent. to almost 60 per cent. This experience was being applied by the London Transport Executive for buses; this principle could be used only when the number of examples was large.

The difficulty of quantitative measurement of maintenance was commented on by several speakers. Not only " down time " resulted from inadequate maintenance, but slow operation of plant as well, and this was difficult to evaluate. Another point was that abuse of plant by ignorance or accident, as damage caused by misuse of a machine, should not be debited against maintenance costs. The use of some yardstick to provide an incentive to cheapen and improve maintenance was suggested, and one speaker emphasized the importance in this connection of having systems of record-keeping and costing in a form which enabled everybody concerned to put a cash value on what was being done in maintenance.

Importance of Maintenance Engineers in Design

The value of associating maintenance engineers with discussions on new plant design at the earliest possible stage was emphasized by a delegate from a firm of plant manufacturers, who said that in one plant installed in this country since the war where co-operation with the maintenance engineers was complete, the " down time " for mechanical maintenance had been less than 0.1 per cent. The same speaker suggested that when the production engineers had complete control over the design, they tended to insist on the most complicated automatic gear and interlocking devices to reduce production man-power costs. They did not always realize that in all probability they were increasing their maintenance costs. Other speakers suggested that maintenance engineers brought in at an early stage might improve design in such matters as accessibility, and in the avoidance of breakdowns by reducing stringent specifications as, for example, in the speed of crane hoists.

In connection with design and manufacture, Mr. Gray's point on the application of theoretical investigations of service conditions to introduce "factors of wear and tear" was commented on by two speakers, one a plant manufacturer. Both thought that work on the functional aspects of machine stresses must inevitably lead to the design of plant more nearly to fulfil exact requirements. Machine builders, according to the plant manufacturer, were beginning to realize that there was a great possibility of lightening designs but their main difficulty was going to be in getting the users to accept these. Other points touched on during the discussion were the importance of careful inspection during construction and installation of plants and the value of cleanliness and good lighting in maintenance. The desirability of standardizing spares, especially for cranes, was urged by several speakers, though others expressed anxiety that this might prejudice enterprise and the exploration of new designs.

Relation of Production and Maintenance Departments

Mr. A. Bridge (Appleby-Frodingham Steel Company) opened the afternoon session with a paper on the "Relation of Production and Maintenance Departments." The first essential was for both sides to understand clearly that they had a common objective, in achieving which they were equal partners. That objective was to produce the maximum output with the minimum of interruption consistent with quality of end product. Maintenance, at once a service and a key to production, was no longer a necessary evil, called in only to remedy a break-down. A modern integrated plant was like one huge and complex machine which needed unreserved teamwork to keep it going. To play its part Mr. Bridge suggested that for shift maintenance it was elementary, but essential, that the maintenance department should be organized so that the various sections, mechanical, electrical and services, were covered round the clock. Each section should be under the control of a competent supervisor and with sufficient personnel at hand to cope with the normal maintenance required. Extra men could be marshalled by the supervisor in an emergency, after which they could return to their respective routine duties. Day maintenance, it was urged, should be free from routine work on running plant and should be concentrated on periodic overhauls and/or the preparation of spares.

The part to be played by the production department in this teamwork was threefold. First, it could help the maintenance department to keep the plant clean and tidy, some 50 per cent. of maintenance troubles being due to dirt. Second, it could ensure proper training of all plant attendants. Third, it must play its part in close liaison with the maintenance department. For example, prior information of production stoppages other than for maintenance, enabled them to be used for minor adjustments and repairs. The correct and speedy passing of all information, instruction and complaints through the proper channels would do much to build up a team spirit and avoid duplication of effort and confusion of responsibilities. To some people, concluded the speaker, plant maintenance merely implied upkeep. But good plant maintenance was more than upkeep, it was one of the answers to increased productivity as, for example, in the shortening of the time required in the re-lining of a furnace.

Preventive Maintenance

Mr. G. Oram (Appleby-Frodingham Steel Company) in the course of a paper on "Preventive Maintenance, Repair Methods, Facilities and Spares" pointed out that the importance of maintenance had recently been emphasized by high wages for operatives, high cost of services for operation, and restrictions on capital expenditure, which had forced managements to make more use of existing machinery. To be effective, maintenance must be planned and must cover preventive maintenance, routine maintenance and major overhaul. A comprehensive plant inventory, which should be developed into a plant ledger was essential before maintenance could be properly planned. The plant ledger should give a concise description of the part of the plant, its costs and an approximate estimate of its life, for appropriate provision in an annual budget for its maintenance. Next, record cards should make it possible to check the frequency of renewals and compare them with the normal expectation of life. Prevention of break-downs necessitated a well-organized programme of inspection so directed that every man had to perform his useful and definite task each day.

Continuing, the speaker claimed that although preventive maintenance required good records, it did not inevitably demand large staff to maintain them. He went on to say that effective preventive and routine maintenance prolonged the periods between general overhauls. When they did become necessary, the management was in a better position, by forecasting and planning, to carry out the repair cheaply and expeditiously.

Provision of efficient maintenance shops would not fill the need for certain proprietary and specialized spares. In the average steelworks the value of spares was such as to justify the appointment of a fairly responsible person who might be known as the stocks or spares controller, and he in turn should have sufficient staff to maintain accurate records and keep the spares in safe custody in a proper state of preservation. The plant engineer should work in close collaboration with this person.

Maintenance Manning Problems

MR. J. WADSWORTH (Park Gate Iron & Steel Company, Limited), a member of the Productivity Team, gave a paper on "Engineering Maintenance—Manning Problems," pointing out that within the iron and steel industry of this country approximately 30 per cent. of the total employees were engaged on maintenance, and their wages represented about 40 per cent. of the total maintenance costs. He suggested that engineers should pay more attention to the manning problem, as much could be done towards improving efficiency and reducing costs if the right people were available to organize, to supervise and to execute the maintenance work. The importance of supervision was increased by the fact that few maintenance workers could be paid by individual results. Practice in the U.K. varied, but probably averaged one supervisor to 20 or 30 men; in the U.S.A. there was one for every 10 or 15 men.

The points which excited most discussion were concerned with the organization of preventive maintenance. Many speakers emphasized that it was not a new conception. Opinion was divided on whether plant inspectors should come under the plant engineer. By some speakers it was maintained that fitters not actually engaged on maintenance could be more profitably engaged than in inspection. If the plant maintenance scheme was to run efficiently, the inspectors must be wholly unbiased. In one plant, for example. the inspection department, together with the layout engineers who planned the job after the inspectors had found the need for it, were directly under the chief engineer and in no way responsible to the maintenance engineers. This worked very well indeed, and covered not only the plant and machinery but all buildings, roofs, roof-lights and so on, all of which came under regular routine inspection. To eliminate the danger of delay, this firm ensured that if an inspector discovered anything which he thought should be urgently dealt with he by-passed the whole system and reported direct to the plant engineer first, afterwards going through the prescribed routine. Delays at this works had dropped from 4.41 per cent. to 1.41 per cent. in the last six years.

Problems peculiar to smaller firms were discussed by a number of speakers. It was pointed out that specialized staffs, however desirable, were economically impossible in small firms and often inspection and maintenance were synonymous and simultaneous. One speaker who remarked that he was in the happy position of running both the engineering side and the production side of a comparatively small works which operated a planned maintenance system, drew the moral that they had to select and pay for good people. Another speaker, however, from a similar firm reported excellent results from having maintenance inspection normally carried out by the people who did the job ultimately.

