FOUNDRY TRADE JOURNAL

Established 1902

Vol. 91 Thursday, November 15, 1951 No. 1837

PRINCIPAL CONTENTS

PUBLISHED WEEKLY : Single Copy, 9d. By Post 11d. Annual Subscription, Home 40s., Abroad 45s. (Prepaid).

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

Foundry Dust

It is now well appreciated that the best way to tackle the dust problem in foundries is initial suppression. The sand used is not toxic until it has been burnt. The first time it shows up is at the knock-out, and then later during the fettling processes. Thus, theoretically, a 100 per cent. efficient knock-out and perfect castings should be the main safeguards against dust. It is, we think, reasonably established that the lower the melting point of the metal—provided it is not the sort that penetrates the sand mould—the lower the incidence of pulmonary diseases. As melting points rise the incidence becomes greater, reaching its maximum with steel. The object, then, should be to establish a proper matching between the refractory mould and the metal it is to contain, so as to maintain a worthwhile differential between the fusion point of the former and the melting point of the latter. Coupled with high-grade craftsmanship, such conditions should be reflected in the reduction of work to be undertaken by the fettlers. From this it should be evident that the real cost of moulding sand is not "d/d your foundry" plus preparation, but one which takes into consideration the extra cost incurred in fettling.

We have noticed from our numerous visits to foundries that those firms which have a well-justified reputation for the surface finish of their castings are inclined to be quite lavish in the use of raw sand, and though we have no knowledge of costs of production, we should imagine that the enhanced price they command—and deserve—for their castings takes care of the higher cost of raw materials. Moreover, as the re-usage of sand must result in the fragmentation of grains, then generous fresh additions must mathematically reduce silt content. Some British sands have been reputed to contain sericitic contamination and these, to our mind, based on a general acquaintance, should be rigorously excluded from the foundry.

It is obvious from the above that the major problem resides with the steel foundry, though where heavily-cored castings are continuously made, ironfounders, too, have a serious problem. Happily, the steel foundry is an industry governed by enlightened managements, who exchange information. One steel foundry has experimented with dozens of different sand mixtures without being satisfied that perfection has been achieved. Yet this search must go on. Coatings may provide a solution, for already some steelfounders continue with the use of a silica wash, as this reduces the amount of dust generated during fettling. It seems that the "nigger in the wood-pile" is when making heavy sectioned steel castings, from time to time there is surface contamination with a mixture of sand and steel. A process of flame-projecting a flux shows distinct promise of providing a virtually dust-free operation. Finally, there is this modern tendency to lump all foundries together as one industry, carrying the

Foundry Dust

rider that they have problems in common to solve. Many jobbing foundries and most light castings foundries, which practice good housekeeping quite seriously, have no real dust problem to solve.

Saving Scarce Materials

A productivity Report* of a team visiting America covering the above subject was published last Monday. It differs from earlier reports inasmuch as it deals with an urgent problem. The sole raw materials dealt with are metals—mostly non-ferrous metals, though including many used in steel-making practice. Early during the visit of the team a table was drawn up showing relative scarcities in the two countries. Fortunately, the items are not quite the same, as those entering the category of "in fair supply" in America are boron calcium, palladium, ferro-titanium and zirconium, whilst here the list includes ferro-chromium, ferro-manganese, ferro-silicon, tin, and ferro-titanium. This is interesting, as boron is being used extensively in very small proportions in American "economy" steels.

At a Press Conference prior to the release of this Report, a strong plea was made for the wiser use of metals. For instance, the Report says: "In the castings field there is an urge to use stronger alloys with uncored castings. Again, without re-design no advantage will be obtained. When, however, the castings are cored, the use of the original patterns but with larger cores may lead to a worthwhile saving in metal." This phrase is somewhat obscure and applies no doubt to some limited range of components. Reclamation by welding, plugging, metal spraying and the like is extensively practised in the States and should be emulated here. The Report also stresses the use of precision castings to save the metal losses incurred through machining operations. The non-ferrous foundry trade has been curtailed through various controls which were referred to, but an assurance was given that the economy drive was not being restricted purely to civilian requirements, and there was to be close co-operation from the service departments. A thorough investigation was being pursued with the object of reducing the consumption of scarce metals in the various items of munitions. It was also stated that the Americans are in exactly the same position as ourselves and are tackling their problems on lines similar to those in vogue here. Moreover, in "jet" production, the British were much more economical in the use of alloys than the Americans, but steps have been taken to bring them into line.

