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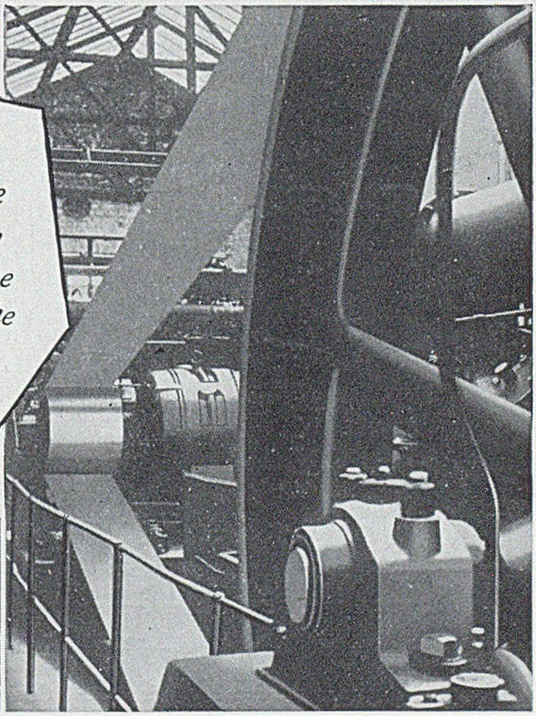

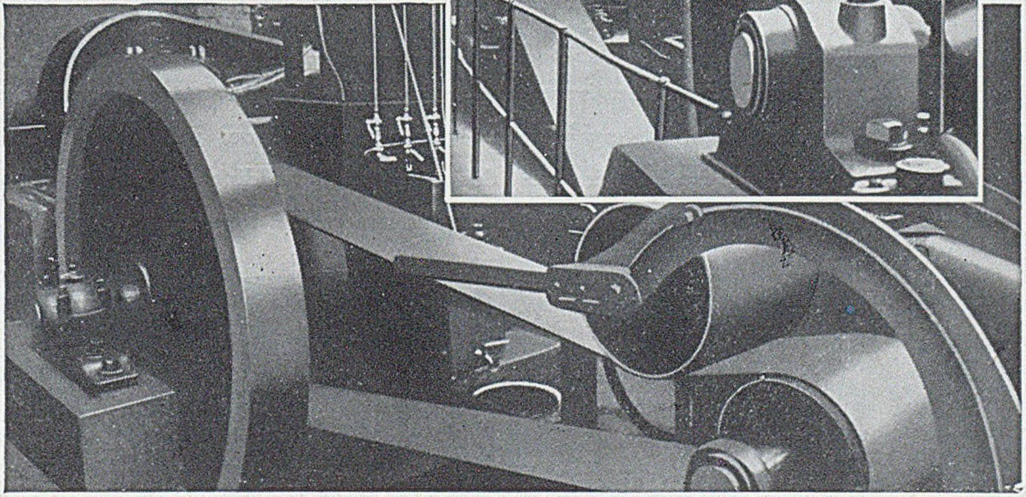

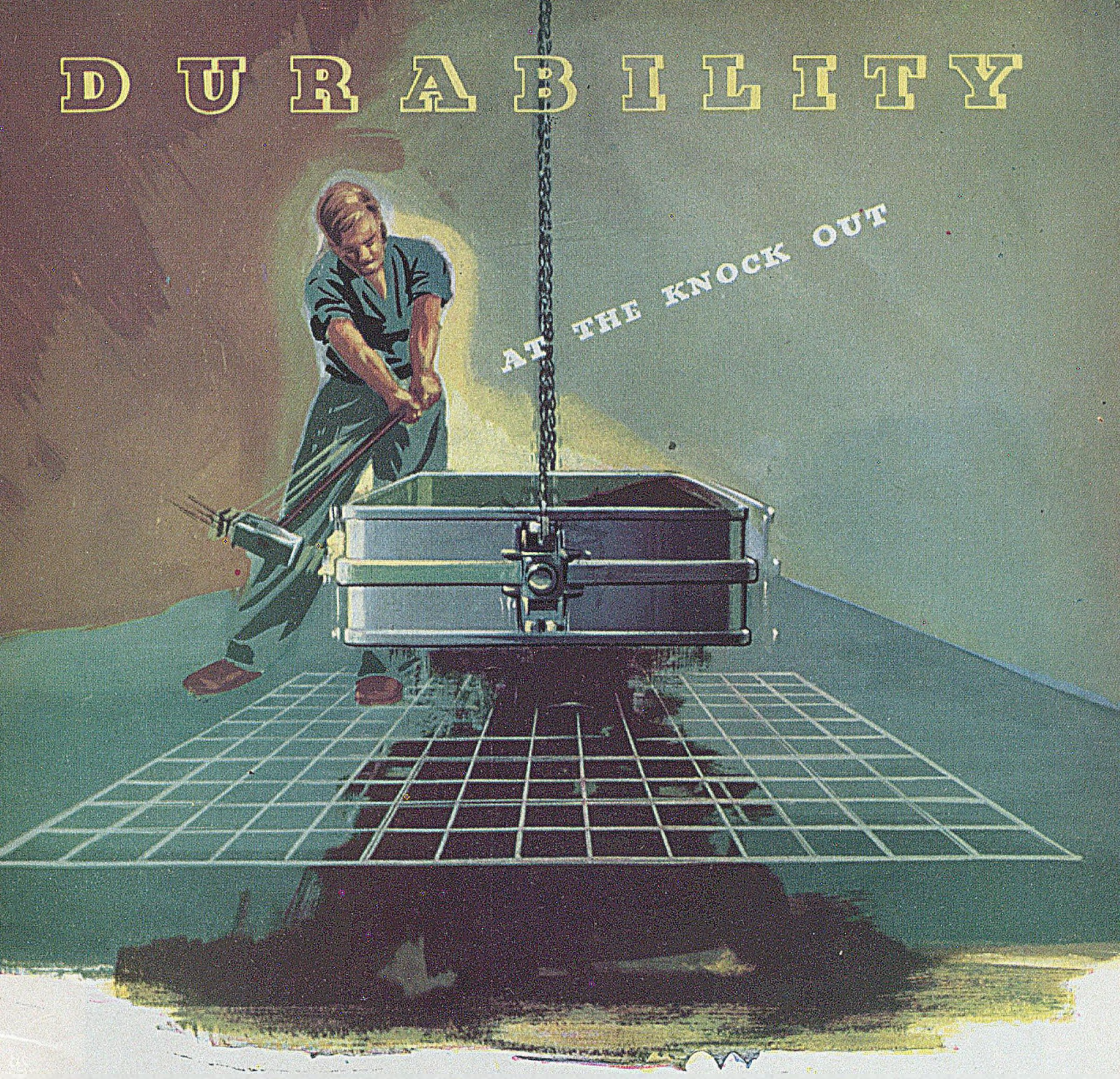

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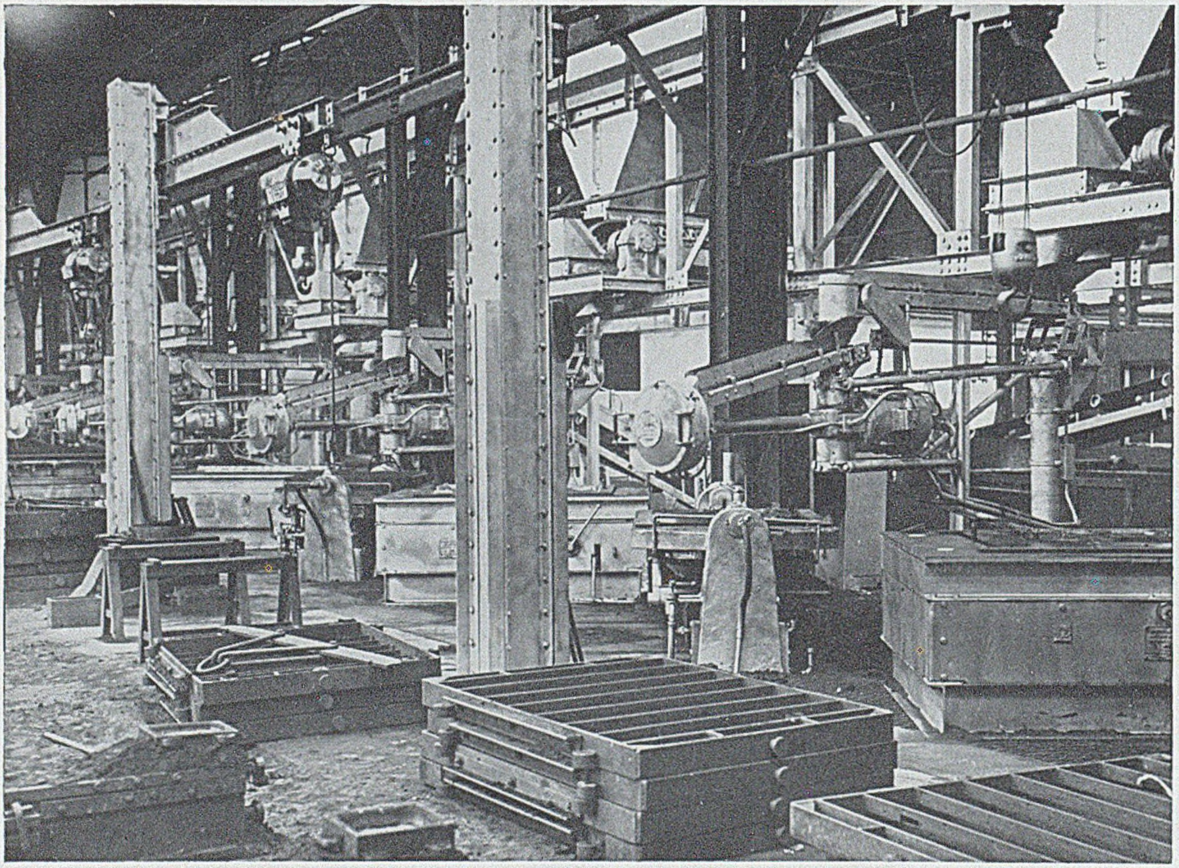

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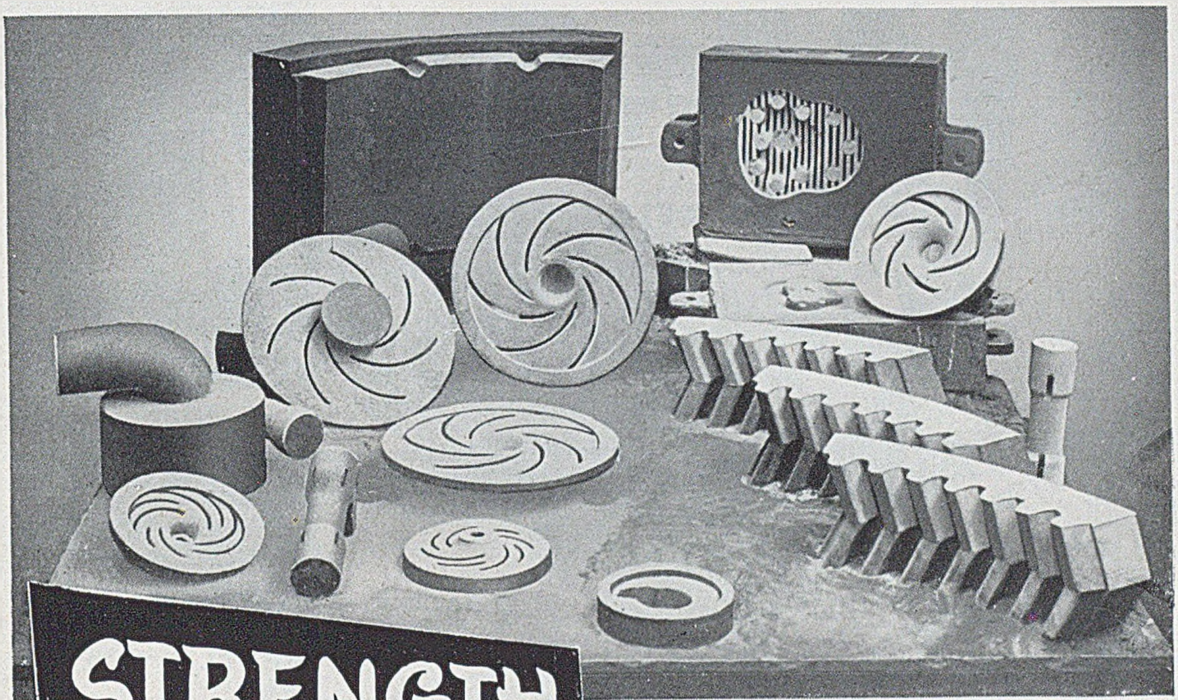

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Au Revoir

This week the British iron and steel industry officially becomes a State monopoly. This is a matter of great moment for ferrous foundry interests because their annual turnover follows the same pattern as iron and steel and State monopolies have so far not produced any new record high outputs. Thus, in general terms, a recession of trade can be anticipated despite the rearmament programme. Free enterprise loses about 18 foundries—it is difficult to say just how many, as some of the firms expropriated operate a number of plants. Moreover, the question is complicated by "hiving off." These 18 include such famous names as Stanton, Staveley, Sheepbridge, Hadfields, English Steel Corporation and the United Steel Companies. The steel castings industry loses 25 per cent. of its capacity to the State. The chairman of the Iron and Steel Corporation of Great Britain said last Tuesday that long-term agreements were to be made with the Coal Board, the Electricity Authorities and other State monopolies for the supply of raw materials and services to the industry. It is to be noted that as the State is the sole shareholder in 80 concerns plus 100 subsidiaries, it will in the future nominate the directors and, may be, the senior executives. The appointment of a senior executive over the heads of the board of directors will yield a situation similar to that when an official receiver assumes control. The companies taken over form the bulk of the membership of the British Iron & Steel Federation and the Joint Iron Council.

We fail to see what benefits can accrue from the creation of an iron and steel monopoly. It will not produce an extra ton of pig-iron or ingots; no price reduction is in sight and labour relations cannot very well be improved as harmony has reigned within the industry for many decades. The change-over will not bring in a single dollar nor will it make for easier sales in foreign markets. The competition between the State works and those left to private enterprise will create all sorts of difficulties and potential unpleasantness. It is reasonable to forecast that the number of non-producers will be increased, so producers will have to work harder to keep somebody-else's family.

The new conditions mean that one more raw material—pig-iron—will be produced and sold by the State and should it follow the same path as fuel and electricity, supply and transport, more chaos can be expected. All the present economic difficulties are not due to the aftermath of war—as Sir Claude D. Gibb recently said to the Manchester Association of Engineers, leaving his audience to draw their own conclusions. However, the country can rely on the foundry industry, both the State monopoly and free enterprise sections, to carry on intelligently to service all other industries with their essential requirements in cast products. Naturally founders are worried. The established employers' organisations may have to face up to losing valued members. Whilst no immediate changes can be anticipated, time, unless there be a general election—will change the whole pattern of ferrous founding.

1951 Minibition

Following the success of the first "Minibition," organised by the Purchasing Officers' Association at Brighton in September, 1950, arrangements have been made for the feature to be repeated at the Craigside Hydro, Llandudno, from September 27 to 30, in conjunction with the Association's 1951 national conference. Facilities at Llandudno offer scope for a more extensive layout than in 1950, and already a large number of last year's exhibitors have made advance reservations.

This exhibition, the only annual show organised by buyers for buyers, is designed so that the maximum information regarding products can be displayed attractively and economically — the stands, all of one size, being situated adjacent to the main conference room. As the membership of the Association is not restricted to any particular industry or group of industries, stand reservations can be accepted from any company whose products are likely to interest buyers in industrial or public undertakings. In 1950, space was taken by nearly one hundred leading companies (all there was room for) representative of the whole field of British industry. Full details and stand reservation forms may be obtained from the secretary of the Association, at Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4.

Death of Sir Francis Joseph

The death occurred last week of Sir Francis Joseph at the age of 81. His career was a typical example of success through hard work and enterprise. He left a Liverpool school at the age of 12 to become a railway messenger. Whilst not directly associated with the foundry industry, he was well known to many foundrymen as the founder of the Central Pig Iron Producers' Association and chairman of Settle, Speakman and Company, Limited, the coal merchants. He was a former president of the Federation of British Industries, was knighted in 1922 and created a baronet in 1942.

The Late Professor Turner

Mr. H. Field in a private letter reminds us that when he retired in 1926, Professor Turner, desiring to have a token to distribute to his friends, asked John Harper & Company, Limited, of Willenhall, to strike a 6-in. medallion to carry on one side his profile and on the other a reproduction of the iron-silicon diagram with the inscription "His researches laid the foundation of scientific ironfounding."

The death occurred on February 12 of Mr. Robert Crooks Stanley, chairman of the International Nickel Company of Canada Limited.

By profession a mining engineer, Mr. Stanley entered the nickel industry in 1901 as assistant superintendent of one of the production units, and became President of the company in 1922. He was one of the principals in the merger with the Mond Nickel Company, in 1928.

Commencing this week in Swansea, the British Iron and Steel Federation are staging a series of educational exhibitions in steel-making areas this year. Various aids to training—pamphlets, charts, films and other material have been specially prepared for these exhibitions. School children in each area are being invited, and people interested in education and training will be able to meet men in the industry and discuss common problems.

Designer and Founder

The Giesserei Verlag of August Thyssen Strasse, Düsseldorf, publishers of *Die Neue Giesserei*, have just issued a special edition covering the question of the designer and the founder. There are a dozen Papers on the subject, the first being by the President of the German foundrymen's association, Mr. D. J. H. Küster, who introduces the importance of price levels. Ordinary grey iron is dealt with by Dr. Hugo, and the high-duty type by Dr. Heuers. Other authors cover steel (Mr. G. Schmidt and Dr. Resow); malleable (Dr. Roll); light alloys (Dr. Buckeley and Mr. Schneider); copper-base alloys (Mr. C. A. Piel), and patternmaking (Mr. J. Hagen). Finally Dr. Piwowarsky has used some material from Meehanite publications to show the relative costs of making jobs as castings and weldings The whole of the Papers are excellently presented and well illustrated. Dr. Roll in his contribution makes use of "right" and "wrong" methods for designers to use. This dogmatic way of presentation has been criticised in British circles, but its very directness does, what it is supposed not to, invite criticism. Practically the whole of the examples given are, however, the essence of commonsense. The book contains 88 pages and costs 7.20 D.M., and is, for those who can read German, very good value for money.

Zirconium Metal

The production of zirconium metal on a commercial scale has recently been initiated by Murex Limited, of Rainham, Essex. Previously only very limited supplies were available in England, and even now full production has not yet been attained. Sheets down to 0.005 in. in thickness, 6 to 7 in. wide and 2 to 3 ft. long, are now being made, and it is expected that sheets up to 12 to 15 in. wide will be available in the course of the next few months. Rods down to 2 mm. dia. can be supplied and drawn zirconium wire may also shortly be available.

Zirconium has excellent resistance to corrosion. Hydrochloric acid and fused alkalis have practically no attack on this metal and its resistance to attack by nitric, phosphoric and sulphuric acids is only slightly less than in the case of tantalum. This property renders it very suitable for use in chemical plant where corrosion resistance is required. It is also employed in surgery for the same reason and because of of its further convenient property of attaching itself permanently to the surrounding flesh. The metal has exceptionally good "getter" properties which will tend to make its use in electronics widespread. It is used for grid emission inhibitors and can, in many cases, replace tantalum or molybdenum.

Another Productivity Team

A second training-methods productivity team left for the States last week. It is charged with the study of the technical colleges which provide industry with its technicians. Most of the team, which is led by Mr. J. R. Armstrong, the chief education officer for Joseph Lucas, Limited, are education officers or heads of colleges.

The Iron and Steel Institute announce that the fifth Hatfield Memorial Lecture on February 20, at 8.30 p.m., will now be held in a larger hall—the Great Hall—at the Institution of Civil Engineers, Great George Street, London, S.W.1.

Drying of Foundry Moulds and Cores*

By G. T. Hampton and W. H. Taylor

While most of the contemporary systems of sand drying are reviewed in this Paper, the details given are of necessity confined to the equipment and practice adopted in the Authors' foundry. Facts and figures are given which indicate the performance of the equipment in use for the drying of new sand, for core drying and for mould drying.