Records and Statistics

Some contributors to the discussion expressed anxiety that compiling of the records and statistics mentioned by Mr. Oram might call for large clerical staffs. He claimed, however, that it was the people who did the jobs who filled in the forms. All the work of looking after the records was in his own case done by two people, a man and a girl. Another speaker said that at his works there had been some trouble when they started their scheme because people did not like paper work. However, those who had opposed it in the early stages came to realize that planned maintenance was not a matter of displacing the maintenance engineer, but of making his job easier, and that was what in fact it had done. Another speaker from the same works described how planned maintenance had improved organization of work during holiday weeks. Now they were able to plan everything beforehand and they knew what every man, from the labourers upwards, was going to do. Another speaker thought that paper schemes introduced a danger of losing those personal contacts which were essential to good team-work.

Mr. Bridge referred to the considerable improvements his company had made in relining blast furnaces, simply by working as a team and paying an incentive to the men. They had a programme which was set out in summarized form and they did the job without layout engineers or outside inspectors. The question of incentive payments was touched on by other speakers as well. One speaker said that his comparatively small firm had operated for five or six years quite a good system of bonus payments on day work for the whole of the engineering department, based on skilled man-hours placed against piece-work earnings of the production department.

New Catalogues

Refractories. Much useful and reliable data are included in a 52-page, well-printed, and splendidly-illustrated catalogue just issued by the Leeds Fireclay Company, Limited, of Wortley, Leeds, 12. It has been wisely prepared on general lines for a wide range of users. After a foreword and a statement of the lines the firm manufactures, there are no fewer than 31 pages of high-grade technical data. After nine pages of illustrations of industrial applications, which include no examples from foundry practice, there is a map showing the location of their various works. The catalogue, which is well bound, is available to our readers on writing to Wortley.

Gas Analysis. A 4-page leaflet (G.T. 1408) just issued by Griffin and Tatlock Limited, Kemble Street, Kingsway, London, W.C.2, describes and illustrates the G.L.C. (Gooderham) Soap Film Gas Analysis Apparatus. With this new apparatus, the average time for an analysis of town's gas, cupola gases or the like is of the order of three minutes. No special skill is required and the short interval of three minutes between tests is needed for flushing. The accuracy of the results is stated to be in the region of $\pm$ 0.1 per cent. The technicians of the industry desiring further information should write to Kemble Street.

A NEW 20-TON ELECTRIC ARC FURNACE was poured for the first time on Wednesday, January 21, at the East Hecla works of Hadfields, Limited, Sheffield. Part of a large modernization scheme, it will be used for melting superfine steel at the rate of 300 tons a week.

Personal

DR. R. BAULK has been appointed fuel research officer of Samuel Fox & Company, Limited, Sheffield.

MR. JOHN ROBINSON has retired from the post of chief chemist with the Workington Iron & Steel Company (branch of the United Steel Companies, Limited).

MR. GEORGE WILSON, deputy chairman and managing director of Raleigh Industries, Limited, Nottingham, has been appointed a governor of the College of Technology, Loughborough.

SIR JOHN MORISON has been appointed main adviser to the Chancellor of the Exchequer in connection with the responsibilities which will fall upon the Treasury when the Steel Bill is enacted.

MR. H. HICKS, managing director of Sheffield Forge & Rolling Mills, Limited, was elected president of the Sheffield Metallurgical Association at the annual meeting on January 20. He succeeds Mr. E. W. Colbeck, director of metallurgical research at Hadfield's, Limited, Sheffield.

OWING TO ill-health, MR. W. S. KNIGHT, managing director of Lightalloys, Limited, London, N.W.10, has been granted six months' leave of absence by the board, and MR. K. C. T. MARSHALL, works director, has been appointed acting managing director. LORD ROCKLEY has resigned from the board owing to pressure of his other commitments.

MR. C. E. WRANGHAM has recently been appointed a director on the main board of Power-Gas Corporation, Limited. MR. CHARLES INGHAM has been appointed a director on the technical and contracting division of the companies; MR. T. K. HARGREAVES, works manager, has been appointed director of the works division; MR. C. ROBSON, company secretary, has been appointed commercial director.

MR. RONALD M. GARLAND, deputy to the managing director of Veeder-Root, Limited, manufacturers of computing and counting mechanisms, Dundee Industrial Estate, has been appointed a director of the firm. He will be responsible for the development, production and manufactures of the company's products, and will continue to act as deputy to the managing director, a position he has held for two years.

SIR VINCENT DE FERRANTI, chairman and managing director of Ferranti, Limited, manufacturing electrical engineers, etc., of Hollinwood (Lancs), and MR. CHARLES CLORE, a director of the Furness Shipbuilding Company, Limited, Haverton Hill-on-Tees (Co. Durham), were admitted to the freedom of the Worshipful Company of Shipwrights at the annual meeting of the court of the Company.

MR. J. F. ROBERTSON, treasurer of the Hawker Siddeley Group, Limited, since 1938, has been appointed a director of the company. Aged 48, he is a director of Armstrong Siddeley Development Company, Limited, Aluminium Wire & Cable Company, Limited, Swansea, and Self-Changing Gear Company, Limited, Coventry. He is also chairman of the taxation committee of the Society of British Aircraft Constructors and the representative of the aircraft industry on the taxation committee of the Federation of British Industries.

MR. J. JONES, managing director of the National Gas & Oil Engine Company, Limited, and Associated British Oil Engines (Marine), Limited, both of Ashton-under-Lyne, left on January 14 for a round-the-world tour. He will visit Holland, Italy, Egypt, India, Pakistan, Ceylon, Singapore, Manila, Hong Kong, Canada, and the United States. Both companies are members of the BRUSH ABOE group. Mr. Jones joined the National Gas & Oil Engine Company in 1908. He was appointed chief engineer in 1939, technical director in 1948, general manager in 1949, and managing director in 1951. One of the foremost authorities on the gas engine, he is a founder member of the British Internal Combustion Engine Manufacturers' Association. He was chairman of the B.I.C.E.M.A. research committee for two years and later chairman of the B.I.C.E.R.A. council. In 1943 he was awarded the Thomas Lowe Gray prize for a paper on the position and development of the gas engine, presented to the Institution of Mechanical Engineers.

Obituary

BRIG.-GEN. MAGNUS MOWAT

THE DEATH is announced of BRIGADIER-GENERAL MAGNUS MOWAT, who for 18 years had been secretary of the Institution of Mechanical Engineers, until his retirement in 1938. He was 77 years old. An ex-student of King's College, London, he served his apprenticeship at the Cowlais works of the old North British Railway. After experience with other railway companies, he spent some time in high executive positions with Indian Railways. On returning to this country, he joined the staff of Robert McAlpine & Sons, where he was engaged in dock development in the East End of London and continued in this activity beyond the time when the undertakings were acquired by the Port of London Authority. During the 1914-18 war, he held various command and staff appointments and ended his army career as a director of the War Office. He was appointed C.B.E. in 1919 and returned to civil life with the rank of Brigadier-General on the reserve. For many years he served on the Foundry Practice and Patternmaking Committee of the City and Guilds of London Institute. He was a liveryman of the Worshipful Company of Founders.

MR. H. HAIGH, of Halifax, a foundry foreman at Harry Burnley (Brassfounders), Limited, Bradford, was killed last week when he was accidentally crushed between a heavy lorry and a telegraph pole. The lorry was being reversed in the firm's yard up the side of the brass shop when Mr. Haigh went to assist the driver. He stood in front of the telegraph post and was pinned there by the reversing lorry.