We presume that all this comes under the heading of productivity, as the object is to achieve more output from a constant quantity of raw materials. We ask our readers to support the plea of economy, not merely of the relatively-scarce metals, but of all raw materials, for economy in one section has a beneficial effect on all others.

QUALCAST, LIMITED, ironfounders and lawn-mower manufacturers, of Derby, has established a new £100,000 subsidiary company, Qualcast (Swan Gardens), Limited, at Wolverhampton. It is estimated that a £300,000 re-organisation scheme at the company's Derby works, which should be completed early next year, will increase the capacity of the ferrous die-casting division by 50 per cent.

* Anglo-American Council on Productivity, 21, Tothill Street, London, S.W.1. Price 2s. post free.

Conference Paper Author

Mr. W. J. Driscoll, B.Sc.(Eng.), A.M.I.Mech.E., M.Inst.F., who presented the Paper "Mechanical Charging of Cupolas" (printed on the opposite page), was educated at King's Norton Grammar School, Birmingham. Following a short period as laboratory assistant in the department of metallurgy, Birmingham Central Technical College, Mr. Driscoll became laboratory apprentice at the British Cast Iron Research Association in 1936. On being appointed to the development department of the Association in 1938, as assistant to Mr. L. W. Bolton, he was primarily interested in cupola practice and has since made this subject his special concern. In 1939 he obtained an external honours degree in mechanical engineering of London University. Between 1943 and 1945 he acted as fuel officer to the Ironfounding Industry Fuel Committee, being responsible for the promotion of fuel economy measures within the industry and for the technical co-ordination of the work of the regional panels of the Committee, in which many members of the Institute of British Foundrymen played an active part.

MR. W. J. DRISCOLL.

Brassfoundry Productivity Report

Day Conference for Leading Executives

A brassfounding team sent to America under the auspices of the Anglo-American Council was sponsored jointly by the National Brassfoundry Association and the Association of Bronze and Brass Founders. The Report of the team has created a great impression throughout the country and the two Associations are particularly anxious to do what they can to encourage all firms in the industry to implement its conclusions and recommendations. They are of the opinion that it is essential that management itself should be convinced of the necessity of accepting these recommendations and, with this object in view, a joint conference has been arranged for leading executives at which the whole report can be discussed. This conference will be held at the Queen's Hotel, Birmingham, on Thursday, December 6. All members of the team have undertaken to be present and, after explaining the implications of the report, will be pleased to answer any questions which may be raised. Sir Thomas Hutton has been asked to take the chair on this occasion.

The cost of the conference will be 22s. 6d. per head, inclusive of luncheon. The discussions will open at 11 a.m., and it is hoped to finish at approximately 4.30 p.m. to enable those who are obliged to travel to return home that evening. A number of rooms at the Queen's Hotel have been reserved for the night of December 5 and firms are asked to make immediate application for accommodation required to the secretaries of their respective Associations.

It is earnestly hoped that every firm in the industry will be represented by its leading industrialists, and the National Brassfoundry Association and the Association of Bronze and Brass Founders hope that all their members will make a special effort to be present. Those intending to participate should write to either of these Associations; the address of the former is 30, Waterloo Street, Birmingham, 2, and the latter 25, Bennetts Hill, Birmingham, 2.

Mechanical Charging of Cupolas*

Survey of Methods in Use and Principles Involved

By W. J. Driscoll, B.Sc.(Eng.), A.M.I.Mech.E., M.Inst.F.

An appreciable amount of manual effort can be involved in the movement of cupola raw materials such as pig-iron, scrap, coke and limestone between the vehicles in which they are received in the works and the cupolas themselves. With a view to reducing this manual labour as far as possible, various types and designs of mechanical equipment have been put to use in foundry stock-yards and for cupola charging. For the purpose of this Paper, a mechanical cupola charging installation is considered as one where each metal charge for the cupola is made-up and weighed at about ground level and where each charge is subsequently hoisted, moved to the cupola if necessary, and discharged into the furnace without any further manual handling of the materials of the charge or of the skip or bucket in which they are contained. The main characteristics of chargers of this type are described in this Paper, but no attempt is made to cover detailed points of design which may have been introduced by particular equipment manufacturers.