Drying New Sand

IN A FOUNDRY using what is called a "synthetic" sand practice the new sand consists of clay-free silica sand to which bonding materials have been added to give correct moulding properties. It is necessary to dry a certain amount, if not all, of the new sand in order to standardise the new-sand addition, control the moisture content and ensure a more intimate mixing between the sand and the bonding materials. Drying is especially necessary in the preparation of core sands.

The choice of equipment for this operation will be governed largely by the size of the foundry and the amount of sand required. In small foundries sand is often dried by spreading it out on plates, or on top of core stoves, cast moulds or any other accessible source of heat. In large foundries, on the other hand, special equipment in the shape of a static or a rotary drier is needed to supply the necessary amount of dried sand.

The static sand drier is generally a simple arrangement consisting of a firebox and a sand hopper; the sand falls over the inclined roof of the firebox (Fig. 1). As would be expected, this type of drier has many limitations. Clogging easily occurs at the outlet gaps, whilst the delivery of sand and the degree of drying are very uneven. A modern design of drier using this principle is stated to have an output of 1¼ tons per hr., the running cost being 4d. per ton of sand dried with coal firing and 10d. per ton when adapted for oil firing.

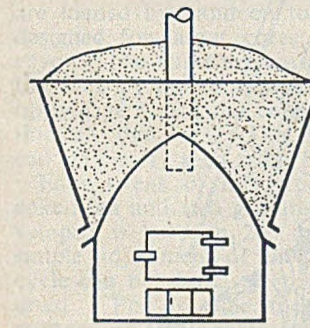


FIG. 1.—*Diagrammatic Representation of a Static Sand Drier adapted for Coal Firing.*

The larger foundries use the rotary drier (Figs. 2 and 3), which is better suited to handle the greater quantities of sand required, and is easily adapted for mechanical handling.

The plant shown is a gas-fired drier using Mond gas with a calorific value of 150 B.Th.U. per cub. ft. The wet sand is fed from a storage hopper, which is charged by a hand-loaded skip. The hopper is fitted with an electrical vibrator which is used periodically to prevent the wet sand hanging in the hopper, and thus ensures a steady flow of sand on to the rotary feed table. The sand so supplied is swept off by a fixed plough into the barrel of the drier. The sand is dried by cascading down the barrel around a 5 in. slotted burner tube which extends the full length of the barrel. The delivery end of the barrel is connected to a Venturi through which air is blown to convey the dried sand to the main storage hopper of the sand mill, approximately 40 yards away. This operation not only avoids the necessity of manual handling but also cools the sand.

A coal-fired drier is also in use which, except for the type of fuel and method of filling the wet-sand storage hopper, is similar in principle to the gas drier. Small pea-size coal is supplied to the firebox by a mechanical stoker, and hot air from the firebox is forced up the barrel by the combined action of a fan, which supplies air for the firebox, and an exhaust stack at the sand-input end of the barrel. The feeding arrangements consist of a hopper above a rotary feed table which supplies an elevator, which in turn carries the sand to the working storage hopper. One other difference between this drier and the gas-fired one is the use of a suction fan to remove the dried sand, but the distance travelled is only approximately half that of the pressure hoist.

The coal-fired drier is considerably larger than the gas-fired one, the barrel sizes being 19 ft. long by 3 ft. 5 in. dia. and 8 ft. long by 2 ft. 6 in. dia. respectively. An exhaustive check was taken on these driers for costing purposes, and the results shown in Table I were obtained.

TABLE I.—*Relative Data for Two Types of Sand Driers.*

	Gas-fired drier.	Coal-fired drier.
Sand dried	4,503 tons	6,840 tons
Fuel per ton	3,300 cub. ft.	39 lb.
B.Th.U. per ton sand dried ..	528,000	526,000
Fuel cost per ton..	3s.	9½d.

Thus it can be seen that the fuel consumption in terms of heat supplied per ton of sand dried is approximately the same for both plants, as is also the amount of sand dried per hr., being 2.1 tons for the gas-fired drier and 2 tons for the coal-fired drier. Taking into account depreciation,

* Paper presented to the Institute of Fuel; the Authors are on the staff of F. H. Lloyd & Company, Limited.

Drying of Foundry Moulds and Cores

maintenance and labour, the cost per ton of sand dried was found to be 7s. 4d. for the coal-fired drier and 9s. 8d. for the gas-fired drier.

Core drying in most foundries in this country is limited to various types of ovens. Di-electric heating is available, but owing to the high capital outlay and the fact that it is mainly applicable to resin-bonded sands it has not come into general use. It has, undoubtedly, many advantages, the two main factors being its extreme rapidity and the absence of over-curing. Infra-red heating is used for drying refractory paint washes which are applied to some dried cores. A tunnel system is used, the cores passing through on a conveyor. Electricity consumption, however, is heavy, and coupled with the high cost of lamp replacement tends to make the process uneconomic except for large installations. Infra-red heating by gas has also been used at a lower cost than by electricity. Neither method has found favour for other uses than "skin" drying, *i.e.*, a depth of drying not exceeding ¼ in.

The ovens in use at the foundry with which the Authors are associated present a fair cross-section of old practice and the more modern practice in use to-day. Each oven is equipped with 2-point temperature recorders, by means of which a standard performance is maintained.

The oldest oven, which dries large cores, is simply a rectangular chamber 22 ft. by 12 ft. 6 in. by 6 ft., with a firebox at the back fed by a mechanical stoker. Hot gases are passed into the oven *via* a grid at the back, a flue at the door end connecting to a stack some distance away (Figs. 4 and 5). Tier loading is employed, the bogie running on a ball track and being moved into and out of the oven by means of a small gantry crane which provides the normal lifting power in the core shop. The bogies will accommodate one day's work from the shop. Drying takes place at night for a period of 8 hr. Approximately 34 tons of sand of 6 per cent. average moisture content are dried each week, with a fuel consumption of 3 tons of coal. Experience has shown that the heating of this oven is far from uniform. There is a large temperature gradient from the door to the back of the oven—so much so, in fact, that any cores placed within 3 ft. of the back wall would be over-dried or burnt. The average temperature of the oven is 300 deg. C.

An improvement on this oven is the recirculating battery stove illustrated in Figs. 6 and 7. This also is coal-fired by means of a mechanical stoker, and employs rack-type loading, the racks being handled by means of hydraulic lift bogies. The stove comprises four ovens of dimensions 10½ ft. by 7 ft. by 6½ ft., and dries approximately 30 tons of sand per week, with a fuel consumption of 6 tons of coal nuts. The drying cycle is approximately 8 hr. at a temperature of 180 deg. C., and each oven is charged twice a day. An even drying temperature is maintained throughout the battery of ovens, and the all-round performance is quite good provided adequate attention is given. Considered from the

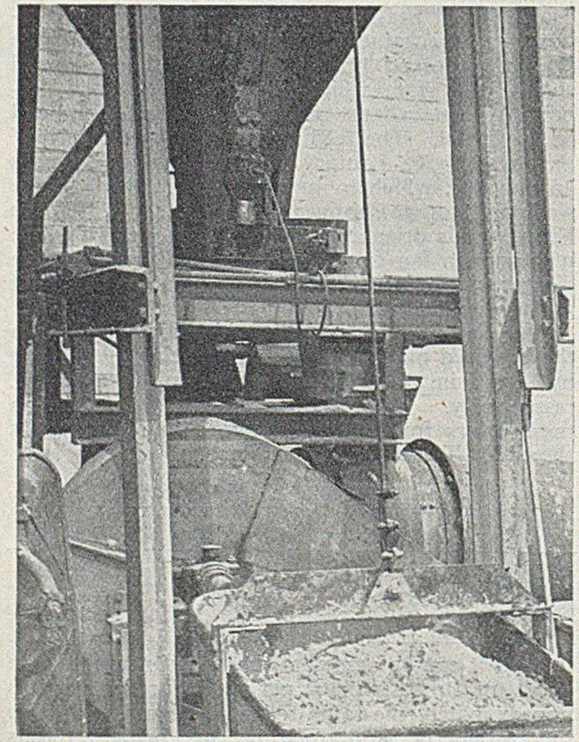


FIG. 2.—*Charging Mechanism and Hopper of a Rotary Sand Drier.*

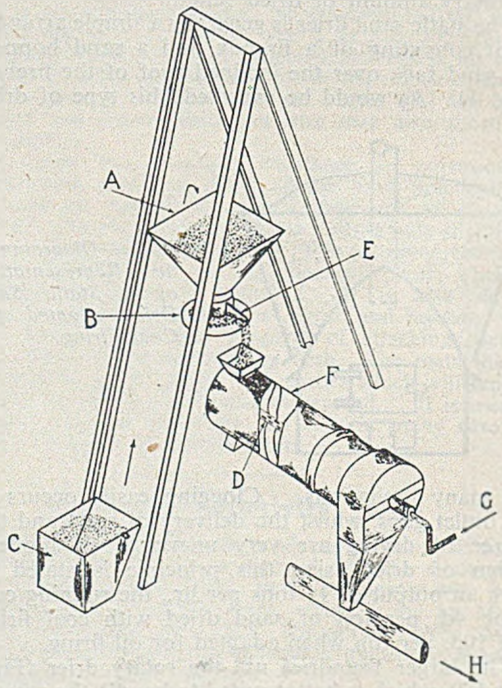


FIG. 3.—*Gas-fired Rotary Sand Drier.* A. *Sand hopper.* B. *Rotary feed table.* C. *Hand-loaded skip.* D. *Slotted 5 in. main burner.* E. *Plough.* F. *Sand-drier barrel rifled to facilitate cascading of sand.* G. *Gas supply and* H. *Pneumatic conveyor to sand plant.*

fuel-efficiency point of view alone, it is felt that this oven would be more economical if hand instead of mechanical stoking were used.

One other batch stove is in use; this was originally identical with the battery just described, but owing to drainage difficulties the flues were constantly flooded, and so it became necessary to change over to a system which did not require underground flues. The gas oven described below was the simplest method of achieving this end. It consists of two chambers 11 ft. by 7 ft. by 7 ft., each of which is fed by eight gas jets situated in the bottom of the oven, as shown in Fig. 8.

Gas is supplied at the rate of 3,000 to 4,000 cub. ft. per hr., and 30,000 cub. ft. are used in the usual drying cycle of 8 hr. at 150 deg. to 200 deg. C. The ovens are charged twice daily, and approximately 14 tons of sand per week are dried at a fuel consumption of approximately 250,000 cub. ft. No air is admitted except that induced from the Venturi, nevertheless, cores containing linseed oil (which dries by oxidation) are quite satisfactorily dried, indicating that sufficient oxygen is present in the oven. Rack-type loading is employed, and it has been noticed that cores on the bottom rack are not dried so well as those higher up in the oven, indicating the need for a baffle plate above the burners to direct the heat down to the base of the oven.

Continuous Core Ovens

The other core-drying units are of the continuous type. These supply the machine-moulding sections where cores are of a reasonably uniform size and made in large quantities. Vertical ovens are used, as floor space in the core-shops is limited. The coremakers work alongside a moving conveyor which transports the cores to the ovens, where they are loaded by hand on to the racks. One oven designed for larger cores is fed by a roller conveyor. The cores are carried into the vestibule of the oven by the conveyor, where the racks moving up engage under the core plates and convey them through the oven. The principle of these ovens can be clearly seen from Figs. 9, 10 and 11.

Four ovens of this type are in use. Two are coke-fired and two gas-fired. The temperature developed is between 200 and 250 deg. C., and by simple adjustment of the gearing system the time cycle can be varied to suit the type of work to be dried. For example, the two gas-fired ovens are engaged on small cores, for which a drying cycle of 1 hr. has been found to be satisfactory, whilst the coke-fired ovens drying heavier cores have a drying cycle of 2 hr. Some of the cores which are heavier than the average receive a 2-cycle treatment, whilst others made with sand of high moisture and low permeability, although in some cases smaller than the average-size core, are also given two cycles. This shows that for the most efficient operation, standardisation of the cores and core size are desirable so that the drying time can be accurately fixed and all the cores dried in one cycle of the oven.

The figures given in Table II were obtained for an average week with the equipment described above.

TABLE II.—*Relative Data for Fuel Consumption in Vertical Core Drying Stoves.*

	Gas-fired.	Coke-fired.
Sand dried	38 tons	50.2 tons
Fuel used	162,495 cub. ft.	3.55 tons
B.Th.U. per ton sand dried ..	641,450	2,090,000
Cost of fuel per ton sand dried ..	3s. 11d.	5s. 10d.

Fig. 10 shows that some ovens incorporate a cooling chamber to facilitate easier handling of the cores at the unloading point. One of the ovens is of this design, and the extra travel entails an additional ½ hr. on the time cycle.

Horizontal continuous ovens are sometimes used, but are less favoured than the vertical type, because of the greater floor space required. The cores pass through a tunnel-type oven on a continuous conveyor, and it is usual for the core-makers to work alongside the stove and load the cores themselves on to the slowly moving racks. A feature of these ovens is their smooth action, whereas the vertical type tend to be a little unsteady and care must be taken in loading.

Mould Drying

Moulds may be cast "green" (*i.e.*, without any drying whatsoever); skin dried (*i.e.*, the first 2 in. or less of sand from the mould face is dried) or fully dried, depending on the size, design and metal thickness encountered in the mould. The larger the mould the greater the force exerted on the sand by the metal, and thus the greater the sand strength required. This strength is obtained by drying.

Three methods are in use: first, stove-drying, which fully dries the mould; secondly, hot-air drying, which may be used for complete or skin drying;

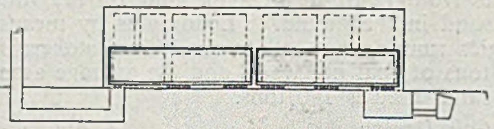


FIG. 4.—*Sectional Elevation of an Old-type Core Stove, Tier Loading.*

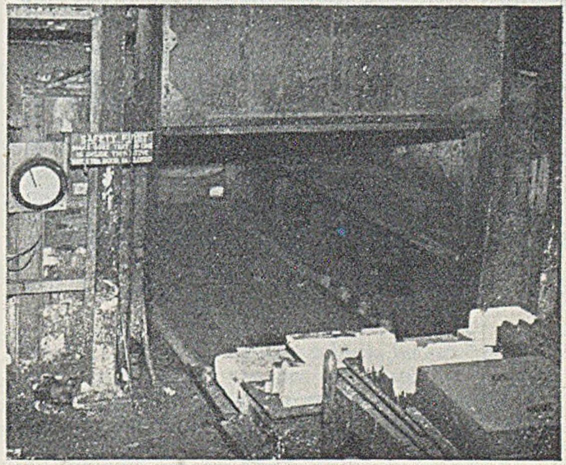


FIG. 5.—*Old-type Core Stove, showing Loading Bogie on a Ball Track.*

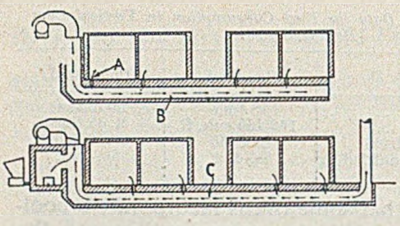


FIG. 6 (*above*).—*Sectional view of a Re-circulating-type Battery Stove.* A. *Dampers.* B. *Heating flue and* C. *Return flue.*

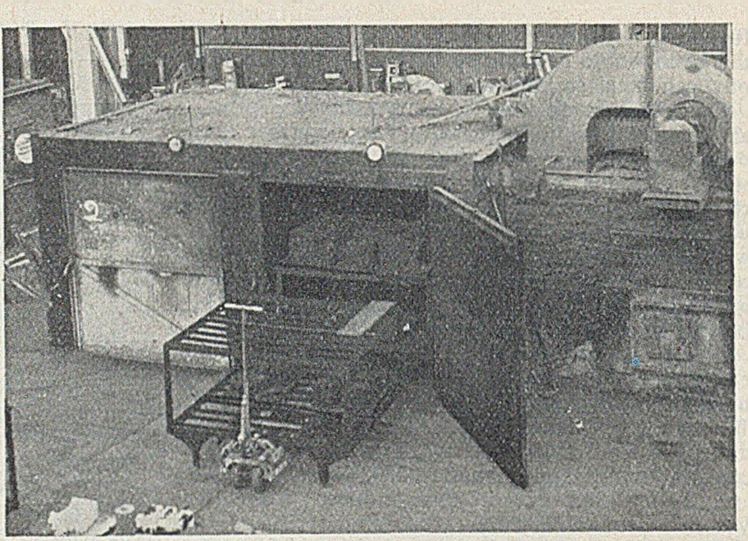


FIG. 7 (*right*).—*Re-circulating Battery Stove with Rack Loading, Coal-fired by Mechanical Stoker.*

and thirdly, torch drying—a method of skin drying confined to moulds smaller than the above, but too large to be cast " green."

Stove Drying

This type of drying is restricted to heavy box-moulded work where sand of high moisture and low permeability is used in order to produce the necessary moulding properties. One battery of stoves is in use, consisting of three chambers each measuring 26 ft. by 18 ft. by 8 ft. It is coal-fired by means of a mechanical stoker, and is similar in construction and operation to the old-type core oven. A temperature of 300 deg. C. is developed, and drying takes from 12 to 48 hr., depending on the volume of sand in the mould. Loading is by means of bogies running on ball tracks. Two stokers feed 20 tons of coal per week, and the average amount of sand dried is 140 tons.

Hot-air Drying

Large floor moulds and any other moulds which cannot conveniently be accommodated by the stoves are dried by the use of portable hot-air driers (Fig. 12). This type of drier consists of a brick-lined kiln which is heated by means of a gas burner using, in this case, Mond gas. A fan blows air through the kiln and, through a branch pipe, the air required for combustion of the gas. The resultant hot air and products of combustion are directed into the mould through a throat at the bottom of the kiln.

The drier is usually employed in the following manner: The two halves of the mould are placed in position, a space between them being provided by arranging bricks along the full length of the mould joint. The drier is positioned above any convenient opening in the top of the mould, all other openings being covered by plates. [The openings provided for feed metal are usually found to be ideal for this purpose (Fig. 13).] It is usually necessary to protect the mould face at the point of entry of the hot air, in order to avoid spalling of the mould at this point. Protection is provided by a plate. Gas flow is at the rate of 2,500 cub. ft. per hr. and drying time depends on the surface area of the mould.

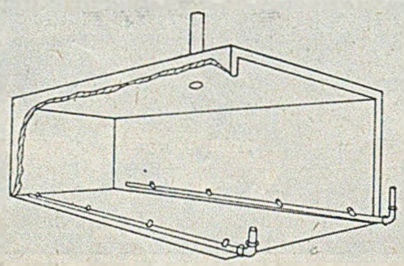


FIG. 8.—*Improvised Gas-fired Core Oven.*

With this equipment mould temperatures of 200 to 300 deg. C. are obtained, depending on gas pressure. On checking, it was found that temperatures up to 850 deg. C. were obtained in the kiln, and at the throat the temperature fell to 460 deg. C. The temperature in the mould below the muffle was 290 deg. C., and, at a point 8 ft. away, 250 deg. C. This would seem to indicate that reasonably constant temperature conditions are produced throughout the mould.

The number of these units available is sometimes in excess of demand, and the view is held that in the absence of reliable data on drying times the tendency is to exceed the optimum, resulting in waste of fuel and increased drying cost.

Comparing the two drying methods, the portable hot-air drier develops the same drying temperature as the average mould stove, and appears to use the heat to better advantage, inasmuch as the heating effect is concentrated on the working face of the mould. The drying time should thus be much less than for stove drying.