MR. WILLIAM REID, proprietor of Campbell, Binnie, Reid & Company, engineers and founders, Burnbank, has died at the age of 91. He resided in Glasgow for a long time until a few years ago, when he went to Uddington. He began his association with the firm 50 years ago and had been sole partner for about 30 years. Coal washing and screening plants from the works have gone all over Britain (some of them still being in use after more than 40 years) and have been exported to Spain and India.

MR. THOMAS M. HUTCHISON, who has died in Montreal at the age of 74, to where he emigrated as a young man, to become president of a steel company, entered upon his career with the Glasgow firm of P. & W. McLellan & Company, Limited. Soon after he left Glasgow in 1897, he joined the steel firm of Drummond, McCall & Company, Limited, Montreal, of which he became vice-president in 1919 and president in 1931. During the last war he was chairman of the advisory committee of the Steel Control Board in Ottawa.

News in Brief

THE *Foire de Paris*, claimed to be the biggest annual trade fair in Europe, is to be held this year from May 9 to 25.

DAVY & UNITED ROLL FOUNDRY, LIMITED, will carry out extensions to Empire Works, Haverton Hill, Billingham-on-Tees.

THOS. W. WARD, LIMITED, have been appointed official general distributors of the "Staffa" mobile crane and of "Wetherill-Hydraulic" loading shovels.

IT IS REPORTED that Aiton & Company, Limited, pipe engineers, Stores Road, Derby, have orders to the value of £3½ million on hand.

THE SHEEPBRIDGE GROUP OF COMPANIES, Chesterfield, entertained 1,350 children of employees to a party in the works canteen. Fourteen buses were engaged for the transport of the young guests.

THE CURRENT ISSUE of *Oil*, the journal of the M.O.R. Group of Companies, published from 48, Dover Street, London, W.1, contains a long illustrated article on "Non-destructive Flaw Detection."

JOHN BROWN & COMPANY, LIMITED, Atlas Works, Sheffield, are to manufacture under licence, steam generating equipment developed by the Riley Stoker Corporation of America. The firm's new boiler works are on Clydebank.

THONOCK HALL, near Gainsborough, Lincs, has been leased to Rose Bros., engineers, of Gainsborough, for use as stores and drawing offices. Home of Sir Edmund Bacon, premier baronet of England, the hall has been in the Hickman and Bacon families since 1750.

THE INDIAN GOVERNMENT has rejected plans for the establishment of an Indo-Japanese steel project. It has decided, however, to appoint a technical mission to re-appraise the project report on the country's third steel plant. Representatives of the World Bank and of Krupps will be included on the mission.

THE BLAST FURNACE, costing £3,500,000 and originally planned for the Clyde Iron Works at Tollcross, Glasgow, is to go to the Dalzell Works at Motherwell instead. The switch will consolidate Motherwell's position as the steel centre of Scotland. The Government has already approved the scheme, and no great difficulty is expected over the transfer.

STEEL SUPPLIES were substantially increased last year, but did the consuming industries at home reap the full benefit? This question is asked in the current bulletin of the British Iron and Steel Federation, which asserts that the distribution scheme currently in operation gives no real guide to the relative demand for different products and is a burden on steelmakers.

AS PART OF ITS PLANS for industrial development in Northern Ireland, the Ministry of Commerce is engaged in the erection of a number of factories which will be available for letting to approved tenants on favourable terms. The factories are situated at Castlereagh, approximately two and a half miles from the centre of Belfast and the docks.

THE LARGEST STEEL CASTING to be made in this country has just been cast at the Grimesthorpe works of English Steel Corporation, Limited, Sheffield. The casting, which is for export, required 210 tons of steel, and will weigh 168 tons in its finished state. Last year the Corporation achieved a record steel production, in spite of scrap and pig-iron shortages. Export output was also a record.

ABOUT 700 MEN are now employed in a new development for the making of heavy tractors at the Scotswood (Newcastle-upon-Tyne) works of Vickers-Armstrongs, Limited. Output will shortly reach 1,000 tractors per annum, and in a few years several thousand men will be employed on the work. Plans are in hand for building light tractors and heavier tractors at a proposed new factory at Longbenton.

AN INTERDEPARTMENTAL COMMITTEE has been appointed by the Minister of Supply to review the various activities which are now being carried on in Woolwich Arsenal, and to formulate proposals for the use of such parts of the area as are no longer required for their present purposes. The committee is instructed to consult with outside parties interested in this problem. The chairman of the committee will be Sir Donald Perrott, of the Ministry of Supply.

A STERN WARNING to British industry was voiced by Sir Norman Kipping, director-general of the Federation of British Industries, when he addressed Scottish members at the annual meeting in Glasgow recently. He said that industrial Britain was gaining in overseas markets an unenviable reputation for failing to keep promises. He instanced the case of a seven-figure contract from Canada, for which a British firm had recently submitted the lowest tender, but the Canadian firm rejected it. They preferred to give the order to an American firm—on the score that Britain was too unreliable.

THE WOLVERHAMPTON FUEL EFFICIENCY PANEL set up recently by the district advisory committee of the Midland Regional Board for Industry is planning a conference for interested firms in the borough in February. The only panel of its kind in the Midland area, it will concentrate its activities within the borough rather than throughout the larger area of the district advisory committee. As at present constituted, it has the expert help of the Ministry of Fuel and Power's advisory service, and of coal, gas, and electricity supply undertakings, and its members include heads of industrial concerns and a representative of the engineering unions.

THE CAUSE of a factory accident stated to be "more dangerous than the discharge of a loaded blunderbuss" was investigated at Bromsgrove Magistrates' Court on January 20, when Garringtons, Limited, Newton Works, Bromsgrove, were fined £15 and 5s. costs. A grinding wheel which burst injured an operator who received two fractures and a mutilated arm. It was stated by prosecuting counsel that the driving machine was stamped 5,500 revolutions a minute, but the wheel fitted was stamped 2,300 to 2,800 revs., so that the machine was being driven at almost twice its proper speed. For the defence it was stated that the wrong wheel had been fitted.

PRODUCTION OF giant dragline excavators, similar to those used in open-cast coal mine developments and in the construction of hydro-electric and other building schemes, has started at the Glasgow works of the North British Loco. Company, Limited. While almost two years have elapsed since the company first decided to take this up in addition to their production of locomotives, the first of the 86-ton giants is only now in the early stages of construction, and is not due to be completed until the summer. Already the Glasgow works have orders on hand for 25 similar machines which are being manufactured under licence of the Baldwin-Lima-Hamilton Corporation of America. This initial order has been received from Jack Olding & Company, London, who are agents for the American firm in Britain. Although specifically designed for use as dragline excavators, the machines to be constructed in the Glasgow works will be convertible on the construction site to serve as mechanical shovels or lifting cranes.

Pig-iron and Steel Production

Statistical Summary of November Returns

The following particulars* of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table I summarizes activities during the previous six months, Table II, production of steel ingots and castings in November, and Table III, deliveries of finished steel. Table IV gives the production of pig-iron and ferro-alloys in November, and number of furnaces in blast.