Suitable facilities for weighing the metal charges and for weighing or measuring the coke charges are considered to be an essential part of any cupola charging system and a section of this Paper is therefore devoted to descriptions of methods whereby these operations may be performed effectively with a minimum of manual effort.

Many of the examples of charging and weighing methods described and illustrated are from sources in the U.S.A. where mechanical methods have been developed and adopted to a greater extent than in this country.

Brief consideration only is given to the application of mechanical aids to cases where most of the charge handling and weighing is done on a charging platform of the conventional type. The movement of materials into and inside the stockyard also, is only dealt with insofar as it may be related to the charging or charge weighing system.

Hand Charging versus Mechanical Charging

Cupolas are often said to be hand-charged when the making-up of individual metal charges and the movement of the charges to the cupola is mainly done at charging-platform level. While in many cases this movement of materials is done by hand, in other cases mechanical equipment using skips or buckets in similar ways to those described later has been installed so that the cupolas are, in fact, mechanically charged although not from the point of view of the definition given in the introduction to this paper. For instance, there is the common case in which a complete metal charge, or a certain component of it, is taken to the cupola in a tilting skip or wheelbarrow and tipped directly through the charging door without subsequent levelling or adjustment by hand. From the point of view of the operation of the cupola even this latter procedure should be described as mechanical charging as distinct from true hand charging which must involve the manual handling of each individual piece of pig and scrap and the placing of it in the most advantageous position in the cupola to give the best sequence of melting of the components of the charge and the best conditions for uniform charge movement downwards and gas flow upwards.

While it must be admitted that the hand placing of cupola charge materials cannot be exactly reproduced by any mechanical method, it has been sufficiently demonstrated that in the majority of iron foundries the advantages accruing from the use of mechanical charging are sufficient to outweigh any benefit normally attributed to hand charging. Provided that care is taken in the selection of suitable mechanical charging equipment and in its operation, then it is normally found that the stock distribution in the cupola is sufficiently near to that of good hand charging to meet all normal requirements.

Advantages of Mechanical Charging

The advantages which can be claimed for mechanical charging as opposed to hand charging might include the following:

Reduction in labour.—This follows from the substitution of mechanical power for the manual labour involved in such operations as pushing wheeled skips, picking up pieces of pig and scrap and transferring them to skips or to the cupola, etc. With hand charging, the labour involved is roughly proportional to the weight of material being handled. With mechanical charging, however, where most of the "lifting and shifting" is done by mechanical power, the number of men employed depends not so much on the weight of material as on the number of mechanical operations to be controlled. It therefore follows, as would be expected, that the saving in labour is likely to increase as the weight of iron to be handled increases.

Improved supervision.—As indicated previously, hand charging normally involves the making-up and weighing of charges on the charging platform and the hand placing of them into the cupola. As the effective supervision of these processes on the charging platform is often inconvenient, the operation of the cupola depends to a very large extent

* Paper presented at the annual conference of the Institute of British Foundrymen, Mr. Colin Gresty in the chair.

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on the skill and conscientiousness with which the men on the platform perform their duties. Where the work on the platform is not, in fact, carried out efficiently not only is the main advantage of hand charging lost but mechanical charging has the advantage of facilitating the supervision of the making-up and weighing of the charges, as this is normally done at ground level.

Better working conditions.—The hand charging of cupolas can be, and often is, heavy, hot and unpleasant work. With mechanical charging, however, most, if not all, of the labour involved is removed from close proximity to the cupola charging door and, in fact, from the platform altogether. The substitution of mechanical power for much of the physical labour encourages the men controlling the operations to be conscientious about their duties, gives them an added sense of responsibility, promotes better "housekeeping" and tends to reduce the number of minor personal injuries often resulting from the manual handling of pig-iron and scrap.