While this method of drying is more costly than stove drying, judged on the data available it could be much cheaper if there were standardisation of drying procedure. Further, there is no doubt that portability eliminates a great deal of the handling necessary with stove drying, since moulds can be dried on the moulding floor. It is the most

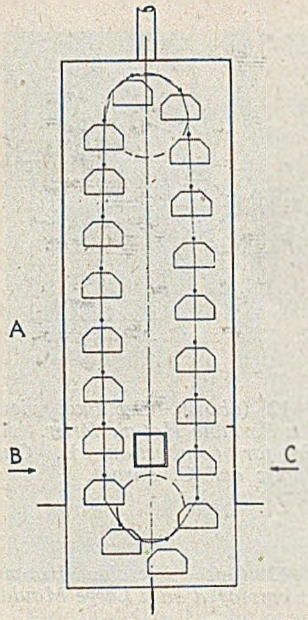


FIG. 9 (*left*).—*Single Circuit Continuous Core Oven.* A. *Loading trays;* B. *Loading; and* C. *Unloading Points.*

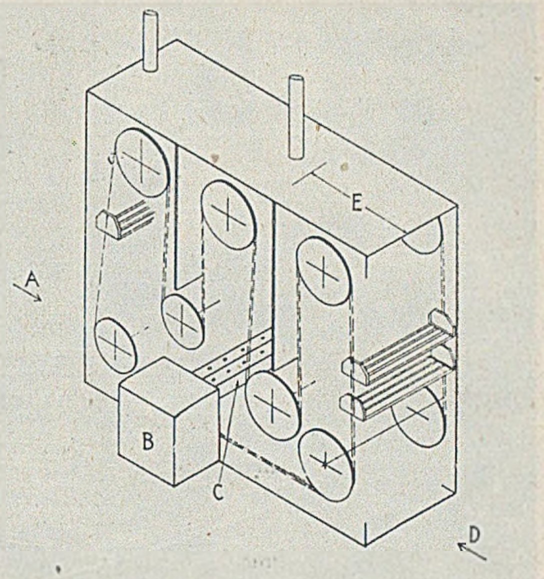


FIG. 10.—*Continuous Core Oven with Cooling Chamber.* A. *Loading;* B. *Fire-box;* C. *Flue fitted with Dampers;* D. *Unloading; and* E. *Cooling Chamber.*

suitable equipment for drying floor moulds, and it is felt that in the field of skin drying it should have a far greater application.

Torch Drying

Torch drying is restricted to moulds which fall between the green- and dry-sand groups. These moulds are painted with a refractory wash which must be dried before casting. Gas torches burning either town gas or gas of low calorific value are used for this drying operation, and the drying period required is judged from the appearance of the paint, which is baked when sufficient moisture has been removed or driven back from the mould face. Using Mond gas, torches consume 110 cub. ft. per hr. of gas, and the drying time varies according to the surface area of the mould (Fig. 14).

Efficiency of the Mould Stove

From a consideration of the results shown in Table III the following observations can be made:—

An indication of the efficiency of the mould stove can be obtained by comparing it with the core ovens. On a cost basis it compares favourably with the best results obtained with the latter, and on this rating its performance is satisfactory. Considering its simple construction it is thought that the stove operates near maximum economy and efficiency, although modernisation would no doubt improve its all-round performance.

Performance of Core Ovens

Loading

Rack-type loading, as used on the recirculating oven and the gas-fired oven, is not a satisfactory method of core-oven charging. Table III indicates that increased loading is possible by all other methods of charging. For economy of operation the continuous oven would seem to give the best results; it is somewhat limited, however, in the size of core it can handle. The horizontal continuous oven has an advantage in this respect over the vertical oven, since it can handle larger cores. The mechanical parts are not subjected to so great a strain and the action of the oven is steadier. The possibility of a large core being dislodged from the tray by a sudden strain on the mechanism and, in falling, upsetting the balance of all the other trays in the vertical oven, must not be overlooked.

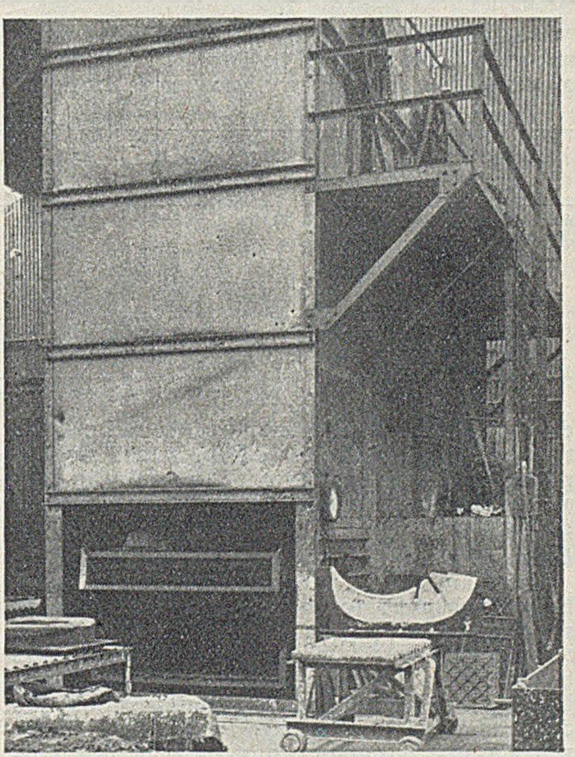
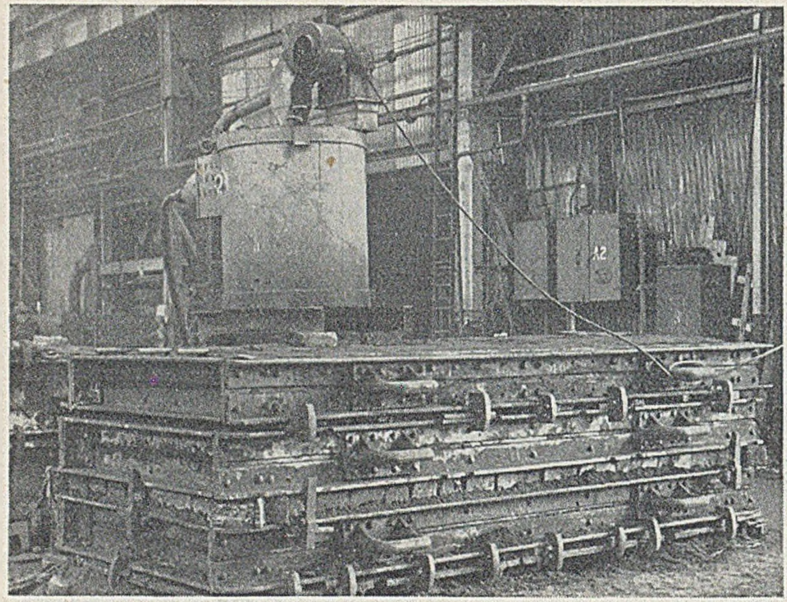


FIG. 11.—*Exterior of a Continuous Vertical Oven used for Fairly Large Cores.*



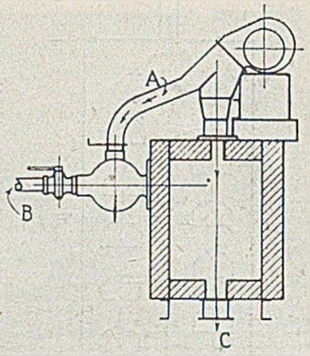


Fig. 12 (*above*).—*Sectional view of a Portable Hot-air Drier.* A. *Air for combustion;* B. *Gas supply; and* C. *Throat.*

Fig. 13 (*left*).—*Portable Hot-air Drier employed on a Large Mould.*

It is suggested, therefore, that all small- and intermediate-size cores should be dried in a continuous oven and that only the very heavy cores should be dried by a fixed oven, preferably of the recirculating type. Cores should be graded by size and physical properties of sand used, to suit various drying units and to facilitate maximum loading and minimum drying times.

Battery Ovens

These are not an economic proposition in the large mechanised foundry, as greater loading is possible with one large chamber and no heat is lost through the necessity for numerous charges, as with battery ovens. The usual types of cores dried could be dried more cheaply by the continuous oven. No doubt they are of advantage to the small works, where a little extra cost can be offset by their convenience and versatility.

Fuel

No direct comparison should be made of the above results, as the design and method of operation of the drying equipment vary greatly. The figures given should, however, link up the drying practice applied to sand with the drying practice adopted in other industries. It is thought that the use of solid fuel and of gaseous fuel would result in approximately the same cost under the same conditions. Gas, however, has the advantage over solid fuel in that better control is possible, and the minimum of attention is required during operation.

Table III.—*Comparison of Types of Drying Equipment: Relative Performance Data.**

Drying equipment.	Vol. of oven, cub. ft.	Working temp., deg. C.	Tons sand dried.	Hours drying time.	Tons sand per hour.	Moisture, per cent.	Fuel consumed.	B.Th.U. per ton sand dried.	Fuel cost per ton sand dried
Mould stove	11,232	300	140	140	1.0	4.5	20 tons coal	2,160,000	6s. 6d.
Core ovens—									
Old type (batch), coal-fired ..	1,640	200	34.0	48	0.70	6.5	3 tons coal	2,674,000	4s. 0d.
Recirculating oven (batch), coal-fired	1,912	180	30.4	100	0.30	3.5	5.85 tons coal	5,825,000	8s. 10d.
Gas-fired (batch)	1,087	200	14.25	84	0.17	2.6	254,800 cub. ft. Mond gas	2,685,000	10s. 3d.
Continuous, gas-fired ..		200-250	38.0	45	0.84	2.5	102,495 cub. ft.	641,428	3s. 11d.
Continuous, coke-fired ..		200-250	50.2	45	1.10	2.7	3.55 tons coke	2,090,000	5s. 10d.

* Obtained on an average week's work with the drying equipment described.

Conclusion

An attempt has been made to give an account of the drying practices used in the foundry industry, and to describe in detail the features applying to the methods and equipment used at the Authors' works, since these are considered to be typical of conditions in the larger ferrous foundry catering for both jobbing and repetitive production. Considerable differences are apparent in the type of equipment and the operating efficiency, while fuel economies may have to take second place where other factors are at stake.

Specific data regarding operating costs in the foundry under review were lacking when this Paper was being prepared. It is suggested that there is a shortage of such information throughout the industry; as a result, many of the drying units do not operate at their greatest efficiency.

Insufficient drying can cause many casting defects and, in a bad case, a total "blow-out" of metal from the mould. In foundry practice there are many other possible sources of defects, and so the opportunity to eliminate one source cannot be ignored. The foundryman does this by establish-

FIG. 14.—*Skin Drying of a Mould by means of a Mond-gas Torch.*

ing a generous factor of safety in drying, especially in the production of large castings where several days may elapse between drying and casting.

Where large numbers of moulds and cores of similar type are produced it is a simple matter to establish optimum drying conditions. Thus, in the repetitive foundry, drying units can be said to operate at the best efficiency within the limitations imposed by the type of plant. In the jobbing foundry, where the size of the work and the properties of the moulding and core-making materials vary greatly, the tendency is to err on the generous side at the expense of fuel economy.

The amount of published work on the subject as a whole is very scanty, and there is obviously considerable scope for investigations in this field of foundry operations.

Developments in foundry drying technique are not limited to the establishment of accurate drying procedures and the use of better equipment. Progress in foundry sand practice has a bearing on the problem. Developments in this field will lead to a reduction in the number of moulds and cores requiring drying, and indeed this trend is already being felt in the foundry. Also, new core-bonding materials are now available which enable shorter drying times and lower temperatures of drying to be used. Thus, it would seem that in the future less drying equipment will be required, whilst the drying that will be done will be of shorter duration, with an attendant decrease in drying costs.

Acknowledgments

The Authors gratefully acknowledge the assistance of their colleagues, particularly in the preparation of photographs and drawings. Thanks are also due to the Fordath Engineering Company, Limited, for supplying information, and to the directors of F. H. Lloyd & Company, Limited, for permission to publish this Paper.

Motorised Hydraulic Tube-bending

Chamberlain Industries, Limited, of Staffa Road, Leyton, London, E.10, have placed on the market a redesigned 2-in. hydraulic tube-bending machine incorporating the noteworthy features of the earlier model. The new machine (overall dimensions 3 ft. 1 in. by 2 ft. 1½ in. by 1 ft. 7 in.) is a neat, compact and entirely self-contained unit, which requires no hydraulic accumulator or airline as the pump is mounted in its own reservoir of selected oil.

The all-steel body forming part of the machine's construction has been designed to ensure maximum strength. The design reduces the floor space to a minimum and gives the operator the advantage of being able to walk around the machine without the interruption of extraneous fittings such as outside cylinder, hose, etc. Thus, from the front of the machine an uninterrupted view is afforded of the work at the "bending head." Hydraulic power is provided by a Beacham high-pressure pump mounted directly above an 8-ton by 10-in. stroke double-action ram unit. The pump is driven by a ½-h.p. electric motor suitable for 220-230 v. single phase, 50 cycles supply, or, alternatively, 400 to 440 v. 3-phase current.

Compensation "Totally Inadequate"

Steel nationalisation was described by Lord Dudley Gordon, chairman of Hadfields, Limited, as "entirely unnecessary and mischievous." Moreover, he said, compensation was "totally inadequate."

In his statement to the shareholders of Hadfields, Limited, presented to the annual meeting on Monday of this week, Lord Dudley Gordon disclosed that a new issue of capital would have been made by the company but for the nationalisation of the steel industry. The strength of the financial position of the company, equipped with what will be almost in the nature of a new works, leaves the directors in no doubt, he said, that an issue of new stock would be fully subscribed without any recourse to public funds.

Regarding compensation, the chairman claimed that the assets of Hadfields, Limited, have a net value of £6,328,820, but the compension to be paid to stockholders when the company is nationalised totals only £3,635,749.

Working of Minerals

A memorandum issued by the Ministry of Local Government and Planning (Stationery Office, 2s.) lays down five guiding principles to be borne in mind by local planning authorities in the control of mineral working.

The memorandum states that mineral deposits likely to be needed should not be unnecessarily sterilised by surface building; the necessary rights in suitable land should be made available to mineral undertakers, if necessary through the use of compulsory powers; working of minerals should be prevented or limited where it would involve unjustified interference with agriculture or other surface uses; proper regard should be paid to the appearance of the countryside; and, wherever practicable, land used for mineral working should not be left derelict.

THE STAVELEY COAL & IRON COMPANY, LIMITED, have failed to reached agreement with the Ministry of Supply on the compensation to be paid, under the provisions of the Iron and Steel Act, in respect of their wholly owned subsidiary, Staveley Iron & Chemical, Limited, and have therefore decided to proceed to arbitration.

Book Reviews

Transactions of the American Foundrymen's Society, Vol. 58. Published by the Society from 616, South Michigan Avenue, Chicago, 5, Ill., U.S.A.

One improvement recorded in the review of the last volume has been maintained, namely, the freedom from the bleeding of the illustrations to the very edge of the leaves. The reviewer always thought this to show a lack of professional dignity. This volume is indeed a monumental work running to nearly 800 large-size pages. Within this compass there are no fewer than 77 technical Papers and Committee Reports. The first 35 pages are devoted to the affairs of the Society. From them there are the following facts of interest to the members of the Institute of British Foundrymen. The membership, which has declined by 1,017 in 1950 as against a loss of 340 in 1949, now totals 8,306. Of this 753 are members of Canadian Chapters, and another 430 are foreign. The Chapter registering the largest membership is Chicago, which has 775 firms and people on its list.

The order of "batting" for this volume is first to give the Edgar Hoyt lecture ("Operation of the Cupola," by Mr. W. W. Levi), and to follow up with the various Exchange Papers. They mount up nowadays! After this come the Committee Reports, and finally the Papers presented at the Annual Congress. The volume has been carefully indexed, which adds very considerably to its worth

Southern and Northern Rhodesia and Nyasaland, by Daniel Broad. Published by H.M. Stationery Office, York House, Kingsway, London, W.C.2. Price 2s. 6d. net.

Whilst one cannot expect publications of this type to resemble a directory, yet when the book is consulted in the Colonies local firms would like to see their name in print. The big banks are so favoured, but not the manufacturing concerns. This book is very interesting and comes from the pen of a man who has lived and worked in the areas for a long time. The standard of English is not as high as is to be expected from a Government publication, and here and there phrases approaching slang are to be found. In the tables, use of the expression "lbs" is to be found, which in the reviewer's opinion is quite wrong. The contents of the book show the Colonies covered to be in a thoroughly healthy condition. It shows where increased business is to be sought, and discloses why present-day cigarettes are somewhat different in flavour from the pre-war supplies. Stress is rightly laid upon the need for the maintenance of high quality in the goods exported from this country. Deterioration has set in and this must be arrested, if profitable business is to be continuous. As non-ferrous metals are to-day much in the limelight the reviewer suggests that those firms affected should acquire a copy of this pamphlet and study the statistics and germane letterpress.

Mechanical World Year Book, 1951 Edition. Published by Emmott & Company, Limited, 31, King Street West, Manchester, 3. Price 3s. 6d.

In earlier issues, this well-known, extremely useful hand-book, always contained a few paragraphs on cast iron. Now that the foundry industry has developed a new series of high-duty alloys—nodular cast irons—it appears to the reviewer that some reference to it would be of real service to engineers consulting their *vade mecum*. Stress is laid in this issue on machinery for increased productivity. The main value of this book always has been and will ever be the huge collection of tables and conversion factors.

New Catalogues

Foundry Plant. We have received from Suffolk Iron Foundry (1920), Limited, of Stowmarket, two catalogues printed in English covering the productions of Alfred Gutmann A.G. für Maschinenbau, Hamburg-Altona, Germany. These catalogues describe and illustrate a very wide range of foundry equipment, the plant which is best known in this country being their shot-blast apparatus. It is for this type of plant that the Suffolk Iron Foundry have obtained the sales agency. This firm have themselves installed a "Whirl Blaster"—an air-less type of rotary-table machine, taking but 12 h.p., for a 9 ft. 2 in. dia. table and readers are invited to visit their foundry to see it in operation. The catalogues are quite well produced, but the phrase "sand-blasting" is now archaic and should be replaced by shot-blasting. There are small translation errors, but the text is not unduly impaired.

Fan Equipment. In the old days, fan equipment in foundries used to be confined to blowing cupolas and furnaces and removing fumes from brass foundries. Now that ventilation has become a major activity in all foundries, much of the equipment described and illustrated in the new catalogues of Keith Blackman, Limited, of Mill Mead Road, Tottenham, N.17, has a new significance. Herein one finds details of various sorts of dust collectors; shop-heating apparatus and man coolers. A separate catalogue covers the "Tornado Extravent" window fan. It is a neat piece of apparatus and no doubt especially efficient for ventilating rooms where an open window invites the entry of much dust. These catalogues are available to our readers on writing to the publicity manager of the Company.

Die Castings. From Scottish Precision Diecastings, Limited, North Hillington, Glasgow, S.W.2, an eight-page booklet has been received, which illustrates some of the more complicated jobs they have successfully produced as die castings—either by the gravity or pressure methods. The illustrations unfortunately give no indication as to size, and a new edition would be improved by the inclusion of a foot rule or the like with each picture. The illustrations taken of the shops are a little on the small side, and at the sacrifice of one or may be two, the reproduction of those remaining would show up to advantage. The front cover is excellent, and the picture of the works frontage gives the reader an impression of a modern factory pleasantly located in a garden.

Core Compounds. The Harborough Construction Company, of Market Harborough, Leicestershire, in leaflet No. 7 detail the purpose and properties of semi-solid and semi-liquid core compounds and core creams. Information is given as to the fixing of suitable mixtures and the establishment of baking conditions. The reviewer notes that temperatures are given in the Fahrenheit scale and wishes the industry would make up its mind whether this or Centigrade should have general application. He favours the Centigrade scale.

Finger Tools. In a leaflet received from the Acra Electric Tool Manufacturing Company, Limited, 123, Hyde Road, Ardwick, Manchester, 12, there are illustrated descriptions of a number of tools and gadgets which are of distinct interest to our readers. The finger tools carrying nuts will appeal to those who have tried to put screws in places difficult of access. As it is difficult to give a word picture of the gadgets, we suggest readers should write to Manchester for this leaflet. Those handling patternplates may find some interest in reading it.

Modern Melting Practices*

Joint Meeting Discussion

Continuing the now long-established practice of holding joint meetings annually, the members of the London branch of the Institute of British Foundrymen were the guests of the London section of the Institute of Metals at their December meeting held at 4, Grosvenor Gardens, London, S.W.1, with MR. E. A. G. LIDDIARD chairman of the London section of the Institute of Metals in the chair.

A welcome was extended by the Chairman to MR. H. S. TASKER, president of the Institute of Metals, who said he was always pleased to attend joint meetings because they effected valuable economy in the time of busy scientists who had so many meetings to attend. He hoped that joint meetings would enjoy increased popularity.

Introducing MR. F. C. EVANS, F.I.M., who was to give his Paper entitled "Modern Melting Practices," the Chairman said he was the only man who had become a Fellow of the Institution of Metallurgists by examination, and one had a very high regard for anybody who could do that. He was also held in high esteem for many other reasons: his excellent work in the field of metallurgy and casting was well known, and he had had long experience in the casting of high-duty alloys.