TABLE I.—*General Summary of Pig-iron and Steel Production.*

Period.	Iron-ore output.	Imported ore consumed.	Coke receipts by blast-furnace owners.	Output of pig-iron and ferro-alloys.	Scrap used in steel-making.	Steel (incl. alloy).			
						Imports.[2]	Output of ingots and castings.	Deliveries of finished steel.	Stocks.[3]
1950	249	174	197	185	197	9	313	241	995
1951	284	170	206	186	175	8	301	243	585
1951—June	310	186	231	200	170	43	313	258	657
July[1]	306	194	233	202	150	38	274	221	762
August	300	194	232	202	151	31	280	213	816
September	318	198	234	209	184	30	330	279	783
October[1]	302	196	227	204	182	31	328	268	725
November	312	194	229	207	189	23	345	—	717

TABLE II.—*Production of Steel Ingots and Castings in November*, 1952.

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derby, Leics., Notts., Northants and Essex	—	3.4	11.4 (basic)	1.9	0.2	15.8	1.1	16.9
Lancs. (excl. N.W. Coast), Denbigh, Flints, and Cheshire	1.9	19.3	—	2.0	0.6	22.6	1.2	23.8
Yorkshire (excl. N.E. Coast and Sheffield)								
Lincolnshire	—	35.3	—	—	0.1	35.3	0.1	35.4
North-East Coast	2.3	63.6	—	1.3	0.5	65.7	2.0	67.7
Scotland	4.5	37.8	—	1.6	0.8	42.6	2.1	44.7
Staffs., Shrops., Worcs. and Warwick	—	17.9	—	1.2	0.7	18.0	1.8	19.8
S. Wales and Monmouthshire	7.2	66.1	5.7 (basic)	1.3	0.2	79.7	0.8	80.5
Sheffield (incl. small quantity in Manchester)	9.3	28.1	—	10.3	0.6	45.9	2.4	48.3
North-West Coast	0.2	2.0	5.4 (acid)	0.4	0.1	7.9	0.2	8.1
Total	25.4	273.5	22.5	20.0	3.8	333.5	11.7	345.2
October, 1952[1]	24.5	257.6	22.2	19.7	3.8	316.1	11.7	327.8
November, 1951	25.7	248.0	21.4	17.1	3.9	305.6	10.5	316.1

TABLE III.—*Deliveries of Non-alloy and Alloy Finished Steel.*

Product.	1950.	1951.	1951.	1952.	
			Oct.[1]	Sept.	Oct.[1]
Non-alloy steel:					
Ingots, blooms, billets and slabs[4]	3.6	4.0	3.9	5.0	4.8
Heavy rails, sleepers, etc.	11.3	10.1	9.6	10.9	9.2
Plates, ⅛ in. thick and over	40.0	41.0	43.5	47.3	45.6
Other heavy prod.	40.2	39.9	38.4	45.0	42.2
Light rolled prod.	47.6	47.1	47.3	54.4	52.2
Hot-rolled strip	19.4	19.5	19.3	20.9	21.1
Wire rods	16.3	16.1	16.2	18.6	17.8
Cold-rolled strip	5.5	6.0	6.5	6.5	6.0
Bright steel bars	6.3	6.6	6.2	7.4	7.3
Sheets, coated and uncoated	30.5	30.4	31.7	33.8	35.5
Tin, terne and blackplate	14.3	13.8	13.0	16.5	16.9
Tubes, pipes and fittings	20.0	20.8	21.1	23.8	22.2
Mild wire	12.5	11.9	12.3	15.0	13.7
Hard wire	3.5	3.7	3.7	4.5	4.0
Tyres, wheels and axles	3.5	3.7	4.3	4.1	3.8
Steel forgings (excl. drop forgings)	2.2	2.3	2.5	3.2	2.9
Steel castings	3.5	3.8	3.5	3.9	3.9
Tool and magnet steel	[7]	[7]	[7]	0.6	0.5
Total	280.2	280.7	283.0	321.4	309.6
Alloy steel	10.6	12.1	12.8	16.4	15.7
Total deliveries from U.K. prod.[5]	290.8	292.8	295.8	337.8	325.3
Add: Imported finished steel	3·8	4·9	5·6	10·1	11·4
	294.6	297.7	301.4	347.9	336.7
Deduct: Intra-industrial conversions[6]	55.6	56.9	58.3	71.0	70.4
Total net deliveries	239.0	240.8	243.1	276.9	266.3

TABLE IV.—*Production of Pig-iron and Ferro-alloys during November*, 1952.

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total
Derby, Leics., Notts., Northants and Essex	24	—	16.8	23.7	1.1	—	41.6
Lancs. (excl. N.W. Coast), Denbigh, Flints. and Cheshire; Yorkshire (incl. Sheffield, excl. N.E. Coast)	7	—	8.3	—	—	0.9	9.2
Lincolnshire	13	—	30.8	—	—	—	30.8
North-East Coast	26	7.3	42.0	0.2	—	1.6	51.1
Scotland	9	0.8	12.8	2.8	—	—	16.4
Staffs., Shrops., Worcs., and Warwick	8	—	7.5	1.7	—	—	9.2
S. Wales and Monmouthshire	9	3.0	27.6	—	—	—	30.6
North-West Coast	8	16.6	—	0.2	—	1.1	17.9
Total	104	27.7	145.8	28.6	1.1	3.6	206.8
October, 1952[1]	103	28.0	142.8	28.2	1.5	3.7	204.2
November, 1951	103	27.0	136.5	27.1	1.5	3.9	196.0

* All figures represent weekly averages in thousands of tons.

[1] Five weeks all tables.

[2] Weekly average of calendar month.

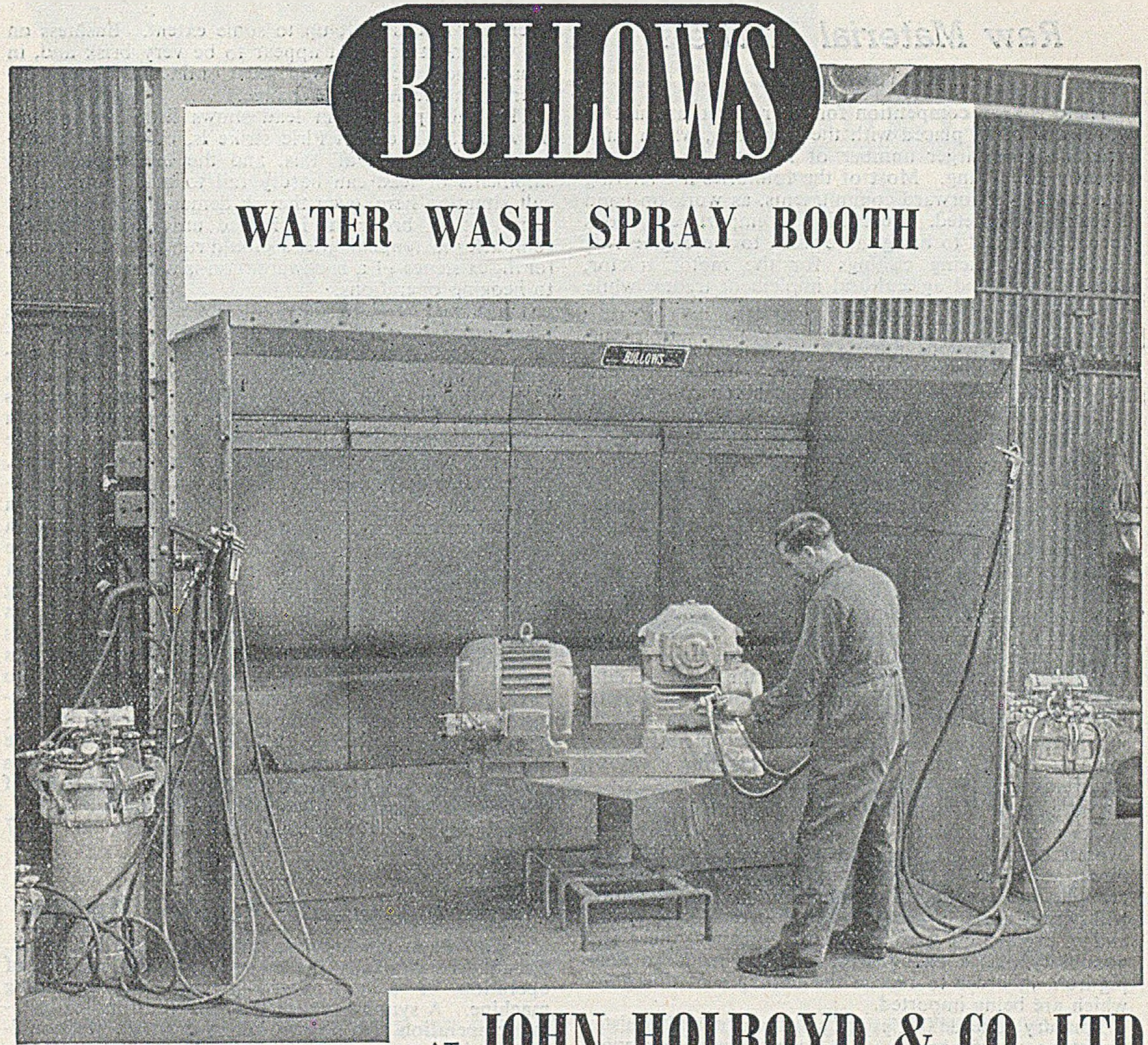
[3] Stocks at the end of the years and months shown.