Less Expensive Charging Platform in New Installations.—With hand-charging, a platform of suitable size and strength to provide adequate working space and storage facilities is often quite costly. Mechanical charging systems, however, normally only require a relatively light service and inspection platform, so that with new installations the cost of the heavy platform and of the hoist or lift which would be associated with it can be offset against the cost of the mechanical plant. In some cases it is preferred to provide a charging platform which is capable of storing, say, one day's supply of materials, as an insurance against mechanical breakdowns, but provided that equipment of proved reliability is installed, and that maintenance is satisfactory, this should normally be unnecessary.

Reduction in Coke Consumption.—This does not necessarily follow the introduction of mechanical charging, but can result where its introduction allows the use of a higher charging door. It is fully recognised that the height from tuyeres to charging door is an important dimension governing the coke consumption of a cupola. Many hand-charged cupolas, however, have charging doors which are at too low a level for maximum efficiency, this situation having come about by the need, for hand charging, to relate the height of the charging door to the height of the charging platform which, in turn, is often governed by other building considerations such as head-room above the platform. Mechanical charging systems can often render the cupola quite independent of the conventional type of platform, and hence the charging door can more readily be arranged at its optimum height. Improved coke consumption can also result from the closer supervision allowed and the better working conditions provided by mechanical charging.

Cupola Design as Affected by Mechanical Charging

Mention has already been made of the advantage sometimes obtained from mechanical charging in allowing the charging door to be arranged at its optimum level. There is, however, one other factor arising from mechanical charging which should be considered when deciding the actual position of the charging door. While mechanical charging cannot reproduce the hand placing of charge materials, every endeavour should be made to reproduce hand charging as far as possible from the point of view of distributing each charge of metal, coke and limestone evenly over the full area of the cupola shaft. It is almost always found, particularly with the side-discharge type of charger, that the charges spread more evenly if the top of the charge column is kept a short distance below the sill of the charging door. The actual distance needs to be found by experiment for each installation, but as a general rule it is desirable for the charging door sill of a mechanically charged cupola to be two or three feet higher than for a similar hand-charged furnace where the stock level can be maintained right up to the sill.

The side-discharge type of charger does not normally involve any modification to the conventional cupola lining shape, but where bottom discharge buckets are to be used for charging, the lining thickness at charging door level is normally kept to a minimum in order to provide as much room as possible for the operation of the bucket and the discharge of its contents. The lining can revert to its normal thickness a short distance below the charging door sill, the slope of the transition zone being about 45 deg.

The impact of the pig and scrap on being discharged from the skip or bucket of a mechanical charger imposes a severe shock on the cupola lining. With side-discharging, the worst impact normally takes place on the wall opposite to the charging door, and with bucket charging at the ledge below the charging door, where the change in lining diameter occurs. It is, therefore, normal practice for the lining at charging-door level, and for some feet below the sill, to be constructed from hollow cast-iron blocks. The level to which the cast-iron lining can be taken downwards depends on the cupola operating conditions, particularly the charge-coke ratio and the melting rate, but the bottom of the iron lining can normally be, say, 10 ft. above tuyere level, if not lower. The weight of the iron blocks should be taken by angle rings inside the shell, or the blocks may be bolted individually to the shell.

The size of the charging door itself depends on the charging method employed, bottom-discharge buckets often requiring a very large door as judged by hand-charging standards. With a large door, care should be taken, of course, to see that any necessary strengthening is carried out to enable the shell to bear the weight of the stack, its lining, and any spark arrester that may be supported by the stack.

It is most desirable that a small supplementary door be provided with its sill corresponding with the expected top level of the charges when the cupola is in normal operation. This door may be used for checking the level of the coke bed and also for any levelling or poking of the charges which may become necessary.