The Paper was then presented.

Discussion

THE CHAIRMAN, congratulating Mr. Evans, said the meeting was privileged to have heard a masterly review of the subject. One was impressed with the advantages of having a metallurgist possessing first-hand experience of many foundry problems associated with the lay-out and design of foundries. The Chairman was particularly interested in Mr. Evans' view that electric melting was bound to extend.

Referring to the slides (Tables I and II of the article printed in the JOURNAL) showing relative total costs of melting in different types of furnaces, he said that, although maintenance, metal losses and fuel costs had been considered, no mention had been made of capital charges. No doubt the Author had considered that angle; but one's impression was that electric furnaces, although very efficient and very accurate, involved much higher capital charges than any other types of furnace. The Chairman wondered how that affected the general picture. He also asked whether Mr. Evans would agree that, where melting procedure had to be such that an oxidising/reduction cycle was needed, the older methods of melting might be more advantageous.

* Paper presented by Mr. F. C. Evans to a joint meeting of the London branch of the Institute of British Foundrymen and the London section of the Institute of Metals. The Paper was based on one which Mr. Evans gave to the International Foundry Congress at Amsterdam in 1949, part of which was printed in the FOUNDRY TRADE JOURNAL, January 19, 1950. The discussion at this joint meeting mainly centred round the part of the Paper printed in the JOURNAL, and reference to it is advised.

MR. EVANS said he had not forgotten the question of capital charges, but in the presentation of lectures it was wise to avoid quoting prices as these often fluctuated very rapidly. It was quite true that electric furnaces generally were of much higher capital cost than the other types, and if one included capital charges with the overhead on a furnace, this would be a considerable item on the melting cost in the case of electric furnaces. He hoped that the greater use of electric furnaces might enable them to be produced on a more reasonable scale and at lower prices. Certainly prices were high and, quoting figures he had worked out on a previous occasion, Mr. Evans said that for a similar size of unit, a furnace using fuel of a common variety, such as coke or oil, being taken as unity, the electric furnace of the high-frequency type would be between 15 and 20, which was a very considerable difference.

On the subject of the oxidation/reduction cycle, he agreed that with some of the older types it was easier to carry out such refining processes, using ordinary fuel-firing. However, he had confined his remarks to foundry melting furnaces where these processes were not commonly practised. In writing the Paper he had tried to stick to generalities and was glad that he had not tried to include billet-melting furnaces, for otherwise it would have been even longer.

Fuel Efficiency

MR. W. G. MOCHRIE said he had been surprised to learn that the fuel efficiency of the stationary reverbatory furnace described in Mr. Evans' Tables was between 8 and 5 per cent. The capacity was small and he wondered whether Mr. Evans had facts on how the efficiency Table was compiled and whether, for example, any undue time lag had been taken into account in the fuel factor for pouring arrangements. He commended Mr. Evans' remarks concerning the localisation of the pouring points, which permitted the removal of fume nuisance at the source. At to-day's high metal prices, this fume had marketable value.

MR. EVANS said the furnace to which he had made reference was of the fixed reverbatory type, coal-fired, natural draught, of 1,200 lb. capacity and melting gunmetal, having a fuel consumption between 0.29 and 0.39 tons of coal per ton of metal melted and giving an efficiency of 8 to 6 per cent. It was a small furnace for a coal-fired reverbatory type, but it was the only one he could find at the time of the preparation of the chart which could give him the figures and comparisons he needed. He assured Mr. Mochrie, however, that the figures had been taken from an authoritative source, being an actual case included in returns made during the war. Normally, he considered the stationary reverbatory furnace would not reach a greater fuel efficiency than 12 per cent.

Modern Melting Practices

With regard to the localisation of pouring points, he said that the cost depended entirely on whether one referred to a jobbing or a mechanised foundry. In the latter, casting could be carried out on a conveyor and the pouring points could be localised; in a jobbing foundry, especially a non-ferrous foundry, the moulds were laid out on the floor and casting had to be carried out where they lay.

Degassers

MR. A. TALBOT invited the Author to comment further on degassing and the relative merits of degassers.

MR. EVANS said the higher the temperature of any melt, the more gas it absorbed, and the longer it stood the more it absorbed. Most people were familiar with the rule that for making metal as free from gas as possible it was necessary to melt as rapidly as one could, superheat to the pouring temperature, take out quickly and cast.

The relative merits of degassers was a more difficult subject and, furthermore, a long one to discuss. Had Mr. Talbot any special interest, such as aluminium alloys? Generally speaking, he felt that for both aluminium alloys and the copper-base alloys the best method of degassing was with inert gases, bubbling through from the bottom of the melt. Whether or not it was the most convenient or most economical method was another matter. Most founders had to decide whether they wanted their metals completely degassed and whether they wished to go to the expense involved. However, often it was a question of "how much gas one could get away with"; in some jobs a high standard of freedom from gas was desirable, but in many others a small amount of gas in the metal did a lot of good.

MR. DEEKS, speaking of the difficulties he experienced with low-frequency electric furnaces, referred to the necessity for starting with a molten charge and to maintain molten metal all the time while putting solid ingots into it. In his opinion that was dangerous, and also assisted the pick-up of gas. Of equal importance was the necessity to maintain constant supervision of the furnaces during working and non-working hours and the regular cleaning of channels, which he found to be costly in labour and damaging to the refractories. He asked if there were a suitable electric furnace for melting magnesium.

MR. EVANS said most people knew that the great advantage of the low-frequency furnace was when it was operated continuously. It was really designed for billet-casting shops, where they worked round the clock, probably for five or six days a week. There was no doubt, however, that it was used also in foundries where melting was carried out only for eight hours a day. Molten metal had to be maintained in the channel throughout the night, which increased the melting cost very considerably; the problem had to be weighed up carefully, and it was generally found that low-frequency furnaces were not suitable for a sand foundry.

He did not see why the low-frequency furnace should pick up more gas than any other type. The supervision necessary was much the same as with ordinary fuel-fired furnaces; it was not necessary to have a man constantly at the switch. It was true that in the case of the low-frequency furnace the channels had to be cleaned, particularly for aluminium; but in spite of that, the refractory costs for melting aluminium alloys, and brass in particular, were exceedingly low. The problem of cleaning the channels had been solved in a number of ways, and even in the older design, which involved the pulling through of chains, it had been mastered. He was unable to give any information on the subject of electric furnaces suitable for melting magnesium.

MR. CHARLES asked for Mr. Evans' opinion on the use of oxygen for enriching the supply of air in furnaces fired by fuel-oil or gas.

MR. EVANS said the use of oxygen for enrichment of the air supply was expensive; although in various papers the cost of oxygen had been stated as being low, this referred to bulk supply and for small quantities in actual practice it was fairly high. There was no doubt, of course, that the enrichment of air by oxygen in a fuel-fired furnace would greatly improve its performance; but for non-ferrous furnaces this was probably not necessary, because all that one would attain thereby would be a hotter flame, and whether that was desirable in the melting of non-ferrous metals, where the melting point was relatively low, was doubtful. So far as he knew, oxygen enrichment had been used more for steel-refining processes than melting, and that was probably its proper field. He knew of no similar application in the non-ferrous field.

MR. E. WILLIAMS asked if Mr. Evans had any knowledge of fluorine treatment but Mr. Evans replied that he had no knowledge of it as practised to-day.

Standing Time

DR. C. E. RANSLEY, commenting on the so-called deleterious effect of standing time mentioned by Mr. Evans, said that in the case of aluminium standing time was normally beneficial if the temperature was properly regulated.

On the question of oil-firing as opposed to the use of other fuel, particularly producer-gas, he said the water-vapour content of the atmosphere from oil-firing was little worse than that from producer-gas, and the deleterious effect which had been attributed to oil-firing generally arose from the fact that oil tended to be used in the wrong type of furnace. Oil burners were put into reverbatory furnaces designed for producer-gas firing, which resulted in high local temperatures and flaming right on the metal. Provided there was plenty of flame space, however, he felt that the oil-fired furnace was certainly no worse than the producer-gas furnace. One of the main advantages of the induction furnace was that the surface temperature of the metal was below the temperature in the bath; the pick-up of gas was thus reduced to a minimum. The pick-up was, however, also very low in a properly-designed reverbatory furnace.

MR. EVANS agreed with most of Dr. Ransley's remarks and hoped that this agreement was inferred in the data given in the Paper.

MR. HARRINGTON asked what loss of zinc occurred in low-frequency furnaces when standing by during the week-end.

MR. EVANS said the metal maintained in the bath over the week-end was a relatively small proportion —about one-fifth of the capacity of the furnace. If the furnace was of half-ton capacity one would maintain 2 cwt. of metal in the bath, and the zinc loss from that could be but little. Furnaces were so designed that, when filled up after a week-end, the amount of zinc lost was more or less negligible.

Relative Balance of Efficiency Factors

MR. P. T. HOLLIGAN, speaking of the reverbatory furnace, particularly the oil-fired type, said its major disadvantages were the high metal loss and the gas pick-up. Mr. Evans did not appear to have covered the point of melting time, *i.e.*, the speed of melting. It would seem that the actual direct cost per ton of metal, taking into account labour cost as well, was not quite brought out. He also asked if Mr. Evans had information on the effects of different types of oil fuel upon the life of the refractories.

MR. EVANS said the high metal loss and the gas pick-up of the reverbatory furnace should be offset against its higher productivity; the metal could be melted down in a very short time. Whether or not the melting labour was less, however, he could not say. It seemed to him that if one were melting half a ton of metal or more in either crucible or reverbatory furnaces, the same weight of metal had to be charged into the furnace in either case, and if one furnace melted in half the time of the other the same amount of labour for charging would still be required. It meant that with oil-fired crucible furnaces a man might look after three of them, but if he had a high-rated reverbatory furnace, which melted very quickly, he could look after only one. The amount of metal produced per man-hour however would be the same. There was no doubt that the reverbatory turned out more than any other furnace; its melting time was far less. He regretted that he was unable to give details concerning the effect of different types of oil fuels on the life of the refractories.

Melting Copper/Phosphorus Alloy

MR. F. E. TIBBENHAM asked for Mr. Evans' experience of the melting of copper phosphorus alloy containing about 7 per cent. phosphorus. What type of furnace would he recommend for melting 5 or 6 cwt. per day, and how would he alloy the mixture?

MR. EVANS said that the important factor was the poisonous nature of the phosphorus fumes. It was a specialised process and, in fact, there were several ways of doing the job. For example, there was the method of using a lidded crucible and dropping in the phosphorus through a valve at the top; another method, which he believed was practised in this country, consisted of pumping phosphorus vapour through the molten copper.

MR. FORRESTER, referring to reverbatory furnaces, asked what would be the effect on the refractories of melting alloys of high lead content.

MR. EVANS replied that much remained to be learned about the effects of lead on the refractories, particularly in reverbatory furnaces where conditions were sometimes oxidising and sometimes reducing. When dealing with gunmetals, and other lead-containing alloys, such as 80 per cent. copper, 10 per cent. tin and 10 per cent. lead, he had seen some rather peculiar effects on refractory linings; there seemed to be some sort of reaction between the lead oxide and the refractories which often contributed to early failure. He had approached the refractory makers on the matter, but had not obtained much information of interest.

Vote of Thanks

MR. F. E. TIBBENHAM, as president of the London branch offered thanks of the foundrymen to the London section of the Institute of Metals for having arranged a joint meeting; such meetings were very valuable. He hoped that members of the Institute of Metals would not wait for specific invitations to attend meetings of the foundrymen, for they would always be welcome. Proposing a hearty vote of thanks to Mr. Evans for his lecture, he said the members of both bodies had very much appreciated it, as was indicated particularly by the nature of the discussion.

MR. HOLLIGAN, who seconded, said he had been fortunate in that he had been very closely associated with Mr. Evans for some years. Mr. Evans must have concentrated very closely on furnace-design and operation, and the results of that study were manifest in his lecture. It had been most interesting and exhaustive; and although Mr. Evans had said that he had generalised, it was only by generalisation that one could cover so wide a field in the course of a lecture. He had created great interest in various types of melting furnaces.

(The vote of thanks was warmly accorded, and Mr. Evans briefly responded.)

THE CHAIRMAN thanked Mr. Tibbenham for the invitation he had extended to members of the Institute of Metals to attend the London meetings of the Institute of British Foundrymen, and assured him that it was heartily reciprocated so far as the meetings of the Institute of Metals were concerned.

Nickel Discovery in Quebec

A strip of nickel 600 ft. long by 400 ft. wide, described as "an extremely rich vein," has been uncovered in the Burn Creek and Knob lake district, Ungava. Announcing this, Mr. Duplessis, Canadian Prime Minister, said that further exploration will undoubtedly uncover one of the richest nickel fields in Quebec. At the end of the winter 21 geological survey parties are to be sent north to continue scientific study of the whole of the undersoil of the province, thus enabling preparation of plans for future exploitation.

The Deputy Minister of Mines, Mr. Dufresne, stating that they wished to save some of the undersoil resources for generations to come, revealed that Quebec's mineral production, valued at $30,000,000 30 years ago, was worth $200,000,000 last year, and was expected to pass $250,000,000 this year.

Iron Foundry Trade Statistics

Census of Production Report, 1948

This Report on the Iron Foundries Trade relates to establishments engaged wholly or mainly in the manufacture of cast-iron goods of all descriptions, and which employed more than ten persons on the average during the year 1948.

The particulars shown for 1937 and 1935 include establishments mainly engaged in manufacturing steel castings. In those years iron and steel foundries were classified together and, as the firms were not required to give separate details of all steel castings made, it has not been possible to re-classify their returns in accordance with the standard industrial classification.

It is estimated that about 96 per cent. of the total net output of these establishments for 1948 is covered by the returns which have been compiled for inclusion in this report. This trade corresponds to minimum list heading 42 in the standard industrial classification.

Establishments in this trade in Northern Ireland (which are excluded in 1948) accounted in 1935 for less than 1 per cent. of the net output for the United Kingdom.

TABLE I.—*General Summary.*

	1948 (*a*).	1937 (*b*).	1935 (*b*).
	£000.	£000.	£000.
Value of production (gross output) ..	108,601	54,306	39,418
Cost of materials, fuel and electricity used	43,442	23,708	16,121
Amount paid for work given out ..	1,004	339	205
Net output	64,155	30,259	23,092
Wages and salaries of persons employed ..	39,495	—	—
Average number of persons employed (excluding outworkers)	113,577	129,082	110,742
Net output per person employed (excluding outworkers)	£565	£234	£209
Number of establishments	836	—	857

(*a*) Great Britain only. (*b*) United Kingdom.

The values of production and of materials, fuel and electricity used in 1948 are derived in the following way:—

	Output.	Materials, etc.
	£000.	£000.
Total value of sales or purchases	109,262	44,988
Adjustments for stocks and work in progress	+1,449	−1,546
	110,711	43,442
Less payment for transport by other firms	2,110	
	108,601	

TABLE II.—*Stocks of Finished Products, etc., Materials and Fuel in 1948.*

	Beginning of year.	End of year.
	£000.	£000.
Finished products and work in progress ..	5,594	7,043
Materials and fuel	6,394	7,940

CAPITAL EXPENDITURE

TABLE III.—*Plant, Machinery and Vehicles.*

	Acquired during 1948.		Disposed of during 1948.
	New.	Secondhand.	
	£000.	£000.	£000.
Plant and machinery ..	2,399	272	90
Vehicles	215	76	38
Total	2,614	348	128

TABLE IV.—*New Buildings Acquired.*

	1948.
	Amount.
	£000.
Capital cost of new buildings (including extensions, etc.) acquired during the year, excluding site value ..	921

TABLE V.—*Employment, Wages and Salaries.*

	Operatives (average for the year).			Administrative, technical and clerical staff (*a*).			Total.		
	1948 (*b*).	1937 (*c*).	1935 (*c*).	1948 (*b*).	1937 (*c*).	1935 (*c*).	1948 (*b*).	1937 (*c*).	1935 (*c*).
Males :—									
Under 18	4,945	14,509	12,054	507	1,040	708	5,452	15,549	12,762
All ages	90,542	110,297	94,296	9,632	9,125	8,109	100,174	119,422	102,405
Females :—									
Under 18	749	2,276	1,939	929	690	386	1,678	2,966	2,325
All ages	8,843	6,695	5,907	4,389	2,965	2,430	13,232	9,660	8,337
Total :—									
Under 18	5,694	16,785	13,993	1,436	1,730	1,094	7,130	18,515	15,087
All ages	99,385	116,992	100,203	14,021 (*d*)	12,090	10,539	113,406(*d*)(*e*)	129,082	110,742
	£000.			£000.			£000.		
Total remuneration	33,434	—	—	6,061	—	—	39,495	—	—

(*a*) At September 25, 1948, October 16, 1937, and October 12, 1935. (*b*) Great Britain only. (*c*) United Kindom.

(*d*) There were, in addition, 171 working proprietors (165 males and 6 females) in 1949. Working proprietors are included in the 1937 and 1935 figures.

(*e*) The employers' share of contributions to all National Insurance Schemes payable during the year in respect of these workers amounted £910,000.

In addition to the employees in the above table the firms in this trade employed 6 male and 24 female outworkers in 1948, the amount paid them being £2,000. Similar information is not available for 1937 and 1935.

Safety in the Foundry

By *H. Allen**

TO BE ABLE to appreciate what is necessary to operate a safety organisation in the foundry industry, it might be useful briefly to review the type of accidents that statistics show have been recurring in foundries during the past years. Only the dramatic or unusual accident tends to have wide publicity but, as every foundryman knows, the day-to-day risk potentials for comparatively minor injuries that nevertheless cause individual harm and lost man-power, are high. It is these that the safety officer must ruthlessly scrutinise and resolve. Bruised feet caused by the dropping of man-handled castings; foreign bodies in eyes; lumbar and muscular strains; hand and leg abrasions; burns suffered by moulders, casters, dressers and so on, these accidents are listed daily in the works surgery of most foundries. The sepsis potential is great How, in addition to providing first-class medical services, can one reduce both the risk and the incidence?

Speaking as a Safety Officer engaged on accident prevention in a group of foundries, the Author would like to enlarge on some of the hazards and to assess some of the methods found to be effective. It may seem a truism to good foundrymen, but the need for and value of good housekeeping cannot be too strongly insisted upon. In, for instance, a typical sand foundry, innumerable accessories have always to be on hand in view of the varying nature of the work, but where the pouring of metal is done on the spot, it is imperative that gangways be kept clear to allow unrestricted access to ladlemen and furnacemen. On this point the Safety Officer will succeed only if he effectively secures the willing and *sustained* co-operation of everybody in the shop, from foreman to labourer.

Moulding-box Hazards

Although most large foundries are extensively mechanised, there is always the need for much manual handling, and here is a fruitful sphere for the Safety Officer's activities. Moulding boxes should be frequently inspected for rough edges—too often, metal plates reinforcing wooden boxes jut out and cause a jagged edge which can injure the operator and also, in the case of a crane-lifted box, cause dangerous chaffing of ropes. The wooden edges of the box should also be regularly treated to avoid splinters.

Other recurrent factors causing lacerations are flash and fraze on castings, especially on die-castings. Here personal experience is that the best preventive method is, where practicable, to provide protection for the hands. Dressers and viewers should wear gloves, but sound glove maintenance is necessary and replacements must be issued as soon as holes are caused. Here again, the willing co-operation of employee and supervisor is essential, but it is desirable to have some clearly understood rules about the use (and abuse!) of gloves.

With regard to strains and sprains, many of these could be avoided if jobs were allotted more carefully.. Where weight-lifting is concerned, the physique of the operative must be taken into consideration and this is especially important when a gang is being formed to work on joint lifting. It all seems so obvious but statistics show how distressingly frequent are the results of not doing the elementary common-sense thing, and it is a fact that chargehands and even foremen, have to be reminded of the need for employee selection.

Hand tools provide yet another sphere for the Safety Officer's enquiring eye. Only those who know the inside of a foundry know just how decrepit some tools are allowed to become. File handles split so that the tongues of the files project; hammers splintered beyond recognition, and so on,—all can represent a serious accident risk. It is suggested that chisels be used with ferruled heads to prevent "mushrooming" for it is not common practice in foundries to keep the heads ground.