[4] Other than for conversion into any form of finished steel listed above.

[5] Includes finished steel produced in the U.K. from imported ingots and semi-finished steel.

[6] *i.e.*, Material for conversion into other products also listed in this table.

[7] Included with alloy steel.


BULLOWS
WATER WASH SPRAY BOOTH

Raw Material Markets

Iron and Steel

There is keen competition for the reduced amount of work now being placed with the foundries, which have welcomed the larger number of inquiries for castings recently circulating. Most of the foundries are striving to add to their forward commitments, as work on hand is readily completed. Relaxation of import restrictions abroad is needed to bring more work to the engineering foundries producing castings for the motor, tractor, Diesel-engine, and agricultural implement trades, while many of the light foundries, making baths, cisterns, cooking and heating apparatus, etc., are adversely affected by restrictions in trade both at home and abroad. Some establishments continue to be satisfactorily employed, chiefly those making castings for colliery and steelworks equipment and machine tools, while a number of the jobbing foundries have a fair amount of work for the many and varied trades they supply.

With reduced requirements, pig-iron supplies are generally sufficient to meet the needs of the foundries. There is, however, little to spare of some grades, particularly the low- and medium-phosphorus irons and hematite, and all available supplies are absorbed. It is reported that a producer of hematite on the North-East Coast is changing over completely to the supply of basic steelmaking pig-iron and after the end of this month no deliveries from that furnace will be made to the foundries. This is likely to involve the users in difficulties, unless they can change their source of supply, and it is hoped that other producers will be able to supply their needs. Hematite is none too plentiful, and some users are having difficulty in obtaining their full requirements.

The supply of high-phosphorus pig-iron is adequate to meet the call for this grade; in fact, it appears that overall outputs will be more than sufficient with the three additional furnaces which have recently been brought into production. It is unlikely that the Control will permit these furnaces to add appreciably to stocks, and if production is in excess of demands, there is a possibility that a change-over may be made to basic pig-iron, in order to reduce the tonnages of this grade which are being imported.

Foundry coke deliveries are satisfactory, and ganister, limestone, and firebricks are in accordance with requirements.

Shortage of steel is hampering production at some of the re-rolling establishments, particularly those in the Birmingham area. They are receiving little benefit from the increased outputs at home steelworks, and are hoping that there will be some expansion in production of billets so that they may share in the improved position.

In spite of the increases in output over the last three months of 1952, makers of sections and joists are generally coping with heavy backlogs, and until these have been liquidated they are restricting their forward commitments. In some instances, sufficient tonnage is on hand to cover their output up to the end of Period II. Plates continue to be in heavy request.

Non-ferrous Metals

In spite of indications of influential support on the zinc market, values gave way last week; trading was only moderate. Reports from consuming centres suggest that demand is not over good and it seems likely that surplus zinc will be put on warrant and Metal Exchange stocks built up to some extent. Business on the Continent does not appear to be very brisk and, in consequence, we may well see Continental brands delivered on the Metal Exchange.

The tight position in lead shows little sign of improvement. The Port Pirie strike is, of course, a contributing factor in all this, and the interference with shipments of lead can hardly fail to make for a difficult situation here, even though demand in the country is not at all brisk. It is indeed unfortunate that so soon after its reopening lead should run into this trouble, for the existence of a backwardation is a serious obstacle to hedging operations.

Those people—and they are not a few—who have been looking for a fall in the price of copper were probably rather shaken by the news that a report in circulation in Chile suggests that there may be a 3 cents rise in the price at which the Chilean Government is selling the country's copper. This would indeed be a most disturbing event were it to prove true and the industry will hope that wiser counsels will prevail. In the United States price controls on many commodities are due to lapse at the end of April, and it is known that there is a good deal of pressure being exerted on the new *régime* to give prices their freedom. On the other hand, those responsible for price stabilization have issued a warning in general terms that an alarming increase in values is likely to result from action of this kind. A Bill to prolong the suspension of the 2 cents import duty has passed the House of Representatives and is now before the Senate, where it is expected to have quick passage. In view of the United States dependence on imported copper, and the very large tonnage brought in during 1952, it would obviously be absurd to put this import tax back again. Chile's contribution to the needs of the U.S. market is, of course, the largest of all the outside suppliers.

Daily prices of tin, lead, and zinc are on p. 27 (advertisement section).

Swedish Automatic Moulding Machine

An article in the Swedish technical press* by Av. R. Orban describes fully the construction and method of operation of a new Swedish automatic moulding machine. A synopsis states that the controls for automatic operation of a normal jolt-squeeze pin-lift moulding machine are described in detail. The controls are wholly pneumatic in contrast to the moulding machines hitherto marketed that have electronic or mechanical control devices. When a push-button is pressed, the machine is started and all the operations follow in sequence. First, the mould is jolted, then the squeeze-head is moved forward, the mould is squeezed, the squeezed-head is moved back, the mould is vibrated and the pattern drawn. The time for the separate operations can be adjusted as a function of the type of pattern, size of moulding box and quality of the sand. It is shown that the machine can work wholly automatically or semi-automatically.

* Gjuteriet, December, 1952.

Foremen's Training Course

Although February 10 is the closing date for receipt of application forms to attend the forthcoming Foundry Foremen's Training Course of the Institute of British Foundrymen, there are now very few vacancies left. Members wishing to attend the course are therefore recommended to forward their applications to the secretary immediately.

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

(Delivered, unless otherwise stated)

January 28, 1953

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2:—Middlesbrough, £13 1s. 6d.; Birmingham, £12 15s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £16 8s., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £15 5s. 9d.