Choice of a Mechanical Charging System

There is obviously no one method of mechanical charging which is the most satisfactory under all sets of conditions and numerous factors need to be considered in evolving a design for a particular foundry. These factors include the following:—

(1) The total number of cupolas to be served by the installation.
(2) The maximum number of cupolas in use at any one time
(3) The shell diameter of each cupola.
(4) The maximum melting rate of each cupola.
(5) The maximum number of charges per hour for each cupola.
(6) The duration of the melting period for each cupola.
(7) The maximum metal charge weight to be used in each cupola.
(8) The bulk density of the metal charge.
(9) The charge-coke ratio, if the coke is to be charged mechanically.
(10) Maximum dimensions and maximum weight of any individual piece of scrap included in the charges.
(11) The site conditions around the cupolas.
(12) The arrangement and position of the stock-yard relative to the cupolas and to incoming materials.

Owing to the infinite number of ways in which the above factors may be combined in individual foundries, no attempt is made in this Paper to describe or illustrate complete layouts, but rather to consider separately the four main component parts of a complete mechanical charging plant so that an intending user can more easily select those items which are most suitable for his particular set of conditions and combine them together in the most effective way. These four main component parts, which will now be discussed separately, are as follow:—

(*a*) The skips or buckets;
(*b*) The hoist or charger;
(*c*) The equipment for making-up and weighing the charges, and
(*d*) The stock-yard.

Types of Charging Skips and Buckets

The principal types of skips and buckets in use for mechanically transporting charges to the cupola and discharging them are shown diagrammatically in Figs. 1 to 7. They may be divided into two main classes, namely, "skips," which are substantially rectangular in shape and which, for discharging, are tilted so that the materials leave by the side or the top of the container, and "buckets," which are essentially cylindrical in shape, which remain with their axis vertical and which are discharged from the bottom.

Fig. 1 shows a skip which remains an integral part of the hoist or charger and which is not normally detached from the hoisting cable.

Fig. 2 shows a removable skip which, for hoisting, is (*a*) run into a frame or cage which is an integral part of the hoist, or (*b*) picked up direct by the hoisting cable. The skip may be wheeled away from the hoist to a more suitable point for the making-up and weighing of the charge.

The skips illustrated in Figs. 1 and 2 are of the type having an open top and which, therefore, discharge from the top. The above remarks apply equally to skips having the top and one end open (*e.g.*, Figs. 12 and 13) and which are normally known as side-discharge skips.

Fig. 3 shows a bottom-discharge bucket having a single bottom door hinged at its edge and operated by a latch. Fig. 4 shows a similar bucket with double doors hinged at the edge and opening at the centre, while Fig. 5 illustrates a trip-discharge bucket with double doors hinged along a diameter and opening from the edge.