Risks from Chemicals

Handling of chemicals also needs routine and standardised behaviour. Sodium, for instance, is frequently left lying accessible to atmosphere and sometimes an employee obtaining a supply has to cross from one shop to another, with exposure to the weather *en route.* Proper containers should be used, clearly marked "Sodium" and stating that it must be kept away from moisture. An adequate lid must be fitted. To take care in the handling of metal fluxes should be a constant injunction and the use of degassing powder and tablets can prove hazardous unless furnacemen are trained in correct handling. Indeed, a vast number of these burns and injuries could be avoided if operatives would establish certain safety habits. The Author's technique is to organise a routine "safety talk" to all new employees, separating men, women and juveniles, as all require a slightly different approach. To each operator, whose job is in every case known to the Safety Officer, it outlined the hazards to be encountered and necessary job-habits required.

Burns

Burns will occur with lamentable frequency unless there is this rigid care on the part of the employee. How many times have explosions resulted from the putting into a pot of metal of a damp ladle or ingot; how often is a hot casting mistaken for a cool one? As with burns, so it is with foot injuries; in spite of the many excellent boots now on the market and guaranteed for safety by standard specifications yet all too many operatives reject the safety boot. It must be the Safety

* The Author is Safety Officer, Birmid Industries, Limited.

Safety in the Foundry

Officer's relentless concern to preach the gospel of safety footwear.

Another personal favourite gospel of essential protective wear is in the sphere of eye protection. Statistics have proved that the majority of foreign bodies in the eyes do not occur to grinders who must wear the goggles provided under the Grinding of Metals Order, but to dressers. The Author has long advocated the use of eye protection for all engaged on dressing castings. Knocking-out can also cause eye injuries and here it is found that the best protection is afforded by a wire-basket type of goggles which is capable of withstanding a blow from the occasional chip of metal which is likely to be dislodged from the casting.

Machinery

Machinery presents a field where the Safety Officer can more completely implement the industrial-safety dictum "guard the machine not the operator." Much interesting experiment has been going on in connection with pressure die-casting machines but no perfect method has yet been devised to protect either the worker from the closing dies or against metal splash. However, guards of an interlocking type have proved considerably effective and the use of these taken in conjunction with the intelligent training of the operators, should notably reduce the accident risk.

Moulding and core-blowing machines have the same hazard in the risk of a trapped hand but where a repetition job with a standard-size box is being produced, the clearance should be adjusted to a minimum. Another machine that needs attention is the sand mill. On this machine a metal grill should cover the periphery, while an extended chute should be fitted to prevent operators from putting in their hands to dislodge sand. Conveyors should carry emergency stop buttons of the type that once pressed, have to be reset before the plant can be re-started.

Stoves

Finally these is one hazard which, as readers of the JOURNAL will know, caused the death of a core attendant in a drying stove. As a result of this accident the Author's company has developed an escape hatch which was fully described at the time. It permits escape from the stove and its value is that no bolt or catch is used; the hatch is held in place by gravity and a small window of mica is fitted in the centre. Every stove should have an escape arrangement fitted, as that ghastly accident proved. Generally speaking, however, the Safety Officer in the foundry has to anticipate and take steps to prevent—not so much the spectacular type of accident—but those of the trivial daily round. A good safety organisation ought to be able to reduce the incidence to a low rate that both management and individuals will appreciate.

H. M. HOBSON, LIMITED, have had plans approved to carry out extensions to their foundry at Hobson Works, Fordhouses, Wolverhampton.

Founders Company Fellowship

The Worshipful Company of Founders of the City of London, to whom Ordinances were granted as long ago as July 29, 1365, was originally formed for the purpose of ensuring that work by founders in the City of London should only be with good metal. The Company believing that the development and progress of founding and the science of metallurgy must depend very largely on attracting to the industry highly trained men of evident talent. To that end the Company awards Fellowships so as to give facilities for advanced education to men who have already completed their normal course of training. Such training to have been at a University or to be at least of a high educational standard.

These Fellowships, which are called "Founders Company Fellowships," are available to those candidates who appear likely to be able to make good their careers in the founding industry if afforded the facilities for further courses of study designed specially to qualify them towards that end.

Fellows are chosen by a selection committee from among applicants who have completed such training as mentioned above, in chemistry, physics, metallurgy (more especially in connection with molten metal) and allied sciences. In addition to this, some previous practical foundry training and experience together with, if and when possible, the Diploma of the National Foundry College would carry weight with the selection committee. At the same time the committee pays considerable attention to the character and powers of initiative of the candidate.

The course to be followed by the Fellow will in each case be chosen with the object of adding to his scientific equipment that which appears to be most necessary for adapting him to some branch of the founding industry. There will be no limitation to the nature of the course which may be selected; it might include research, a period in works or foreign experience; due regard being paid to the particular wishes and aptitude of the Fellow.

The normal value of the Fellowship is £300 per annum and it will be renewable for a second year and in special cases for a third year. Payment will be made monthly in advance to the Fellow's bank. One Fellowship is granted each year so that in ordinary circumstances there are two Fellowships in existence. The Fellow will be expected to devote his whole time to work approved by the Company and to submit periodical reports of progress, if required. No other work for which payment would be received shall be undertaken by him without the consent of the Master of the Company and no other grant, scholarship or fellowship shall be held concurrently with the Fellowship unless the selection committee approve.

Candidates should not be less than 21 years of age on September 1 of the year of application and will be required to furnish particulars of their name, address, age, academic and/or other training, etc., etc. They will subsequently be required to attend before the selection committee.

The tenure of the Fellowship dates from September 1.

Applications must be received not later than May 1 by the Clerk of the Worshipful Company of Founders, Founders' Hall, 13, St. Swithin's Lane, E.C.4, to whom all enquiries should be addressed. The Company does not bind itself to award a Fellowship in any one year.

MR. CARL G. SPORRON, foundry manager to the Iron Refining Company, Hälleforsnäs, Sweden, has been visiting British malleable and grey ironfoundries and has now returned home *via* Holland, where more plants are to be inspected.

Foundry Conditions in Great Britain*

By J. W. Gardom, M.Cons.E., A.M.I.Mech.E., F.I.M.

(*Continued from page* 156)

Moulding Sands

Alterations in the type of sands used and in sand practice generally during the past ten years have been largely occasioned by the introduction of mechanised sand preparation plants and the development of machine moulding. As far as hand moulding is concerned no particular development has been made in the sands employed, apart from generally improved methods of sand preparation, for while the advantages of synthetic sands are realised the inherent difficulties arising from drying out and in patching when these sands are employed for hand moulding has resulted in natural sand continuing to be used almost exclusively for this purpose. It is rare, however, to find a naturally-bonded sand with less than 10 per cent. of the sand grains passing the 150 mesh sieve and, in practice, this means that in using such a sand the foundryman is confined to an A.F.S. permeability number of about 50. Such sands, while giving very satisfactory results when hand rammed to a degree of hardness proper with respect to the contour of the mould, do not lend themselves to the uniform ramming on moulding machines and Sandslingers. The mechanised production of moulds has resulted, therefore, in sands having greater permeability and, generally speaking, greater strength and plasticity. While these requirements have best been met with synthetic sands their use is by no means universal and regard has always to be had to conditions peculiar to a particular foundry, the class of work being made and the locality. In many cases the choice of a sand is dictated more by economic consideration relating to supply than to anything else.

Semi-synthetic Sands

A fairly common practice is to use a semi-synthetic or controlled sand in which case the base sand is naturally bonded and to this is added a silica sand, usually of a coarser grading, to control the permeability, and a colloidal clay such as bentonite to control the green strength. This practice retains the advantages of a synthetic sand from a control point of view, together with economy in new sand, while obviating difficulties arising from a short moisture range and a poor skin finish when using a synthetic sand. Additions of cereal or other binder are also made to the sand to increase plasticity or to counteract any tendency to dry out.

The use of coal dust in iron foundry sands continues to be almost universal but during the recent war the shortage of this material promoted some research into the possibility of using wood dust as a substitute.[13]

Since that time the valuable properties of wood dust in moulding sands on their own merit have been recognised and many foundries are using this exclusively, claiming a more mouldable sand, lower expansion properties and cleaner working conditions. Another material used to replace coal dust is pelleted pitch, but reports on this material in actual production are somewhat inconclusive, some foundries complaining of troubles from high dry strength and a tendency to promote bad mould conditions on casting.

For mechanised production, the advantages of a unit sand are obvious, but in practice, quite apart from any economical considerations, it has not been found possible to work such a system in all mechanised plants. The reason for this is undoubtedly bound up with hot sand which remains a problem in many mechanised sand plants. Attempts have been made to overcome this trouble by introducing water mist sprays, and installing large sand storage bunkers, but the difficulty with the latter is to ensure even extraction, especially when the sand enters at a high temperature. Some improvement has been made by installing an automatic batch measurer at the mixers so that milling time is increased without an increase in the mill cycle, and another alternative is to cascade the used sand through a cooling tower. A further method which has been successfully applied is to blow compressed air through the storage hoppers.

Developments in Sands

The use of substitutes for coal dust has already been mentioned. In addition, much work has been directed towards the various types of clays and their properties are becoming better understood. It has been shown, for instance, that better properties are obtained from prepared moulding sand when the clay bond is added in the form of a slurry rather than in the form of a dry powder. It is considered that if "wet water," *i.e.*, water which has been treated with a wetting agent such as is used in flotation processes, is added to moulding sand it will be possible to develop satisfactory green sand properties at a much lower moisture content and also to effect a reduction in the amount of clay bond necessary. In this connection, it can be reported that experimental equipment for preparing and delivering a slurry of coal dust and bonding agent has been designed by the Author's company and is at present undergoing trials.

Core Sand

Grades of sands used in coremaking vary enormously and may be heavily-bonded natural sands or pure silica sea sands. In the light of better knowledge, however, the general tendency is to use silica sands exclusively for coremaking. The core binders employed in Great Britain can be classified as follows:—(1) Drying and semi-drying oils; (2) cereal binders; (3) emulsions and compounds; and (4) clays. These materials are nearly always used in

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

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combination with one another and are sold under a variety of trade names.

The basic principle is that an oil which polymerises readily is used in conjunction wtih a suitable binder to develop green strength. Until the outbreak of war in 1939, the drying oil almost exclusively in use was linseed but the exigencies of the wartime situation and the immediate post-war period rendered the supply of this material very difficult and the cost became prohibitive. It followed, therefore, that considerable research was devoted to the problem of obtaining a satisfactory substitute for linseed oil and wide ranges of vegetable, animal and mineral oils were examined with varying success. It was found difficult to substitute completely another oil for linseed but certainly very large savings were made possible by substituting petroleum extract, for instance, for a portion of the linseed.

The most important advance in recent years has been the development of synthetic resins as core binders,[14] and there seems to be every prospect that they will prove to be lower in price than, and superior in performance to, linseed oil. However, much work is still to be done before these materials become extensively used and there is some prejudice against them on account of their rather unpleasant smell.

Another core binder produced within recent years is an air-drying compound and while this material has certain limitations it seems ideal for small, fairly simple, cores. However, it has not met with any wide-scale adoption, mainly due to the conservatism of most foundrymen in Britain. The use of green-sand cores is being successfully practised by some foundries and the Author is of the opinion that this method could be much more widely adopted. He considers that too much stress has been laid upon the need for developing high strength and hardness in cores with a consequent increase in cost. Handling of green-sand cores is, of course, more difficult, but as in the case of the air-drying compound it is possible, in many cases, to arrange for coremaking to proceed side by side with moulding.

Metal and Melting Practice for Cast Iron

In no field has there been a greater advance than in that of cast iron over the past ten years. This has been particularly the case in the production of high-duty irons which now represent a large percentage of the total output of cast iron and have proved under service conditions that they can successfully replace steel castings, malleable castings and steel forgings in purposes for which the latter materials were previously used exclusively.

While the technical development of high-duty cast irons was already well advanced in the 1920's and their manufacture fairly well understood long before the outbreak of war in 1939, the engineer maintained a traditional attitude of distrust and suspicion of anything called "cast iron" and continued to specify castings in known and trusted materials. When, however, the British war effort began to get under way in 1940 and 1941, a shortage of castings began to make itself felt and in no case was this more acute than in malleable castings. The only feasible alternative was high-strength cast irons and from that time onwards these materials found increasingly wide application in most engineering fields. Thus foundries melting high-steel mixtures and irons alloyed with nickel, copper and chromium became increasingly common and tensile strengths in excess of twenty tons per square inch were the order of the day.

Technical Control

All this resulted in a higher standard of technical control for cupola-melted metal than had previously been generally obtained—materials entering the cupola were weighed and analysed, blast volumes were measured and recorded, greater care was exercised in preparation of the furnace. Regular tests were taken for analysis and to measure chilling propensities while the principles of quality control were used to keep chemical and mechanical values between specification limits. In this connection it might be mentioned that a report on control tests for cast iron was drawn up by a sub-committee of the I.B.F.[15] For the first time the cupola began to be widely used as a precision instrument and it has been proved that with care it may be used to give close control over metal properties. Recent advances in cupola operation and design, together with notes on special cupolas, have been ably dealt with by W. W. Braidwood.[16]

As far as the production of ordinary grey cast iron is concerned, this has proceeded on much the same basis as previously but for light castings there has been a tendency to use irons of lower phosphorus content. As previously mentioned, during the war a number of foundries turned over to the production of high-duty irons and a difficulty arose in the case of those foundries desiring to maintain their output of light castings normally cast in phosphoric foundry iron. The difficulty was very notably overcome by using a standard cupola mixture for both high-duty and light castings and castings normally made in a high-phosphorus iron were successfully cast with cupola mixtures containing steel of the order of 20 per cent. It has now been demonstrated both experimentally and in practice that it is unnecessary to use high phosphorus contents in order to obtain high fluidity and thus there is a general tendency to avoid highly phosphoric irons.

Raw Materials.—The increase in the production of castings, generally resulting mainly from the introduction of mass-production methods to the foundry, continued throughout the war and particularly in the immediate post-war period. The net result has been a shortage of raw materials, particularly pig-iron, cast-iron scrap and coke and, apart from the shortage, and possibly because of it, there has been an apparent deterioration in the quality of these materials. Pig-iron has tended to be lower in total carbon content, less consistent in analysis and, it has been maintained in certain quarters, has undergone a change in inherent properties. In the case of coke, the average fixed carbon is lower, the ash content higher, the reactivity higher and the shatter value lower.

All such matters are under discussion with producers and it is hoped that an improvement will result. At the same time there has been a tendency for the percentage of waster castings to increase in many foundries and the foundryman has had no hesitation in ascribing this to the afore-mentioned deterioration.

It seems more likely, however, that the human element is largely responsible, and in this regard one includes not only the operatives, but also the metallurgist, who too often does not seem to exhibit the degree of technical appreciation which could be expected.

New Cast Iron

It is necessary to make a reference to the discovery and production of nodular iron which metallurgists in Great Britain regard as one of the greatest metallurgical discoveries of the century. The discovery was made by Morrogh[17] and his co-workers at the B.C.I.R.A. during research on graphite formation, the original method of production involving treatment of the iron with cerium. This latter method, however, proved to have certain disadvantages in practice and following some work in the United States of America an alternative and, in some respects, superior treatment was developed using magnesium. A third type of nodular is obtainable by the heat-treatment of either of the products obtained by the afore-mentioned methods. The outlook for nodular iron and cast irons in general has been summarised by P. A. Russell in a recent Paper,[18] when he suggests that nodular iron "is a new material with its own characteristics which should not be regarded as a competitor for other ferrous materials, but something which will do what neither flake-graphite iron, nor malleable cast iron, nor possibly steel, can do at present.

Steel

While the bulk of the production of steel castings during the last ten years has been in normal grades of steel, starting with the war, increasing quantities of castings in wear-resisting, heat-resisting and corrosion-resisting steels have been produced. During the war, very large quantities of alloy steel were produced for tank and armoured-vehicle components and also for aircraft production. Typical examples of steel castings produced in enormous quantities during the war are manganese-steel track links[11] for tanks and pivot brackets for aircraft undercarriages. During the post-war period large quantities of corrosion-resisting steel castings have been made for chemical plant, hydraulic and steam plant, while the development of jet and gas-turbine engines have opened a new field for heat-resisting high-alloy steels.

The increasing production of foundry steels from the electric direct-arc furnace has continued since the 1914-18 war, but during the last war there was a very marked increase in the production of steel by the Tropenas converter process. The technique of operation of the converter process was greatly improved by close control of cupola operation, raw materials, etc., and by standardisation of the blow resulting in a product which was claimed to be comparable with good electric-furnace steel.[19] The rapidity of the process and the very large output possible from a relatively small floor area made the converter very suitable for foundries producing large quantities of repetition castings. It was further claimed that steel made by the converter process had greater fluidity than similar steel made by other processes. However, at the end of the war, the high metal loss and the large number of personnel required for the converter made the electric furnace to be preferred.

During the last decade, basic-lined electric furnaces have been most usual, but continual arguments have arisen over the relative quality of steels produced by acid- and basic-lined furnaces respectively. Taking into consideration the raw materials position it seems probable that better quality steel can be produced from the basic furnace, but the acid process has much to commend itself on the grounds of rapidity and some foundries are installing acid furnaces for this reason.

Productivity Reports

A review of this kind would not be complete without reference to the two reports recently published in Britain[8, 9] following visits to the United States of America of teams of foundrymen representing the steel castings and jobbing grey-iron foundry industry. It should also be recorded that a similar team of brassfounders is expected to publish a report in the near future.

The objects of these visits were to examine American production methods, equipment and conditions to ascertain what improvements could be made in the productivity of British foundries. It would be inadvisable to attempt any précis of these reports in the space available here, but in the Author's view the reports clearly show that the two main reasons for the higher productivity in American foundries are, first, the greater determination of management and labour to achieve high production, and, secondly, a greater power consumption per man employed.

So far as the technical aspects of the reports are concerned, most features of American metallurgical, sand and foundry practices are well known in Britain, although, undoubtedly, many of them are not so widely adopted for commercial or technical reasons, or, too frequently, for no good reason at all. It is true to say, however, that the steel foundry industry through its trade association is making every effort to implement the recommendations of the report, and no doubt similar action will be taken by the ironfounders whose report has only just been published.

Conclusion

In conclusion, the Author hopes that this review of some features of the foundry industry in Great Britain may serve to stimulate a useful discussion. Unfortunately, he has no intimate knowledge of the industry in South Africa, but it appears to be a

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developing one which has the opportunity of benefiting much from the experience gained in Britain and elsewhere.

Finally, the Author understands that this Paper is to be presented to the South African Branch meeting by Mr. Goyns, whose own Paper was so well received at the Institute's Annual Conference in Buxton last June. He would, therefore, first like to express his thanks to Mr. Goyns for undertaking this duty and, secondly, to congratulate him on his own Paper.

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Annual Movement of Wholesale Prices

The following table, taken from the "Board of Trade Journal," shows the annual movement of wholesale prices of industrial and building materials, expressed as percentage increases on the figure for 1930=100. The figures for 1938 are given for the purposes of comparison.

Group.	1938.	1945.	1946.	1947.	1948.	1949.	1950.
Coal ..	123.2	237.0	244.0	251.7	297.4	*303.8	304.5
Iron and steel	130.1	188.8	209.2	221.5	235.6	252.9	260.8
Non-ferrous metals	94.4	127.1	150.9	222.5	241.7	255.3	337.1
Chemicals and oils	94.7	149.3	148.3	175.6	190.7	191.1	208.4
Building materials	104.1	157.5	173.9	203.5	218.9	224.6	230.8

* Amended

B.S.A. Expansion

Plans for the expansion of Birmingham Small Arms Company, Limited, were announced last week. B.S.A. Tools, Limited, an associated company, will transfer its plant from its Redditch factory to a factory at Sparkbrook, Birmingham. This will enable the company to cope with orders for £2,500,000 worth of high-priority machinery and will also permit the expansion of the parent company.

To avoid dislocation, the move will extend over a period of 12 months. The equipment involved was acquired from Germany after the war in the form of reparations.

BORAX CONSOLIDATED, LIMITED, announce that due to increased costs at our mines, higher dock charges and ocean freights on raw materials, a substantial increase in wages at refineries abroad as well as in this country, increases in delivery charges, etc., prices are to be raised as from March 12, borax (ordinary decahydrate) and Neobor (pentahydrate) by £2 10s., Dehybor (anhydrous borax) by £3 10s., and boric acid by £4 per ton.