Scotch Iron.—No. 3 foundry, £15 19s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £17 14s. 6d.; South Zone, £17 17s.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £18 14s. 6d.; South Zone, £18 17s.

Cold Blast.—South Staffs, £18 2s.

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. Coast and N.-W. Coast of England, £16 2s.; Scotland (Scotch iron), £16 8s. 6d.; Sheffield, £17 3s.; Birmingham, £17 9s. 6d.; Wales (Welsh iron), £16 8s. 6d.

Basic Pig-iron.—£13 19s. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered.)

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

Ferro-vanadium.—50/60 per cent., 22s. to 28s. per lb. of V.

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

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

Ferro-tungsten.—80/85 per cent., 25s. 3d. to 25s. 9d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 28s. 3d. to 32s. 7d. per lb. of W.

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

Cobalt.—98/99 per cent., 20s. per lb.

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

Ferro-manganese (blast-furnace). — 78 per cent., £48 12s. 11d.

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

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

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft, u.t., £25 4s. 6d.; tested, 0.08 to 0.25 per cent. C (100-ton lots), £25 14s. 6d.; hard (0.42 to 0.60 per cent. C), £27 12s.; silico-manganese, £33 8s.; free-cutting, £28 8s. 6d. Siemens Martin Acid: Up to 0.25 per cent. C, £31 9s.; case-hardening, £31 17s.; silico-manganese, £34 9s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £29 8s.; basic, hard, over 0.41 up to 0.60 per cent. C, £30 8s.; acid, up to 0.25 per cent. C, £31 17s.

Sheet and Tinplate Bars.—£25 3s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £29 14s.; boiler plates (N.-E. Coast), £31 1s. 6d.; chequer plates (N.-E. Coast), £31 3s.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £27 17s.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £31 15s. 6d.; flats, 5 in. wide and under, £31 15s. 6d.; hoop and strip, £32 10s. 6d.; black sheets, 17/20 g., £41 12s. 6d.; galvanized corrugated sheets, 24 g., £52 9s.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £50 18s. 3d.; nickel-chrome, £71 7s. 9d.; nickel-chrome-molybdenum, £79 2s. 6d.

Tinplates.—57s. 1½d. per basis box.

NON-FERROUS METALS

Copper.—Electrolytic, £285; high-grade fire-refined, £284 10s.; fire-refined of not less than 99.7 per cent., £284; ditto, 99.2 per cent., £283 10s.; black hot-rolled wire rods, £294 12s. 6d.

Tin.—Cash, £959 to £961; three months, £942 to £944; settlement, £961.

Zinc.—January, £85 15s. to £85 17s. 6d.; April, £86 to £86 2s. 6d.

Lead.—Refined pig-lead: January, £97 10s. to £97 15s.; April, £94 10s. to £94 15s.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £114 5s.; rolled zinc (boiler plates), all English destinations, £112 5s.; zinc oxide (Red Seal), d/d buyers' premises, £115.

Other Metals.—Aluminium, ingots, £166; magnesium, ingots, 2s. 10½d. per lb.; antimony, English, 99 per cent., £225; quicksilver, ex warehouse, £70 10s. to £71 (nom.); nickel, £483.

Brass.—Solid-drawn tubes, 26¼d. per lb.; rods, drawn, 34¼d.; sheets to 10 w.g., 284s. 9d. per cwt.; wire, 32⅛d.; rolled metal, 271s. 6d. per cwt.

Copper Tubes, etc.—Solid-drawn tubes, 32⅝d. per lb.; wire, 317s. 9d. per cwt. basis; 20 s.w.g., 346s. 3d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £195 to £218; BS. 1400—LG3—1 (86/7/5/2), £212 to £238; BS. 1400—G1—1 (88/10/2), £320 to £375; Admiralty GM (88/10/2), virgin quality, £325 to £380 per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £350 to £385; L.P.Bl, £250 to £275 per ton.

Phosphor Bronze.—Strip, 413s. 3d. per cwt.; sheets to 10 w.g. 435s. per cwt.; wire, 49⅝d. per lb.; rods, 44½d.; tubes, 42¾d.; chill cast bars: solids 3s. 10d., cored 3s. 11d. (C. Clifford & Son, Limited.)

Nickel Silver, etc.—Ingots for raising, 2s. 9d. per lb. (7%) to 3s. 11d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 3s. 3d. (7%) to 4s. 5d. (30%); to 12 in. wide × .056, 3s. 3½d. to 4s. 5½d.; to 25 in. wide × .056, 3s. 5½d. to 4s. 7½d. Spoon and fork metal, unsheared, 3s. to 4s. 2d. Wire, 10g., in coils, 3s. 9½d. (10%) to 4s. 11d. (30%). Special quality turning rod, 10%, 3s. 8½d.; 15%, 4s. 2d.; 18%, 4s. 6¾d. All prices are net.

Forthcoming Events

FEBRUARY 2

Institute of British Foundrymen

Sheffield branch:—"Flow of Metal," T.S.35 film and report presented by G. W. Nicholls, 7.30 p.m., at the Sheffield College of Commerce and Technology, Dept. of Engineering, Pond Street.

FEBRUARY 3

Burnley section:—"Some Impressions of U.S. Foundries," by T. Makemson, M.B.E., 7.30 p.m., at the Technical School, Blackburn Road, Accrington.

Sheffield Metallurgical Association

"Problems in Selling Refractories," by F. Houghton, 7 p.m., in the Grand Hotel.

Incorporated Plant Engineers

Edinburgh branch:—"Preventive Maintenance—the British and American Approach," by T. C. Robinson, 7 p.m., at 25, Charlotte Square.

FEBRUARY 4

Institution of Works Managers

Paisley group:—"Legal Aspect of Industrial Accidents," by J. Walker and C. Miller (further details from the secretary).

Institution of Production Engineers

Liverpool section:—"Rate Fixing in Workshop Practice," by V. Eaves, 7.30 p.m., at Radiant House, Bold Street.

FEBRUARY 5

Institute of Metals

Birmingham section:—"Substitution," by Prof. A. J. Murphy, 6.30 p.m., at the James Watt Memorial Institute, Great Charles Street.

Leeds Metallurgical Society

"Continuous Casting Processes," by Dr. E. Scheuer, 7.15 p.m., at the Chemistry Department, The University, Leeds, 2.

FEBRUARY 6

Institute of British Foundrymen

Coventry and district students' section:—Works visit to Daimler Company, Limited, at 2 p.m.

Tin, Lead, and Zinc Prices

Official prices for tin, lead, and zinc on the London Metal Exchange during the past week were as follow:—

TIN:—*Cash:* January 22, £963 to £965; January 23, £961 to £962; January 26, £958 to £960; January 27, £958 to £960; January 28, £959 to £961. *Three Months:* January 22, £943 to £944; January 23, £941 to £942; January 26, £942 to £943; January 27, £941 to £942; January 28, £942 to £944.

LEAD:—*January:* January 22, £100 to £100 10s.; January 23, £100 5s. to £100 10s.; January 26, £99 10s. to £100; January 27, £96 10s. to £96 15s.; January 28, £97 10s. to £97 15s. *April:* January 22, £97 5s. to £97 15s.; January 23, £97 10s. to £97 15s.; January 26, £96 10s. to £97; January 27, £93 15s. to £94; January 28, £94 10s. to £94 15s.