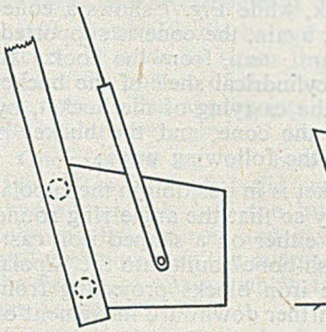


FIG. 1.—*Integral Skip.*

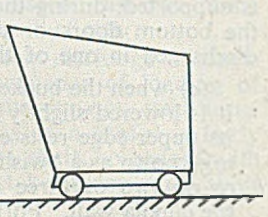


FIG. 2.—*Removable Skip.*

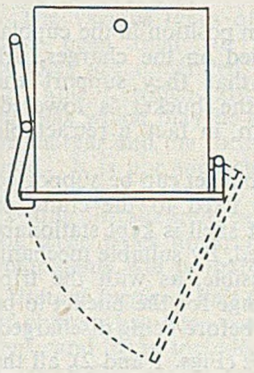


FIG. 3.—*Single-door, Trip-discharge Bucket.*

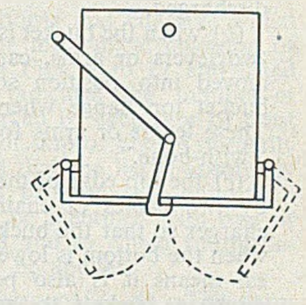


FIG. 4.—*Double-door, Trip-discharge Bucket (Centre Opening).*

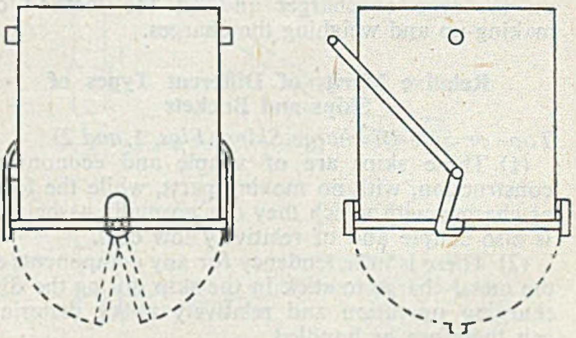


FIG. 5.—*Double-door, Trip-discharge Bucket (Side Opening).*

Mechanical Charging of Cupolas

The latch holding the doors of any of the trip-discharge buckets (Figs. 3 to 5) can be operated in either of the following ways:—(*a*) as the bucket enters the cupola, the upper arm of the latch hits a striking plate in the wall of the cupola opposite to the charging door, or (*b*) by means of a trip-line controlled by the operator of the charger or crane. In this case it is sometimes arranged that the bucket can be lowered inside the cupola before it is discharged, thus minimising the shock imposed on the coke and the lining during the initial filling of the cupola.

Fig. 6 shows a double-door, bottom-discharge bucket in which the doors are supported by the crane or charger hook, while Fig. 7 shows a cone-bottom bucket where, again, the cone is supported, by means of the central stem, from the hook. In both these cases the cylindrical shell of the bucket is supported, during the carrying of the bucket, by the bottom doors or the cone, and the bucket is discharged in one of the following ways:—

(*a*) when the bucket is in position in the cupola, it is lowered slightly so that the angle ring round its upper edge rests either on a shaped iron casting known as a "wish-bone" built into the cupola, or on two or three iron blocks projecting from the cupola wall. Further downward movement of the hook then results in the bottom doors or cone being lowered and the contents of the bucket discharged.

(*b*) when the bucket is in position in the cupola, two levers or arms, carried on the charger, are moved into position so that they support the bucket top flange when the bucket is lowered. These levers or arms form, in fact, a retractable "wish-bone."

(*c*) the top edge of the bucket can be supported by two cables or chains fixed to the crane or charger so that the bucket shell is kept stationary when the bottom is lowered. By suitable mechanical means it is also possible, as with the trip-discharge buckets, to arrange for the bucket to be lowered inside the cupola before being discharged.

As in the case of the skips (Figs. 1 and 2), all the bottom-discharge buckets (Figs. 3 to 7) may be integral with, or removable from the charger itself. Which of these two alternatives is adopted depends on the type of charger and on the method of making-up and weighing the charges.

Relative Merits of Different Types of Skips and Buckets

Top- or Side-Discharge Skips (Figs. 1 and 2)

(1) These skips are of simple and economical construction, with no moving parts, while the form of charger with which they are normally associated is also simple and of relatively low cost.

(2) There is little tendency for any components of the metal charge to stick in the skip during the discharging operation and relatively bulky materials can therefore be handled.

(3) Due to the inclined discharge from the skip, there is a tendency for non-uniform distribution of the charges across the cupola. For instance, the metal charge may be thrown to the far side of the furnace while the coke tends to fall on the near side. This does not happen to any appreciable extent on small cupolas with an internal diameter at the charging door of, say, 24 in., but may become more serious as the cupola size increases until at a shaft diameter of, say, 42 in., alternative means of charging should be considered. This tendency to maldistribution may normally be sufficiently overcome on all but the larger cupolas by careful attention to design and operation. For instance, the best angle for the discharge chute should be established, the charges in the cupola should be kept at their optimum level a little below the charging door sill, while the fitting of swinging plates, bars or chains in the delivery chute in order to reduce the momentum of the charges may result in a substantial improvement in distribution.

(4) The impact of the charges on the far wall of the cupola is severe but this can normally be counteracted by the fitting of iron lining blocks.

Trip-Discharge Buckets (Figs. 3 to 5)

(1) On the operation of the latch, the whole charge is immediately dropped into the cupola. Thus the lining and the bed coke are subjected to appreciable impact particularly when the cupola is not full, unless the charger is of the type where the bucket can be lowered inside the cupola.

(2) The rapid discharge of the bucket does, however, tend to allow a shorter charging cycle than with controlled-discharge buckets.