Notes from the Branches

Middlesbrough

In January, an interesting lecture was given to the Middlesbrough branch of the Institute of British Foundrymen by Mr. L. Smith of Imperial Chemical Industries, Billingham, on "Some Interesting Failures of Metals in Fabrication and in Service." The lecturer pointed out the very onerous conditions of service which were demanded from metals used in connection with the manufacture of acids and corrosive materials. From necessity, chemical manufacturers have built up metallurgical research stations to assist in providing the most economic materials for new processes and also for improving old processes. He realised that the Institute was mainly interested in casting and founding technique, but felt sure that they would like to hear something of the work of metallurgists in the chemical industry.

Much of the knowledge which was obtained came from the examination of failures and whilst his main job was to prevent the necessity for post-mortem examinations by seeing that failures did not occur—very few metallurgists had been able to obtain perfection in this direction. Mr. Smith went on to describe the development of corrosion-resisting steels; which were originally known as stainless steels. Many of these failed during operations whilst the plant was being fabricated, one of the main troubles which arose being "weld decay." It was later discovered that this was not due to the process of welding as the same effect could be reproduced in articles which had not been welded, provided they had been heated to and cooled from a certain range of temperature. Tests and trials which had been carried out to try and remove this trouble were described. Other prevalent sources of trouble were fatigue and corrosion fatigue for which the reasons were:—(*a*) Alternating-stress conditions; (*b*) the effect of sharp corners, holes, etc. (this being far greater under fatigue than under static conditions) and (*c*) service life under fatigue was so much affected by the precise condition of the material. Mr. Smith went on to describe the various effects of corrosion fatigue.

The lecturer closed by asking his audience not to feel that a metallurgist in a chemical factory spent all his time investigating failures. Many items used in chemical factories were made from ordinary materials and gave normal service.

The PRESIDENT, Mr. L. Johnson, then invited members to contribute to a discussion. It became quite apparent that all present had been extremely interested in the remarks put forward by Mr. Smith and a lively half-hour ensued. Many of those present, it seemed, had experienced troubles similar to those described by Mr. Smith and were very keen to discover whether they could remedy faults on the lines suggested.

MR. MARSHALL described the fracturing of a pipe which was carrying pitch at a temperature of 200 deg. F. and MR. SMITH said that this could have been caused by stress fatigue. The piece of pipe concerned had been by-passed but Mr. Marshall felt that when it was replaced a similar state of affairs might again result but Mr. Smith suggested that before the pipe was put into service again it should be stress-relieved.

Many cases of faults in services were then discussed and it was clear that founders themselves were not always aware why their products failed when they were used under abnormal conditions. They also showed how eager they were to make improvements and, far from resenting criticism, welcomed it.

Mr. Johnson, in closing, proposed a vote of thanks saying that Mr. Smith had helped him on many occasions and that the lecture was one of the most interesting given for some time.

Chemistry Research Board Metallurgical Activities

The activities of the Chemistry Research Board, outlined in their report for 1949 (HM Stationery Office, price 3s.) and amplified in the report of the Director of the Chemical Research Laboratory, include a number of investigations having metallurgical interest. Among other things attention is drawn to the development of an inhibitor of corrosion consisting of sodium benzoate with a smaller proportion of sodium nitrite. This it is stated has been used effectively in glycol antifreeze mixtures in the cooling systems of motor vehicles having cast iron cylinder heads and blocks with the usual assembly of other metals. A new investigation undertaken during the year on behalf of the British Shipbuilding Research Association is concerned with the study of boiler-tube corrosion, already described in these columns.

The Microbiology Section it is stated now maintains cultures of industrially important bacteria and fundamental work on sulphate-reducing bacteria is revealing the conditions of their growth requirements and the reactions by which sulphate becomes reduced to sulphide. Work for the Division of Atomic Energy, Ministry of Supply, on the analysis and concentration of uranium in minerals and ores has been continued on an increasing scale and mention is made of the development and application of methods, based on solvent extraction in conjunction with the use of cellulose and other solid adsorbents, for preparing and analysing inorganic substances, including uranium products. The Laboratory is also giving substantial help in problems concerned with the enrichment of low grade ores of valuable metals.

Europe's Iron-ore Requirements

The Iron Ore Working Group of the United Nations Economic Commission for Europe met recently in Geneva to examine Europe's coming requirements of ore. It was said that while the principal ore-producing and exporting countries would have 3.4 million more tons of ore available in 1953 than previous figures had shown, this would still leave a deficit. The group asked countries to supply new data which would show quality-by-quality estimates of ore requirements and availabilities for 1953.

According to present plans, Europe expects to produce 15 per cent. more pig-iron in 1953 than in 1950. While many ore-producing countries are planning for a greater output of ore, the development of ore production takes a long time. The governments in the framework of E.C.E. are therefore concentrating on ore production in 1953 and after, hoping, by gauging demand prospects for that date, to give indications to producers which would help them in their planning.

Wills

BEALE, LT.-COL. HARRY, formerly inspector of works for Swan, Hunter & Wigham Richardson, Limited ...	£28,698
TINSLEY, HENRY, founder of H. Tinsley & Company, Limited, scientific instrument makers, of London, S.E.	£24.320
WATSON, GEORGE, an expert iron-ore sampler, formerly of J. & H. S. Pattinson, analytical chemists, of Newcastle-upon-Tyne	£1.261
CURRAN, JOHN, managing director of Edward Curran & Company, Limited, enamelled steel hollow-ware manufacturers and structural engineers, of Cardiff	£274,849
HANKINS, DR. G. A., director of Mechanical Engineering Research in the Department of Scientific and Industrial Research since 1947, designer of the first supersonic wind tunnel	£7.872

Future Shortage of Metallurgists?

The Ministry of Labour and National Service has issued the twelfth and last of the series of reports, prepared for the Technical and Scientific Register of the Ministry, on the present and future demand for the supply of workers with professional or equivalent qualifications in science, engineering, architecture and surveying. The new report deals with metallurgists. It is mentioned in the conclusions reached, that while it will be appreciated that exact forecasting of future supply and demand for professional personnel is not practicable, the inquiry indicates that the supply of qualified metallurgists during the next five years will not satisfy the demand. The supply of trained metallurgists for research and teaching seems likely to be adequate; the shortage will be felt most in those sections of industry dealing with production and development. Active and urgent consideration should be given by those concerned to the question of whether the training of metallurgists intending to enter industry is best suited to the needs of the times. Efforts should be continued to interest school teachers and scholars in the possibilities of a career in metallurgy. It is emphasised that the position should be reviewed again before the end of the period under review, 1950-54. The report does not discuss salaries for metallurgists. The future shortage would doubtless be less acute if the generally low rate of remuneration paid to qualified metallurgists was raised. The future supply situation would also be helped by more general readiness on the part of industry to engage graduates without "Honours" who are suited by temperament and personality for an industrial career outside the laboratory; men so engaged would complete their industrial training on the job. The report is obtainable from the Stationery Office, price 4d.

Obituary

MR. FREDERICK LOUIS RISEBROOK, who was in business as a lock maker at Willenhall (Staffs), for many years, died on February 1 at the age of 76.

MR. JOHN HENRY BRODIE, who was rolling-mill manager for Stewarts and Lloyds, Limited, at Corby (Northants) from 1934 until he retired in 1946 after 52 years' service with the company, died on January 25, aged 69.

MR. T. MURRAY, who has died suddenly at his home at the age of 70, was employed in the light foundry department of Glenfield & Kennedy, Limited, for 45 years and until his retirement in 1943 was staff foreman in that department.

VICE-ADM. C. V. USBORNE, chairman of Tungum Sales Company, Limited, Cheltenham, and an underwriting member of Lloyd's since 1934, died on January 30 at the age of 70. During his service with the Royal Navy he was responsible for three inventions—an early form of the paravane (a device for protection against mines), a quick-firing anti-aircraft gun, and a gunnery indicator.

SIR EUSTACE TENNYSON d'EYNCOURT, Bt., FRS., an eminent designer of ships and formerly Director of Naval Construction at the Admiralty, died on February 1 at the age of 82. He was head of the Admiralty committee which produced the first tank and was vice-president of the Tank Board in 1918 and a member of the War Office Tank Committee, as well as a member of the Advisory Committee on Aeronautics during the 1914-18 war. Among the ships Sir Eustace designed for the Royal Navy were the battleships Nelson and Rodney.

British Blast Furnaces in the December Quarter, 1950

These tables are published through the courtesy of the British Iron and Steel Federation.

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of last quarter, 1950. Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.	Weekly average in blast.	Total existing at end of quarter.
Clay Cross	—	—	1	—	1	1	2
Ford Motor	—	—	1	—	1	1	1
Holwell Iron	—	1	2	—	3	3	4
Kettering Iron & Coal	—	—	1	—	1	1	2
New Cransley Iron & Steel	—	—	1	—	1	1	2
Renishaw Iron	—	—	2	—	2	2	2
Sheepbridge	—	—	1	—	1	1	1
Stanton Ironworks: Stanton-by-Dale	—	—	5	—	5	5	5
Staveley Iron & Chemical	—	—	4	—	4	4	4
Stewarts and Lloyds: Corby	—	4	—	—	4	4	4
Wellingboro' Iron	—	2	—	—	2	2	3
Total	—	7	18	—	25	25	30

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Name of firm.	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.	Weekly average in blast.	Total existing at end of quarter.
Brymbo Steel	—	1	—	—	1	0.6	1
Darwen & Mostyn	—	—	—	1	1	1	2
Lancashire Steel Corp'n	—	2	—	1	3	3	4
Total	—	3	—	2	5	4.6	7

North-West Coast.

Name of firm.	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.	Weekly average in blast.	Total existing at end of quarter.
Barrow Ironworks	2	—	—	—	2	2	2
Charcoal Iron	—	—	1	—	1	1	1
Millom & Askam	2	—	—	—	2	2	3
United Steel: Workington	2	—	—	—	2	2	3
Total	6	—	1	—	7	7	9

Lincolnshire.

Name of firm.	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.	Weekly average in blast.	Total existing at end of quarter.
Appleby-Frodingham	—	8	—	—	8	8	8
Lysaght, J.: Scunthorpe	—	4	—	—	4	4	4
Thomas, R., & Baldwins: Redbourn	—	2	—	—	2	2	2
Total	—	14	—	—	14	14	14

North-East Coast.

Name of firm.	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.	Weekly average in blast.	Total existing at end of quarter.
Cargo Fleet Iron	—	2	—	—	2	2	2
Consett Iron	1	1	—	—	2	2	3
Dorman, Long: Acklam	—	3	—	—	3	3	4
Redcar	—	2	—	—	2	2	2
Cleveland	—	2	—	—	2	2	5
Bessemer	—	2	—	—	2	2	3
South Bank	—	—	—	2	2	2	4
Grangetown	—	—	—	—	—	—	2
Gjers, Mills & Co.	2	—	—	—	2	2	5
Pease & Partners	2	—	—	—	2	2	3
Skinningrove Iron	—	2	—	—	2	2	2
South Durham Steel & Iron	—	2	—	—	2	2	3
Total	5	16	—	2	23	23	38

Scotland.

Name of firm.	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.	Weekly average in blast.	Total existing at end of quarter.
Bairds & Scottish Steel: Gartsherrie	1	1	1	—	3	3	5
Carron	—	—	1	—	1	1	4
Colvilles	—	3	—	—	3	3	3
Dixon's	—	—	2	—	2	2	6
Total	1	4	4	—	9	9	18

South Wales and Monmouthshire.

Name of firm.	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.	Weekly average in blast.	Total existing at end of quarter.
Briton Ferry Works	1	—	—	—	1	1	1
Guest Keen Baldwins: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	2	—	—	2	2	3
Steel Co. of Wales: Margam	—	2	—	—	2	2	2
Total	2	6	—	—	8	8	10

Export Licensing Changes

The Board of Trade has announced that from February 12, the export of iron and steel goods under Open General Licence will be permitted only if the value exceeds the value of the iron and steel content, calculated at £21 per ton. This licence applies to iron and steel goods specified in Group 6 (2) of the First Schedule to the Export of Goods (Control) (Consolidation) Order, 1950. Under a previous similar licence, which is revoked, the value was £16 16s. per ton. Exporters' inquiries regarding this licence should be made to the Export Licensing Branch, Board of Trade, Regis House, King William Street, London, E.C.4.

Under an Order made by the Board of Trade, coming into operation on the same date, export licences are required for all destinations for antimony, vanadium, and zinc and their alloys in certain forms, nickel ores and concentrates, some further types of used steel materials, cobalt compounds, naphthalene, and sulphuric acid. From this date licences are required in respect of corundum, carbonyl iron powder, molybdenum carbides, specified insulated cables and wires, gear-testing machines, certain types of marine boilers, mine car loaders and parts, mechanically propelled road vehicles and parts as specified, rail locomotives and parts, certain scientific apparatus, and various chemicals, for export to all destinations other than those specified in Part II of the Third Schedule.

AN ORDER increasing the merchants' trade allowance for maximum prices for scrap iron and steel from 3¾ per cent. to 5 per cent. has been made by the Ministry of Supply, and came into force last Monday.

Mr. Senior's Appointment

Chairman of the team to be appointed by the Minister of Supply with the responsibility of seeing that the requirements of the arms programme are met will be Edward W. Senior, who succeeded Sir John Duncanson as Commercial and Technical Director of the British Iron and Steel Federation early in 1949. Born in Sheffield in 1902, Mr. Senior was Master Cutler for 1948. He served throughout the 1939-45 war in the Iron and Steel Control. After a period as General Director of Alloy and Special Steels, he represented the Control in Washington. He was later appointed Controller of Ball and Roller Bearings, resigning at the end of the war to return to his own interests in Sheffield.

Mr. Senior is chairman of George Senior & Sons, Limited, of Padley & Venables, Limited, a director of Ransome & Marles Bearing Company, Limited, and of the British Iron & Steel Corporation Limited.

British Blast Furnaces in the December Quarter, 1950—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of last quarter, 1950.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron ..	—	—	1	—	1	1	2
Lilleshall ..	—	—	1	—	1	1	2
Round Oak Steelworks ..	—	—	1	—	1	1	3
Shelton Iron, Steel & Coal ..	—	3	—	—	3	3	3
Stewarts and Lloyds : Bilston ..	—	3	—	—	3	3	3
Total ..	—	6	3	—	9	9	13
Sheffield.							
Park Gate Iron & Steel ..	—	2	—	—	2	2	2
GRAND TOTAL ..	14	58	26	4	102	101.6	141

Weekly Average Number of Furnaces in Blast during December Quarter, 1950, and Previous Four Quarters.

District.	1949.	1950.			
	Dec.	March.	June.	Sept.	Dec.
Derby, Leics., Notts, Northants, and Essex ..	25.4	26	24.6	24.4	25
Lancs (excl. N.-W. Coast), Denbigh, Flint, and Ches ..	5	5	4.5	4.2	4.6
Lincolnshire ..	14.8	13.7	14	13.8	14
North-East Coast ..	23	23	23	22.8	23
Scotland ..	8.7	7.5	8	8.7	9
Staffs, Shrops, Worcs, and Warwicks ..	9	9	8.4	8.9	9
S. Wales and Monmouth ..	8	8	8	7.7	8
Sheffield ..	1	1.5	1	1.5	2
North-West Coast ..	7	7	6.6	6.4	7
Total ..	101.9	100.7	98.1	98.4	101.6

The following companies have furnaces in course of construction or rebuilding:—Barrow Ironworks Cargo Fleet Iron; Lancashire Steel Corporation; J. Lysaght (Scunthorpe); R. Thomas & Baldwin (Redbourn); Sheepbridge; Skinningrove Iron, and Steel Co. of Wales.

New Names in Powell Duffryn Team

Our issue of January 12 announced that 46-year-old Sir Henry Wilson Smith, one of the Treasury's second secretaries, had accepted a very attractive offer from the Powell Duffryn group and had relinquished his £3,500-a-year job. It was understood that his work with P.D. would be chiefly concerned with finance and matters appertaining to international trade.

Powell Duffryn, Limited, has now confirmed that Sir Henry is one of four additional directors appointed to the board of the company on February 1.

Two of the other three board appointments are of men closely connected with the group. Alfred Read, for example, has been with the company for 43 years and will continue to hold the office of secretary. Miles Belfrage Reid is a director of several of the group's associated companies. His directorships include Stephenson Clarke, Limited, Powell Duffryn Technical Services, Limited, Associated Coal & Wharf Companies, Limited, and Coastwise Colliers, Limited, of which he is vice-chairman.

Thomas Stuart Overy, a senior partner of Allen & Overy, London solicitors, who is the fourth additional director, holds several directorships. They include Metropolitan-Vickers-G.R.S., Limited, Crane Packing, Limited, and G. A. Harvey & Company (London), Limited.

Science and the Government

The functions of a Government now embrace the active improvement of the welfare of the citizen, certain aspects of which call for scientific knowledge. Sir Edward Appleton, F.R.S., Principal of Edinburgh University, was addressing a joint meeting of the Scots Law Society and the Edinburgh University Commerce Association recently when he pointed out that science was being used to an increasing extent as a basis for Government policy. Speaking of the Department of Scientific and Industrial Research, which was formed in 1916, he said that it was most desirable that the scientific aspect of any matter should be explored without any sense of administrative pressure.

Scientific research in British industry was hampered by lack of understanding between scientists and management, said Sir Edward, and some scientists found great difficulty in communicating their ideas to others. In the United States it was quite usual for a number of the board to have had scientific or technical training in the subject with which their firm was concerned.

THE IRON AND STEEL CORPORATION of Great Britain announce that they are now in occupation of their new offices at 1, Chester Street, London, S.W.1 (Tel.: SLOane 0818). Mr. R. Cox, assistant secretary to the Corporation, will be in charge of the information division; since 1947 he has been deputy chief information officer to the Ministry of Supply.

Personal

MR. K. HEADLAM-MORLEY, secretary of the Iron and Steel Institute, is recovering from pneumonia.

MR. PAUL SISON HAM, joint managing director of Ham, Baker & Company, Limited, Langley Green, near Birmingham, is the first valvemaker to be elected president of the Society of Engineers. In his presidential address to the society in London on Monday, he urged the close study of the human side of industry.

MR. J. HARNETT, a foreman engineer with John I. Thornycroft & Company, Limited, Southampton, has been commended by the Minister of Transport for his bravery after a boiler tube burst in the New Australia when the vessel was on trials last May. His prompt action in shutting off the oil fuel supply prevented a dangerous situation from developing.

MR. ALEXANDER MURDOCH, chairman since 1936 of the Singer Manufacturing Company, Limited, sewing machine manufacturers, of Clydebank, has completed 70 years' service with the company. In 1935 he was appointed managing director, a post which he relinquished in 1947, although retaining the chairmanship. He is 84.

MR. G. W. BOOTH of Tyseley Metal Works Limited and MR. A. ALLCOCK of Allcock & Company (Metals) Limited have been made president and vice-president respectively of the British Bronze and Brass Ingot Manufacturers Association. Mr. Allcock is the retiring president. MR G. T. WHITEHOUSE of Metal Products (Willenhall) Limited has resigned from the council and his place has been taken by MR. K. M. B. BARUCH of Copper and Alloys Limited.

COUNCILLOR A. G. B. OWEN, the well-known Midland industrialist, was nominated as Mayor-designate of Sutton Coldfield at a meeting of the Town Council last Wednesday. Mr. Owen has been a member of the Council since 1937, and by his adoption at the age of 42, he will probably be the youngest to become Mayor of the Royal town. He was born at Streetly, Birmingham, and educated at Oundle and Cambridge University. He is chairman and joint managing director of Rubery, Owen & Company, Limited, Darlaston; chairman of the Brooke Tool Manufacturing Company, Limited; A. G. Sutherland, Limited; and E. Camelinat & Company, Limited. Mr. Owen is chairman of the British Racing Motors Production Committee and chairman of the Council of Dr. Barnardo's Homes. He is also a member of the Darlaston Urban Council.

Triple Anniversary to be Celebrated

In Salford (Lancs) 150 years ago, the parent company of Mather & Platt, Limited, began making machinery for the textile trade. A century has elapsed since the firm became known by its present name, and 50 years have passed since the works were transferred to Manchester. To celebrate this triple anniversary, a visit to the Festival of Britain South Bank Exhibition has been arranged by the company for its 5,000 employees. On May 26 the works will be closed, and in the early hours of the morning special trains will convey the visitors to London, arriving at breakfast time. The return journey will be made late that night, thus leaving the whole day free for visits to the Festival and other places of interest.