ZINC:—*January:* January 22, £88 to £88 10s.; January 23, £88 to £88 10s.; January 26, £86 15s. to £87; January 27, £85 10s. to £86; January 28, £85 15s. to £85 17s. 6d. *April:* January 22, £88 5s. to £88 10s.; January 23, £88 10s. to £88 15s.; January 26, £87 to £87 5s.; January 27, £85 15s. to £86; January 28, £86 to £86 2s. 6d.

THE CHILEAN national steel plant at Huachipato (Compania de Acero del Pacifio, S.A.) recently completed its second anniversary. Steel-ingot production this year is planned to reach 300,000 tons.

THE INDIAN GOVERNMENT has signed a contract with a German firm to erect a coke-oven plant at Sindri at an estimated cost of £1,760,000. The plant is expected to be completed within 22 months. Estimated capacity is 600 tons a day.

SITUATIONS VACANT—*Contd.*

METALLURGIST (Assistant) required by large Tyneside engineering firm for Metallurgical Laboratory. Experienced in Metallography, Heat Treatment and Pyrometry, and general Industrial Process Control. Applicants should possess L.I.M., Higher National in Metallurgy or equivalent qualifications. Applications should state age, education, experience, salary required to Box 3231, FOUNDRY TRADE JOURNAL.

PRODUCTION MANAGER required to take charge of foundry departments, maintenance, production methods, and planning in mechanised ironfoundry producing 120 tons per week of medium weight grey iron castings. Applicants should be between the ages of 30 and 45, and should hold either a University degree or membership of a recognised professional institution. They should have had not less than five years' executive experience in industry, with specific experience of initiating, operating and supervising Work Study applications. Foundry experience will be an asset, but is not essential. Commencing salary according to qualifications from £1,000-£1,500 p.a., with substantial bonus on results. The appointment holds good prospects of promotion to the Board of Directors.—Forms of application for interview may be obtained by writing to the MANAGING DIRECTOR, Henry Wallwork & Co., Ltd., Roger Street, Manchester. 4.

HENRY WALLWORK & CO., LTD.

WE have been producing finest quality Iron Castings for nearly a century, and to-day our foundries lead in the small and medium castings field.

Our productivity has been increased, and our quality even further improved by the installation of the most modern equipment.

We now propose to further develop the sales of our castings in the South of England and we are expanding our area office accordingly.

We require four ultra-keen, fully-experienced men to represent us in the area south of The Wash-Bristol Channel. These men must possess the requisite technical background and have proved sales records.

They will each be given a car, adequate remuneration, and the fullest support. In return, they will have to produce top-grade results in a field which is virtually unlimited.

Applications in writing, giving fullest details, in strictest confidence, to: Box No. H.C.153, McCONNELL'S (LONDON), LTD., Registered Practitioners in Advertising, St. Stephen's House, Westminster, London, S.W.1.

AGENCIES

AGENTS required. Able to obtain orders for Brass, Bronze Monel and Aluminium Castings, and machine parts of light and medium weight.—Box 3222, FOUNDRY TRADE JOURNAL.

ALUMINIUM Die Casters in gravity and sand require SALES AGENTS for all areas, excluding South-East Counties and London.—Apply Box 3226, FOUNDRY TRADE JOURNAL.

LIVE AGENT wanted for London and South by Midlands Mechanical and Jobbing Whiteheart Malleable Ironfounders. Must have good connections.—Please reply Box 3217, FOUNDRY TRADE JOURNAL.

AUSTRALIA.—TECHNICAL REPRESENTATIVE, well known Foundry and Metallurgical Consultant, willing to consider representation of, or act in a consultative capacity for, one or two old-established firms. Foundry plant, equipment and materials.—Please address replies, in confidence, to "T.R.," Box 5255, G.P.O., Sydney, N.S.W., Australia.

MACHINERY WANTED

WANTED, urgently, One Monometer, 1 ton aluminium capacity. Fully Mechanised Rotary Melting Furnace, with retractable End Flue.—Box 3218, FOUNDRY TRADE JOURNAL.

WANTED: Secondhand Universal Testing Machine for cast iron, 5/10 tons capacity, hand or motor operated. Amsler preferred.—THOMAS GREEN & Co., LTD., Coseley Foundry, Nr. Bilston, Staffs.

WADKIN Pattern Shop Machinery wanted. Price and particulars.—Box 3210, FOUNDRY TRADE JOURNAL.

MACHINERY FOR SALE

6 A300 Carborundum Crucibles, unused and in good condition, at reduced price.—Box 3200, FOUNDRY TRADE JOURNAL.

15,000 LB. Roll over Machine with some capacity available. Falkirk district.—Box 3228, FOUNDRY TRADE JOURNAL.

"CONVEYANCER," Mark VIII, for sale; petrol driven fork lift truck, 10-cwt. lifting capacity; height of lift, 9 ft.; pneumatic tyres. Price £400.—HAYWARD TYLER & Co., LTD., Luton, Beds.

TILGHMAN Tumblast Wheelabrator WTB.2, 36-in. by 42-in. chamber (11½ cub. ft.) for castings to 80 lbs. individual weight, capacity approx. 3 tons per hour; motors 400/3/50.

SMITH Steam Locomotive Jib Crane, standard gauge, 3 tons at 16-ft. radius, 30-ft. jib. (Two available.)—NEWMAN INDUSTRIES LIMITED, Yate, Bristol. 'Phone: Chipping Sodbury 3311.

"WADKIN" motorised Ball-bearing Woodworking Machines:—18 in. "PKA" Canting Spindle Dimension Saw, 30 in. "JV" Double Disc Sander (both practically new); 30 in. "DNA" Bandsaw; 6 in. centre "RTA" Lathe; 18 in. "AZA" Rising Table Sawbench.—DALTON'S, Canal Street, Nottingham.

FOR SALE.

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

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MACHINERY FOR SALE—*Contd.*

CRANES FOR SALE.

2-ton E.O.T. Crane, 3-motor. Floor controlled, 30 ft. span (span can be adjusted if required), 400/3/50. Almost new. Price £1,200, ex-works.

1 brand new 6-ton E.O.T. Crane. Electric hoist and hand long travel and cross traverse. Single girder type. Floor controlled, 400/3/50. Price £595, ex-works.

Hand Overhead Travelling Cranes. 1-5 ton. Spans up to 36 ft., from stock.

FRANK SALT & CO., LTD.,
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BLA. 1635.

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AIR COMPRESSORS.

1,000-C.F.M. ALLEY & McLELLAN, type 18B, vert., encl., 2 stage, watercooled, 100 lb. W.P., speed 360 r.p.m. With vert. intercooler.

1,000-c.f.m. FULLERTON, HODGART & BARCLAY, vert., double acting, 2 stage, watercooled, W.P. 100 lb., speed 290 r.p.m. With separate vert. Intercooler, and motorized water circulating Pump. Fitted with Flywheel and shaft ext. carrying "V" pulley suported by outer bearing.

665-c.f.m. SULLIVAN, type WJ3, vert., high pressure, right angle, watercooled 125 lb. W.P., speed 188 r.p.m. Direct coupled 170-h.p. auto synch. Motor by Crompton, 415/3/50, with control gear.

600-c.f.m. TILGHMAN, vert., single cyl., single stage, watercooled type F.C.9. Speed 365 r.p.m. W.P. 60 lb.

600-c.f.m. INGERSOLL RAND, model 10XB, horiz., 2 stage, 110 lb. W.P., speed 185 r.p.m., with Intercooler between the 2-cyls., Automatic Unloader. Driven by 127-h.p. S/R. Induction Motor by L.S.E., 415/3/50, with control gear.