(3) There is a certain amount of danger associated with these buckets on account of the possibility that the latch may not be properly fastened, or that it may be operated accidentally.

(4) When the latch is operated by means of a striking plate in the cupola, it must be ensured that the cupola structure is adequate to withstand the bucket hitting the striking plate with considerable impact.

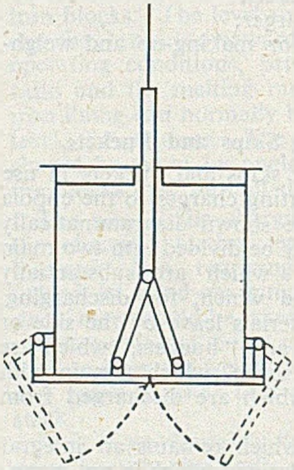


FIG. 6.—*Double-door Controlled discharge Bucket (Centre Opening).*

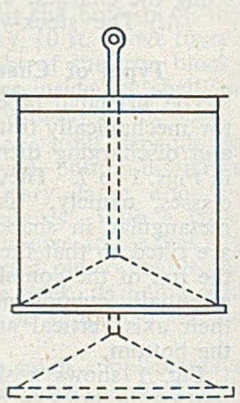


FIG. 7.—*Cone-bottom, Controlled discharge Bucket.*

(5) The buckets, having no internal obstructions, have a maximum capacity for their size.

(6) The single-door bucket and the double-door, centre-opening bucket (Figs. 3 and 4) offer no obstruction to the free discharge of their contents so that bulky components of the charge are unlikely to become jammed in the bucket. In the Fig. 5 bucket, the central hinge is liable to cause some slight obstruction.

(7) The single-door bucket and the double-door, side-opening bucket (Figs. 3 and 5) can be of larger diameter, and hence larger capacity, for a given cupola diameter, than other types of bucket as virtually no clearance is required between the bucket and lining for the swinging of the doors. With the single-door bucket, the door is arranged to swing outwards through the lower part of the charging opening.

(8) Unless some mechanical provision is made for closing and latching the doors as the bucket returns to ground level, labour must be made available for this purpose.

(9) There is a tendency for the Figs. 3 and 4 buckets to pack the charge rather more tightly in the centre of the cupola than at the circumference, as compared with the preferred condition, as obtained in good hand-charging, where the charge density is highest at the circumference.

(10) When charging coke, either alone or on top of the metal charge, in the single-door bucket (Fig. 3) there may be a tendency for the door, on its return swing into the charging opening, to strike some of the coke which is still falling and throw it to the far wall of the cupola.

Controlled-discharge Buckets (*Figs.* 6 *and* 7)

(1) The rate of discharge of these buckets is under the control of the operator and the lower charges are therefore not subjected to such severe impact.

(2) The doors or the bottom cone being supported directly from the hook of the crane or charger, there is virtually no danger from accidental discharge of the contents.

(3) The buckets are self-closing so that no labour is necessary for the closing of the bottom doors.

(4) The buckets need to be appreciably smaller in diameter than the inside diameter of the cupola at charging door level, this reducing their capacity. The double-door bucket requires room for the movement of one of the doors (the other moving outwards through the charging opening) while the cone-bottom bucket requires an adequate clearance for the discharge of its contents from the periphery of the cone. This clearance normally needs to be about 12 inches, the diameter of the bucket thus being about 2 feet smaller than the internal diameter of the cupola at charging door level.

(5) The Fig. 6 bucket, in common with Figs. 3 and 4, tends to pack the charge rather more tightly in the centre of the cupola, but the cone-bottom bucket, Fig. 7, reproduces more closely than any other type of bucket the desirable feature of good hand charging which is a high charge density at the cupola wall.

(6) For a given bucket size, the capacity of the cone-bottom bucket is slightly lower than that of the other types, due to the volume taken up by the cone.

(7) Compared with other buckets, the cone-bottom bucket is simple in construction, having no hinges or latches.

(8) Bulky, tangled or large pieces of scrap or pig are not so readily discharged from the cone-bottom bucket as from other types. It has been suggested that this should be regarded as an advantage, however, as it is thus ensured that pieces which are, in fact, too large for the cupola are not charged.