The company's chairman, Mr. Loris Emerson Mather, is also chairman of Food Machinery (M & P), Limited, a director of the Lancashire Steel Corporation, Limited, and vice-chairman of the North-West Production Board.

Wage Increases in 1950

Weekly wage rates in 1950 rose on the average about 4 per cent., compared with a rise of between 1½ and 2 per cent. in 1949, 4 per cent. in 1948, and 5 per cent. in 1947. The influence of the TUC's decision at its Margate conference to abandon the wage freeze is apparent from the fact that the weekly rate was only 1 per cent. higher at the end of September than it was at the end of December, 1949. Thereafter, however, its upward movement was rapid. By comparison, the average level of retail prices, as measured by the interim index, rose by about 3 per cent. during the year.

According to the "Ministry of Labour Gazette," some 7,349,000 workers received increases amounting to about £2,020,000 a week. More workers received increases in 1948, but the total cost was only £1,898,400 a week. In 1949 some 5,200,500 workers were affected by increases amounting to about £1,076,100. The new wages agreement in the engineering industry in November accounted for most of the £821,600 increase in weekly wages in engineering and allied trades. About 1,822,000 workers in this industry received increases in 1950.

Classified by cost, nearly half the total increases were the result of direct negotiation, and more than 15 per cent. were settled in joint industrial councils. Of the remainder, some 19 per cent. of the total were arranged by wages councils and other statutory boards, 7½ per cent. by arbitration and mediation, and 7½ per cent. by relation to cost-of-living sliding scales.

Fewer working days were lost in 1950 than in any year since 1941. The total was 1,388,000, compared with 1,807,000 in 1949, and 302,000 workers were involved, of which 33,000 were not directly concerned in disputes. Nearly a third of the loss of working time due to stoppages occurred in the coal industry.

Dollar Aid for Consett

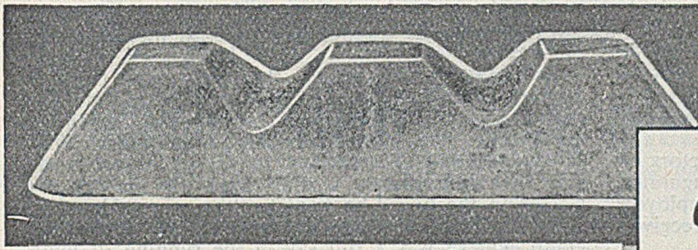
The Economic Co-operation Administration mission to the United Kingdom has announced that Marshall plan funds will pay for $583,000 worth of engineering services, drawings, and fees for patents being supplied by American firms for modernising the steel plant of the Consett Iron Company, Limited. The American services are being provided in connection with the construction and installation of a billet mill, slabbing mill, pug mill, and blast furnaces.

Although new allotments of dollar aid to the United Kingdom were suspended at January 1 last, previously-allocated funds are paying for this project.

Russia's Iron and Steel Production

A German report on the iron and steel production figures announced by E.C.E. says that, according to the Russian Minister of Ferrous Industries, the following totals were produced by the Russian iron and steel industry in 1950:—Pig-iron, more than the 19.5 million metric tons scheduled in the current production plan; raw steel, 27.6 million tons (2.2 million tons above the planned figure); rolled products, 20.4 million tons (2.6 million tons higher than planned).

MR. S. C. TYRRELL, F.W.C.A., F.I.I.A., local board director and chief accountant of Newton Chambers & Company Limited, Sheffield, (ironfounders, engineers and chemical manufacturers) has returned from a nine weeks' tour of S. Africa and the Rhodesias.



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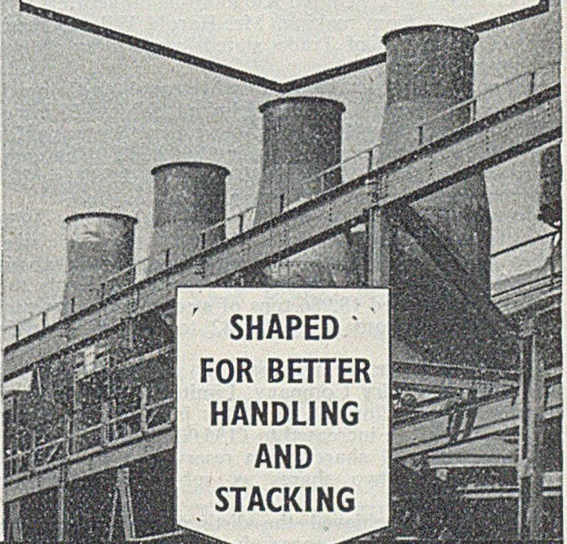
We welcome enquiries on foundry problems and offer free technical advice.



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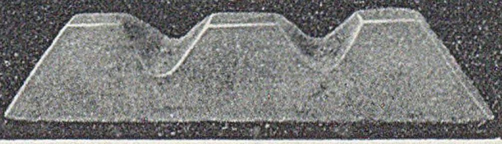

THE STANTON IRONWORKS COMPANY LIMITED – NEAR NOTTINGHAM

News in Brief

IMPORTS OF iron and steel manufactures (excluding cutlery and machinery) into the Republic of Ireland last October were valued at £720,818 (£570,034 in October, 1949), making £6,237,749 (£5,524,822) for the 10 months.

ORDERS are to be placed locally by the Clyde Navigation Trust for four new harbour craft—a bucket dredger, a grab hopper dredger, and two hopper barges. It is estimated that these vessels will cost £740,000.

To MARK the company's centenary, the directors of John Summers & Sons, Limited, have inaugurated presentations of gold watches and chains to employees with more than 50 years' service. The first 50 received their awards on Friday last.

PARTS of a Diesel engine weighing over a ton have been flown to Australia by the Wallsend Slipway & Engineering Company, Limited, for the Norwegian tanker Staland. This is the biggest consignment of ship's parts sent by air by the firm.

MR. A. JOHNSON, of Leeds University, addressing a Workers' Educational School at South Bank, Middlesbrough, forecast a million tons drop in steel ingot production this year, owing to the world shortage of iron and steel scrap and the use of more ships for carrying coal.

THE 1951 STEEL PRODUCTION TARGET of the Steel, Peech & Tozer branch of the United Steel Companies, Limited, has been fixed at 803,000 tons. Last year, the firm produced 798,547 tons against a target of 800,000 tons, the highest production in the firm's history.

THE GOVERNMENT has decided not to impose for the time being import restrictions on the brass, zinc, and copper goods which United Kingdom manufacturers will be prohibited from making, Mr. Harold Wilson, President of the Board of Trade, stated in a written answer to a question.

AN ORDER has been secured by Metropolitan-Cammell Carriage & Wagon Company, Limited, Saltley, Birmingham, from the New Zealand Government Railways, for 2,000 wagons, valued at just over £1,000,000. The company has supplied New Zealand with 2,500 similar wagons since the end of the war.

STEWARTS AND LLOYDS, LIMITED, which in 1950 manufactured approximately 730,000 tons of steel tubes and beat its previous record output by about 25,500 tons, has achieved another record. Recently the company produced 18,986 tons of steel tubes in a week, the previous record being 16,382 tons in the middle of last year.

A 50 PER CENT. SCRIP BONUS is announced by the Anderston Foundry Company, Limited. The directors propose sub-dividing the £3 shares into £1 shares and that the capital be increased to £135,000 by the free issue of 45,000 new £1 shares from reserves at the rate of one for every two shares as sub-divided held on February 28.

DUNDEE has achieved the distinction of becoming the first development area in Britain to secure a balance in industry. Announcing this, Lord Bilsland, chairman of Scottish Industrial Estates, Limited, said that when certain additions had been completed to existing factories, no further development would take place in the present circumstances.

TWO LINERS, similar to the 28,000-ton Himalaya, have been ordered by the P & O Company for the UK-Australia service. One is to be built at the Clydebank yard of John Brown & Company, Limited, and the other by Harland & Wolff, Limited, Belfast. They will probably be fitted with Denny-Brown stabilisers which have proved so successful in the company's liner Chusan.

OF THE 421,110 ORDINARY 5s. SHARES recently offered to ordinary stockholders of the Glacier Metal Company, Limited, at 8s. per share in the proportion of five shares for every nine held, over 90 per cent. were taken up by the stockholders entitled to them. The small number not so taken up and also offered to stockholders were applied for by them more than six times over.

EXPRESSING THE BELIEF that no such thing as workers' control of industry could exist, Mr. John Lang, chairman of the Scottish TUC, speaking at the annual dinner of the Association of Supervisory Staffs Executives and Technicians in Glasgow last week, said that immediately a man from the factory was elected to the board he went to "the other side of the table." The most that the workers' side of industry could achieve was a full say in the running of industrial affairs, the right to point out to a management wherein it was inefficient and where wasteful methods were employed, and to suggest measures for increasing productivity.

Contracts Open

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

ANLABY, February 27—Cast-iron grates and frames, for the Haltemprice Urban District Council. Mr. A. B. Glasspool, Anlaby House, Anlaby, E. Yorkshire.

BARKING, February 22—Manhole covers, frames, gully grates and frames, for the Borough Council. The Borough Engineer and Surveyor, Town Hall, Barking.

BRIERLEY HILL, February 26—Manhole covers and gully grates, for the Urban District Council. The Engineer and Surveyor, Hawbush House, Brierley Hill.

DEWSBURY, March 1—Cast-iron pipes and specials, valves and hydrants, water meters, and surface boxes, for the Borough Council. The Water Engineer, 10, Church Street, Dewsbury.

DUBLIN, March 7—Cast steel wedge gate valves, flanged steel check valves, and steel pipe flanges, for the Port and Docks Board. The Engineer's Office, Dublin Port and Docks Board, East Wall Road, Dublin.

DUKINFIELD, March 5—Gully grids and manhole covers, for the Town Council. Mr. S. F. Potter, borough engineer and surveyor, Town Hall, Dukinfield.

ECCLES, February 17—Manhole and lamp-eye covers, gully grates, etc., for the Borough Council. The Borough Surveyor, Town Hall, Eccles.

GODALMING, February 26—Castings, for the Borough Council. The Water Engineer, Branksome, Filmer Grove, Godalming.

HUCKNALL, February 24—Cast or spun iron pipes, for the Urban District Council. The Surveyor to the Council, Council Offices, Hucknall.

HUDDERSFIELD, February 28—Cast-iron materials, for the Borough Council. The Borough Engineer and Surveyor, High Street Buildings, Huddersfield.

LITTLEBOROUGH, February 24—Road grids, manhole covers, and other iron castings, for the Urban District Council. Mr. G. F. Wild, engineer and surveyor, Council Offices, Littleborough.

LLANELLY, February 17—Castings, for the Town Council. The Borough Surveyor, Town Hall, Llanelly.

LOURENCO MARQUES, April 23—Manual pneumatic tools and accessories, for the Permanent Purchasing Commission, Treasury Department (reference, CRE (IB) 51329/51).

LOUTH—Supplying and laying about 13 miles of 6 in., 4 in., and 3 in. spun-iron mains, etc., for the Rural District Council. Mr. J. H. Haiste, 4, Queen Square, Woodhouse Lane, Leeds, 2. (Deposit, £2 2s.)

MIDDLESBROUGH, February 27—Cast-iron specials, surface boxes, spun-iron concrete lined pipes, double flanged sluice valves, hydrants, etc., for the Tees Valley Water Board. Mr. E. A. Morris, clerk of the board, Water Board Offices, Corporation Road, Middlesbrough.

SALE, February 28—Ironwork, manhole covers, etc., for the Borough Council. The Borough Surveyor, Town Hall, Sale.

SELBY, February 23—Cast-iron gully grates and frames, for the Rural District Council. The Surveyor, 22, Park Street, Selby.

SOUTHAMPTON, February 19—Castings, for the Borough Council. The Borough Engineer and Surveyor, Civic Centre, Southampton.

Raw Material Markets

Iron and Steel

The cuts in industrial coal supplies bring into the immediate foreground the prospect of a shrinkage in the output of pig-iron. Such a development would be most inopportune. The foundries need more pig-iron and any reduction in supplies must involve a curtailment of operations. Blast-furnace men will no doubt endeavour to keep their plant in operation, if only on slack blast; but it looks as though stoppages will be inevitable unless fuel supplies are quickly restored to normal proportions. First priority is given to the provision of basic iron for the steel plants, and foundrymen are eager to accept any other grade of iron which is available. Few establishments have any substantial stocks in hand, and these no doubt will be heavily drawn upon.

In regard to supplies of semi-finished steel the present position is more favourable than the outlook. Re-rollers have been receiving reasonably satisfactory deliveries—chiefly from home sources—but they fear an immediate restriction owing to the fuel shortage. Already small billets are scarce, but deliveries of sheet bars and slabs have been sufficient for the current needs of the sheet trade. It is understood that the rearmament programme will entail very heavy calls upon the sheet mills, with a consequent further curtailment of supplies to other users.

The period originally fixed for the voluntary limitation of exports of finished steel products expires at the end of this month, and steelmakers are now awaiting official directives concerning deliveries beyond that date. Disposal of maximum outputs presents not the slightest difficulty. The problem is to arrange distribution of available tonnages to the best advantage, and upon this subject the last word will henceforth rest with the Ministry of Supply. It will be an admittedly difficult task to reconcile rearmament demands, with the desire to maintain exports at a high level and also to satisfy the requirements of the steel-using industries at home. Collectively these demands are far in excess of the maximum output, and offers of new business are numerous to the point of embarrassment.

Non-ferrous Metals

The British Bureau of Non-ferrous Metal Statistics has issued statistics covering the month of December and also completing the picture for last year. In copper, stocks increased slightly to 104,330 tons, but consumption was sharply lower at 43,960 tons from the exceptional figure of 52,168 tons in November. Practically the whole of the decline took place in virgin metal. Total copper usage in 1950 was 521,998 tons, against 496,720 tons in 1949. The December zinc usage was 24,338 tons, compared with 29,869 tons in November, while stocks of virgin metal dropped from 37,308 tons to 36,256 tons. There was also a fall in lead stocks—from 65,102 tons at the end of November to 61,687 tons at December 31.

As might be expected, consumption of tin declined in December to 1,709 tons from the November figure of 2,156 tons. Government stocks at December 31 improved by nearly 1,000 tons to 7,217 tons, the best figure for about six months. But the tin market in Whittington Avenue of late has suggested a scarcity of early metal, for dealings in the cash position have been light. However, the price has advanced sharply, further high records having been set up.

The scrap market has worn a somewhat stunned appearance, as if it had not recovered from the shock administered by the new price schedule, which certainly compels a very sharp downward revision in values from the inflated values ruling prior to February 3 when the Order came into force. The permitted charge of 9d. to cover the cost of bag and the operation of bagging is being adversely criticised, and there can be little doubt that a revision will be made. In view of the complexity of the scrap trade it would be very strange if some adjustments were not necessary in the light of experience, but they probably will not amount to a lot. The great need is that the scrap should flow into consumption in order to help fill the gap created by cuts in the supply of copper and zinc. So far the establishment of ceiling prices has not operated in favour of more secondary metal—rather the reverse. But perhaps when the Government's plans for licensing and stock returns are announced matters will take a more favourable turn.

Official tin quotations were as follow:—

Cash—Thursday, £1,450 to £1,455; Friday, £1,455 to £1,460; Monday, £1,475 to £1,485; Tuesday, £1,515 to £1,525; Wednesday, £1,610 to £1,620.

Three Months—Thursday, £1,415 to £1,420; Friday, £1,420 to £1,425; Monday, £1,450 to £1,455; Tuesday, £1,485 to £1,490; Wednesday, £1,555 to £1,565.

Two Decades of Blast Furnaces

Ashmore, Benson, Pease & Company, Limited, Stockton-on-Tees, in conjunction with their American associates—particularly Freyn Engineering Company, Chicago—have contributed much to reaching the high level of blast-furnace efficiency existing to-day both in this country and in various parts of the British Commonwealth. Their record is one of which any such company might be proud, and it is appropriately embodied in an attractive souvenir brochure. It is the intention to re-issue this quinquennially, thus rendering it a continuous and evolutionary record of blast-furnace plant. This, the first edition, contains some 20 or so photographs, 14 of which are about 9½ in. deep and 7 in. wide. They depict blast furnaces at the South Works of Appleby-Frodingham Steel Company, Limited; at the works of Consett Iron Company, Limited; Steel Company of Wales, Limited; John Lysaght's Scunthorpe Works, Limited; Guest, Keen, Baldwins Iron & Steel Company, Limited; Colvilles, Limited.

Views of plants abroad include two furnaces of the South African Iron & Steel Industrial Corporation, Limited; African Metal Corporation, Limited; Rhodesian Iron & Steel Commission; and the Karabuk Nos. 1 and 2 furnaces in Turkey. Plants under construction include a furnace for the Steel Company of Wales, Limited (Margam No. 2); two furnaces at the Vanderbijl Park works of ISCOR, Pretoria, and one furnace for John Lysaght's Scunthorpe Works, Limited. There are brief notes on the various plants with shadow illustrations of the numerous items of plant which go to complete a blast-furnace installation. This is a notable production both in layout and execution.

Board Changes

CAMMELL LAIRD & COMPANY, LIMITED—Mr. J. C. Mather has been appointed a director.

F. PERKINS, LIMITED—Mr. T. H. R. Perkins has been appointed a director. He is the only son of the chairman and managing director.

KAYSER, ELLISON & COMPANY, LIMITED—Mr. A. B. Heeley, Mr. F. Henshaw, and Mr. S. B. Shepley, works directors, have joined the board.

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

(Delivered, unless otherwise stated)

February 14, 1951

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2:—Middlesbrough, £10 10s. 3d.; Birmingham, £10 5s. 6d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent P, £12 1s. 6d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si)—North Zone, £12 10s.; South Zone, £12 12s. 6d.

Scotch Iron.—No. 3 foundry, £12 0s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £13 2s. 6d.; South Zone, £13 5s.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £13 12s. 6d.; South Zone, £13 15s.

Cold Blast.—South Staffs, £16 3s. 3d.

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. Coast and N.-W. Coast of England, £12 0s. 6d.; Scotland, £12 7s.; Sheffield, £12 15s. 6d.; Birmingham, £13 2s.; Wales (Welsh iron), £12 0s. 6d.

Spiegeleisen.—20 per cent. Mn, £17 16s.

Basic Pig-iron.—£10 11s. 6d., all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, basis 2-ton lots, d/d Sheffield works.)

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

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

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

Ferro-titanium.—20/25 per cent., carbon free, £120; ditto, copper free, £142.

Ferro-tungsten.—80/85 per cent., 33s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 35s. 6d. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent. C, £66, basis 60% Cr, scale 22s. per unit; 6/8 per cent. C, £61, basis 60% Cr, scale 21s. per unit; max. 2 per cent. C, 1s. 6¾d. per lb. Cr; max. 1 per cent. C, 1s. 7¼d. per lb. Cr; max. 0.15 per cent. C 1s. 8d. per lb. Cr; max. 0.10 per cent. C, 1s. 8¼d. per lb. Cr.

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

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

Ferro-manganese (blast-furnace). — 78 per cent., £31 13s. 1d.

Metallic Manganese.—96/98 per cent., carbon-free, £186 per ton.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft, u.t., £16 16s. 6d.; tested, up to 0.25 per cent. C (100-ton lots), £17 1s. 6d.; hard (0.42 to 0.60 per cent. C), £18 16s. 6d.; silico-manganese, £23 19s.; free-cutting, £20 1s. 6d. Siemens Martin Acid: Up to 0.25 per cent. C, £22 4s.; case-hardening, £23 1s. 6d.; silico-manganese, £26 6s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £19 16s. 6d.; basic, hard, over 0.41 up to 0.60 per cent. C, £21 1s. 6d.; acid, up to 0.25 per cent. C, £23 1s. 6d.

Sheet and Tinplate Bars.—£16 16s. 6d.

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Heavy Plates and Sections.—Ship plates (N.-E. Coast), £20 14s. 6d.; boiler plates (N.-E. Coast), £22 2s.; chequer plates (N.-E. Coast), £22 19s. 6d.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £19 13s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £22 6s.; flats, 5 in. wide and under, £22 6s.; rails, heavy, f.o.t., £19 2s. 6d.; hoop and strip, £23 1s.; black sheets, 17/20 g., £28 16s.