600-c.f.m. ALLEY & McLELLAN, Series 18B, size No. 6., vert., single crank, 2 stage, watercooled, 100 lb. W.P., speed 290 r.p.m. Driven by New 140-h.p. S/R Brook Motor 400/440/3/50, with control gear.

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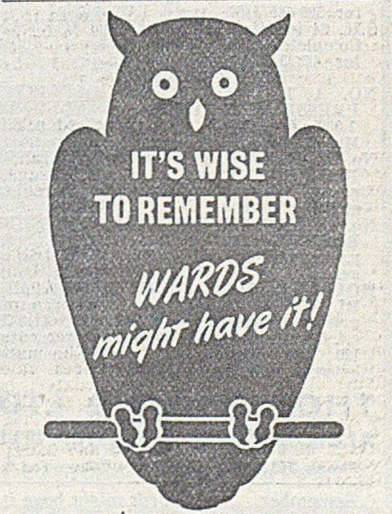

MACHINERY FOR SALE—*Contd.*

ALBION TWW WORKS

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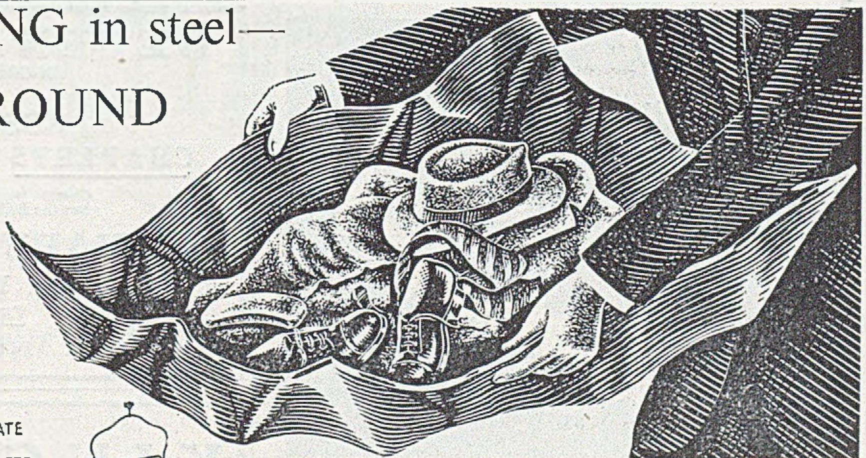

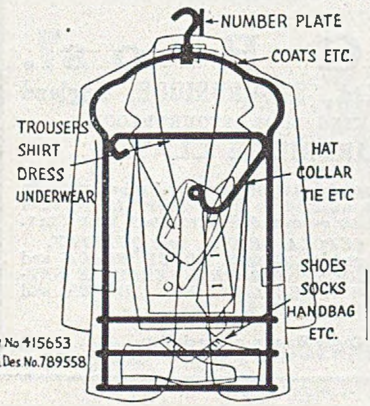
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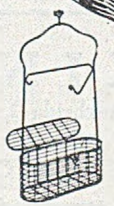

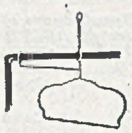

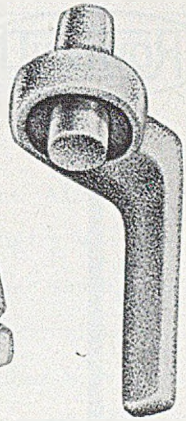

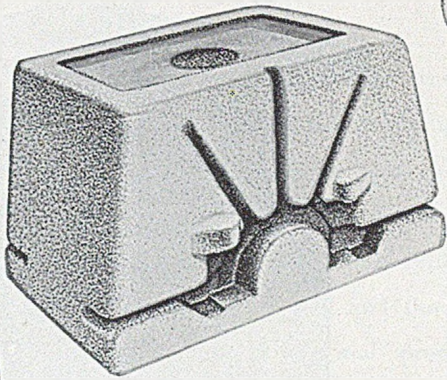

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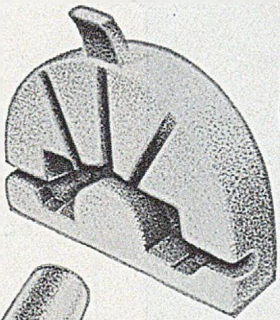

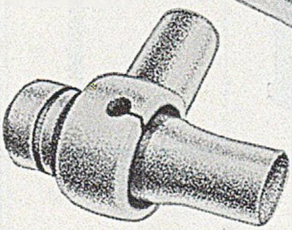

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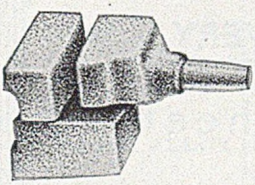

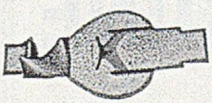

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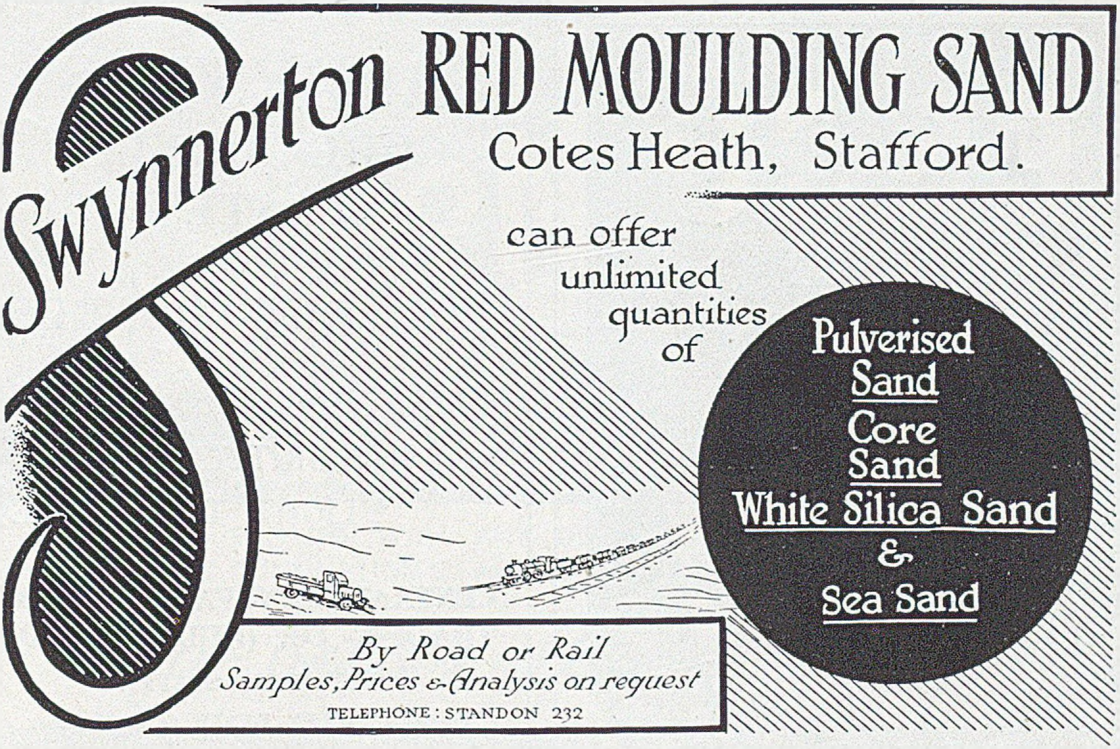
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