Alloy Steel Bars.—1-in. dia. and up: Nickel, £37 7s. 3d.; nickel-chrome, £55; nickel-chrome-molybdenum, £61 13s.

Tinplates.—I.C. cokes, 20 × 14, per box, 41s. 9d., f.o.t. makers' works.

NON-FERROUS METALS

Copper.—Electrolytic, £202; high-grade fire-refined, £201 10s.; fire-refined of not less than 99.7 per cent., £201; ditto, 99.2 per cent., £200 10s.; black hot-rolled wire rods, £211 12s. 6d.

Tin.—Cash, £1,610 to £1,620; three months, £1,555 to £1,565; settlement, £1,615.

Zinc.—G.O.B. (foreign) (duty paid), £151; ditto (domestic), £151; "Prime Western," £151; electrolytic, £155; not less than 99.99 per cent., £157.

Lead.—Good soft pig-lead (foreign) (duty paid), £136; ditto (Empire and domestic), £136; "English," £137 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, all English destinations, £170 17s. 6d.; rolled zinc (boiler plates), all English destinations, £168 17s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £170.

Other Metals.—Aluminium, ingots, £124; antimony, English, 99 per cent., £325; quicksilver, ex warehouse, £73 10s. to £74; nickel, £406.

Brass.—Solid-drawn tubes, 21¾d. per lb.; rods, drawn, 29¼d.; sheets to 10 w.g., 26⅝d.; wire, 27½d.; rolled metal, 25⅛d.

Copper Tubes, etc.—Solid-drawn tubes, 23¼d. per lb. wire, 226s. 6d. per cwt. basis; 20 s.w.g., 254s. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £240; BS. 1400—LG3—1 (86/7/5/2), £255; BS. 1400—G1—1 (88/10/2), —; Admiralty GM (88/10/2), virgin quality, —, per ton, delivered.

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

Phosphor Bronze.—Strip, 35d. per lb.; sheets to 10 w.g., 37⅛d.; wire, 39¼d.; rods, 36½d.; tubes, 41½d.; chill cast bars: solids, 42d., cored, 43d. (C. Clifford & Son, Limited.)

Nickel Silver, etc.—Ingots for raising, 2s. 3½d. per lb. (7%) to 3s. 2½d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 2s. 9¼d. (7%) to 3s. 8¼d. (30%); to 12 in. wide × .056, 2s. 9½d. to 3s. 8¾d.; to 25 in. wide × .056, 2s. 11½d. to 3s. 10¾d. Spoon and fork metal, unsheared, 2s. 6¼d. to 3s. 5½d. Wire, 10g., in coils, 3s. 3d. (10%) to 4s. 2¼d. (30%). Special quality turning rod, 10%, 3s. 2d.; 15%, 3s. 6¾d.; 18%, 3s. 11d. All prices are net.

Forthcoming Events

FEBRUARY 19

Sheffield Society of Engineers and Metallurgists.

"Some Aspects of Modern Steelmaking," by A. Robinson. 6.15 p.m., at the Royal Victoria Station Hotel, Sheffield.

Royal Society of Arts

Meeting at John Adam Street, Adelphi, Strand, London, W.C.2, 6 p.m. Series, "Training for Industry and the Professions": "Training for the Professions," by Sir H Howitt and T. E. Scott.

FEBRUARY 20

Institute of British Foundrymen

Coventry and District Students' Section:—Lecture on Pig-iron Production (details from the secretary), 7.15 p.m., in Room A.5 at the Coventry Technical College.

Association of Bronze and Brass Founders.

Lancashire and Cheshire Area:—Informal meeting at the Midland Hotel, Manchester, preceded by luncheon at 12.30 p.m.

Incorporated Plant Engineers

Glasgow Branch:—Meeting at 351, Sauchiehall Street, at 7 p.m. Paper, "Choice and Installation of Temperature-measuring Instruments," by A. Stewart.

Sheffield Metallurgical Association

Meeting at the Grand Hotel, at 7 p.m. Paper, "Organisation and Use of a Metallurgical Laboratory in a Small Engineering Works," by G. Robinson.

FEBRUARY 21

Institution of Production Engineers

Birmingham Section:—Meeting at the James Watt Memorial Institute, Great Charles Street, at 7 p.m. Paper, "Steel Company of Wales, Limited—Developments at Port Talbot."

Institute of Vitreous Enamellers

Southern Section:—Annual General Meeting, followed by "Aspects of Frit Manufacture of Practical Interest to the Enameller," by N. F. Parker, 7.30 p.m., at the Howard Hotel, Norfolk Street, London, W.C.2.

Northern Section:—"Training and Education of Vitreous Enamellers," by A. J. Biddulph, 7.30 p.m., at the Queen's Hotel, Manchester.

FEBRUARY 22

Institution of Production Engineers

Leicester Section:—Meeting at the College of Technology, The Newarke, at 7 p.m. Paper, "The Lost-wax Process," by A. Short.

FEBRUARY 23

Institution of Mechanical Engineers

Meeting at Storey's Gate, St. James's Park, London, S.W.1, at 5.30 p.m. Papers, "The Size Effect in Fatigue of Plain and Notched Steel Specimens under Reversed Direction Stress," by C. E. Phillips and Dr. R. B. Heywood, and "Some Fatigue Tests on Aluminium-alloy and Mild-steel Sheet, with and without Drilled Holes," by C. E. Phillips and A. J. Fenner.

Sheffield Metallurgical Association

Refractories Group:—Meeting at the University, St. George's Square, at 7.30 p.m. Paper, "Surface Tension and Structure of Silicate Melts," by T. B. King.

East Midlands Metallurgical Society

Meeting at the College, Loughborough, at 7 p.m. Paper. "Recent Developments in Copper and Copper Alloys," by Dr. E. Voce.

FEBRUARY 24

Institute of British Foundrymen

Bristol and West of England Branch:—"Development of Foundry Sand Control," by G. L. Harbach, 3 p.m., at the Grand Hotel, Broad Street, Bristol.

East Midlands Branch:—"Refractory Materials in Use," by A. T. Green, 6 p.m., at the Derby School of Arts and Crafts, Green Lane, Derby.

Wales and Monmouth Branch:—"Non-ferrous Foundry Practice," by J. Bamford, B.SC., 6 p.m., at the Engineers' Institute, Cardiff.

CLASSIFIED ADVERTISEMENTS

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

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

SITUATIONS WANTED

PATTERNMAKER seeks position of responsibility. 25 years' experience on all types of patternmaking, planning and estimating, also foundry experience. Area London or suburbs.—Box 612, FOUNDRY TRADE JOURNAL.

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SITUATIONS VACANT—*Contd.*

CHIEF CHEMIST wanted for a Steel Foundry in the West of Scotland. Previous experience in Steel Foundry work essential. Applicant will be required to take charge of steel plant with Tropenas and Electric Furnaces.—Write, stating age, education, past experience, and salary required, to Box 608, FOUNDRY TRADE JOURNAL.

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FOREMAN COREMAKER required for South Wales Repetition Foundry, including mechanisation. Progressive position for man with suitable qualifications. Give details of experience and salary required.—Box 596, FOUNDRY TRADE JOURNAL.

PLANNING ENGINEER required for Company manufacturing light alloy castings, sand and die. Location South-East area. Applicant must be capable of controlling estimating and drawing office, and be fully conversant with modern plant layout. Salary offered £1,000.—Box 598, FOUNDRY TRADE JOURNAL.

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SITUATIONS VACANT—*Contd.*

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IRON-BRASS FOUNDRY (within a few miles from London) for Sale or to Let on Lease. Fully equipped. Capacity 15 tons per week. The present owner retiring from business.—Apply Box 602, FOUNDRY TRADE JOURNAL.

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SUITABLE Steel Plates, ¼ in. or thicker, up to 300 sq. ft., in large pieces. Old chequer plates considered.

Also about 60 sq. ft. ditto, but ½ in., and must be perforated.

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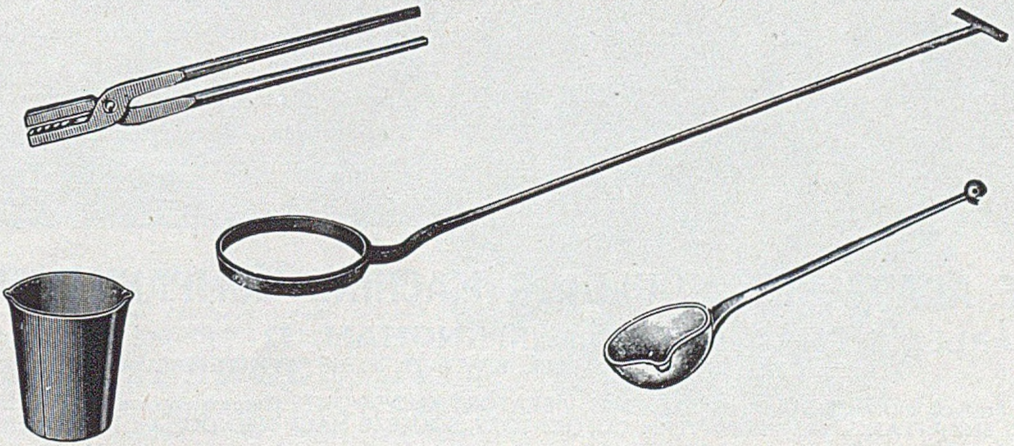

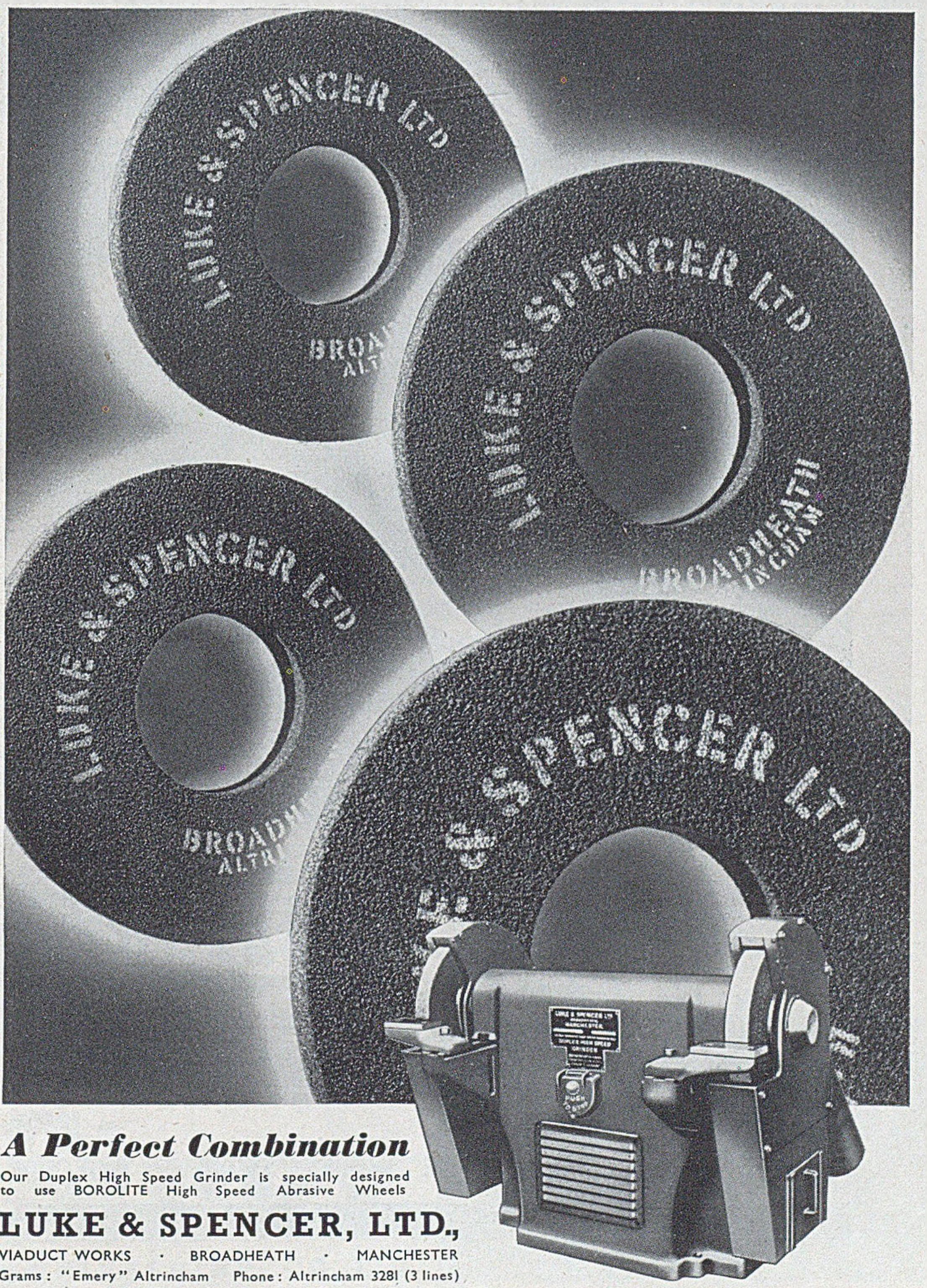
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3 Ton Model Illustrated

Larger and smaller machines available

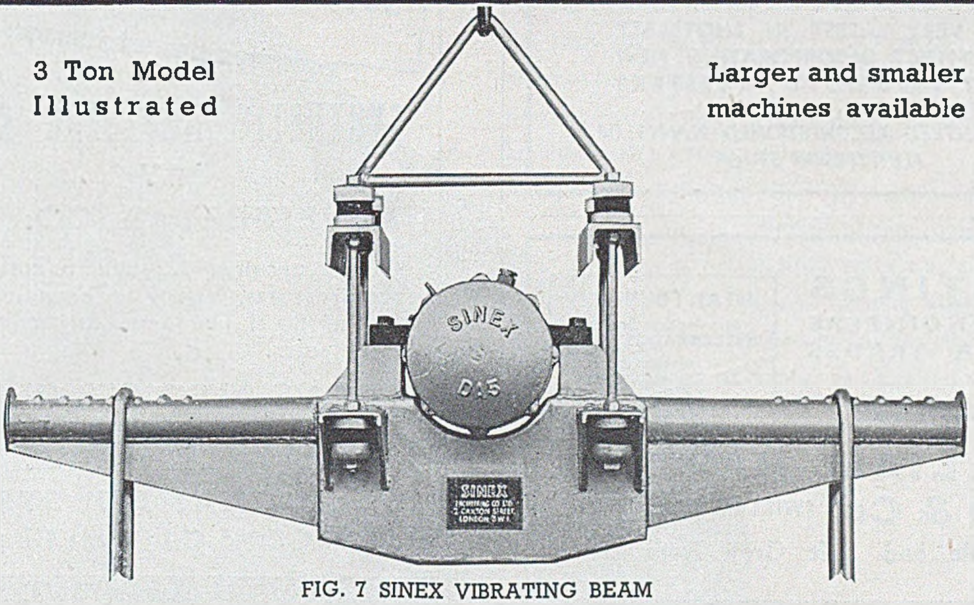


FIG. 7 SINEX VIBRATING BEAM

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

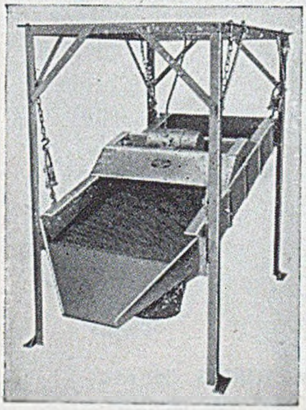
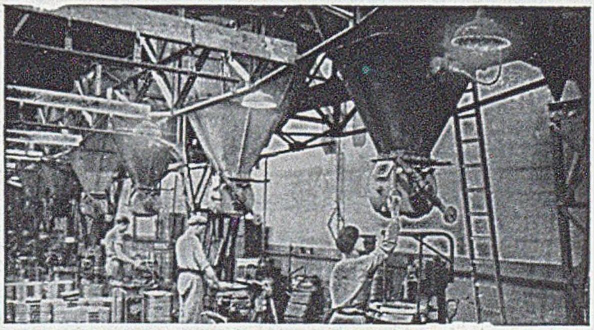


FIG. 10 (on left)
Sinex Vibrating Screen 6ft. × 3ft. Single Deck. Hourly output —15 tons of sand through ⅜ inch mesh.

This screen is also manufactured in sizes to suit requirements

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



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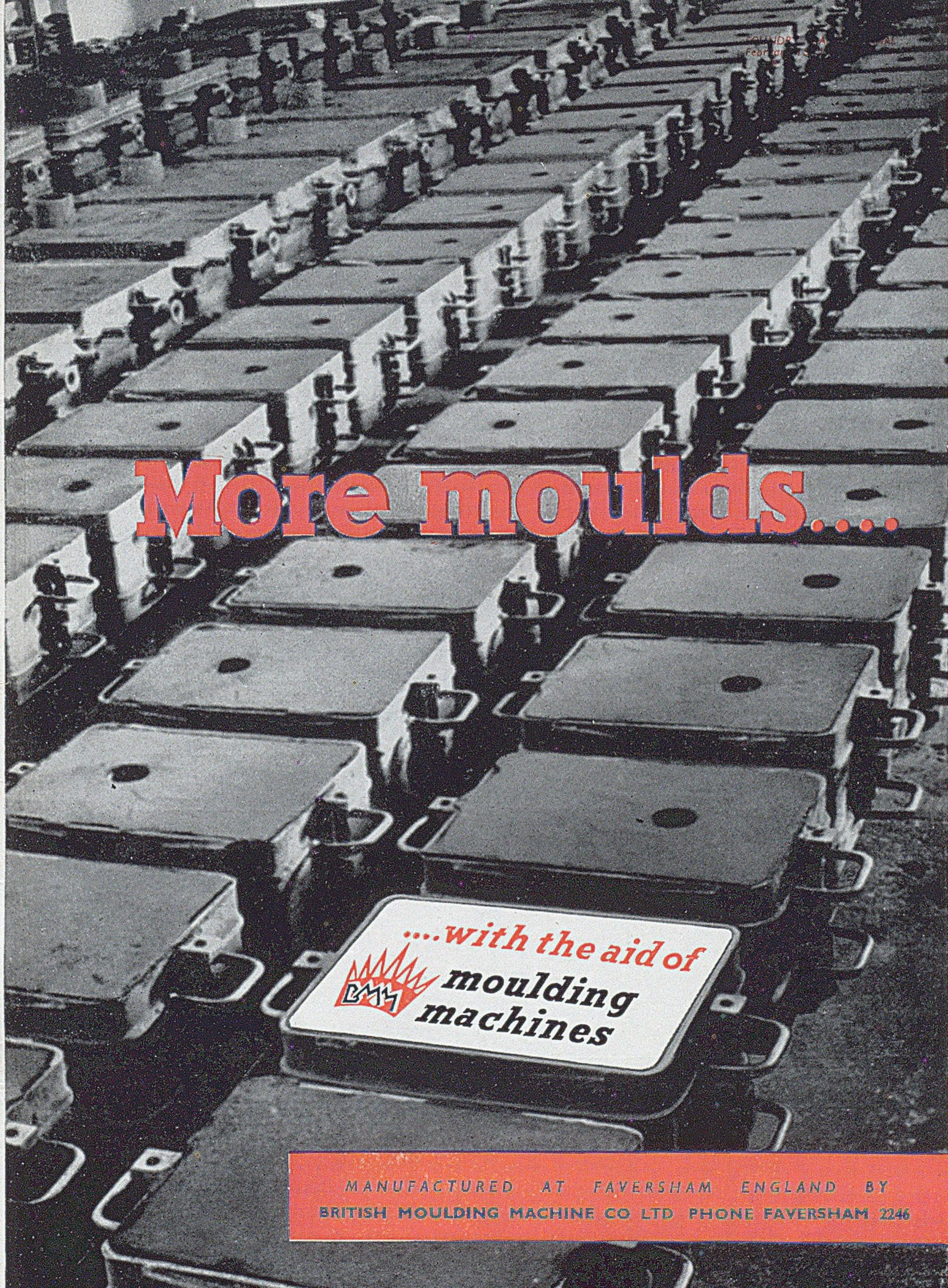
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