(9) Where buckets are to be loaded directly by magnet, the central stem of the cone-bottom bucket may interfere with the loading of some types of material. This may also apply to some extent to the side-arms or cross-beam of the Fig. 6 bucket.

(10) As metal is discharged from the cone-bottom bucket, it tends to strike the cupola lining at the level of the bottom of the bucket and so cause abrasive wear. The appropriate use of cast-iron lining blocks, however, obviates any ill-effects.

One feature of all bottom-discharge buckets (Figs. 3 to 7) is that the sequence of loading of charge materials into the bucket (*e.g.*, steel scrap followed by pig-iron and cast-iron scrap) is fairly well reproduced in the cupola shaft, compared with the degree of mixing which takes place when skips are discharged.

Types of Hoists and Chargers

The various types of hoists and chargers which have been used for the mechanical charging of cupolas are illustrated in Figs. 8 to 22 and listed in Table I, which also indicates the number of cupolas which may be served by each type of hoist or charger and the form of skip or bucket normally used. It is not suggested that the list is absolutely comprehensive, but it is believed that almost all existing installations can be identified with one of the basic types illustrated and to which future developments will probably be applied.

Radial Inclined Belt Charger (*Fig.* 8).—This form of charger has been used only to a very limited extent, and it is included here mainly so that the

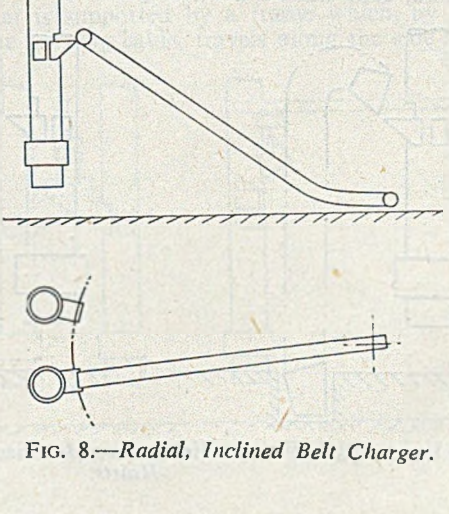


FIG. 8.—*Radial, Inclined Belt Charger.*

TABLE 1.—*Types of Hoists and Chargers.*

	Type of hoist or charger.	Number of cupolas which may be served by one set of equipment.	Skip or bucket normally used.
Fig. 8	Radial inclined belt charger	Unlimited, provided on arc of circle	—
Fig. 9	Vertical or inclined skip hoist	1	Fig. 1, 2
Fig. 10	Vertical or inclined skip hoist with bifurcated chute	2	Fig. 1, 2
Fig. 11	Travelling vertical skip hoist	Unlimited, provided in one line	Fig. 2
Fig. 12	Transverse monorail skip hoist	Unlimited	Fig. 1, 2
Fig. 13	Monorail skip hoist with bifurcated chute	2	Fig. 1, 2
Fig. 14	Vertical or inclined bucket hoist	1	Fig. 6, 7
Fig. 15	Radial inclined bucket hoist	Unlimited, provided on arc of circle	Fig. 3-5
Fig. 16	Jib crane charger	1 or 2	Fig. 3-7
Fig. 17	Crab (or horseshoe) type crane charger	1	Fig. 3-7
Fig. 18	Radial monorail crane charger	Unlimited	Fig. 3-7
Fig. 19	Travelling monorail crane charger	Unlimited	Fig. 3-7
Fig. 20	Overhead travelling crane charger—crab infeed	Unlimited, provided in one line	Fig. 3-7
Fig. 21	Overhead travelling crane charger—bridge infeed	Unlimited, provided in one line and subject to the span of the crane	Fig. 3-7
Fig. 22	Travelling gantry crane charger	Unlimited, provided in one line	Fig. 3-7

survey shall be as complete as possible. Apron plate and wire mesh conveyors have been used, usually with transverse slats fitted to the belt so that a reasonable inclination may be obtained. This form of charger can, of course, be fitted to a single cupola, or to more than one if the cupolas are arranged on an arc of a circle about a point at which the lower end of the conveyor is pivoted. The main disadvantages of this form of charger would appear to be (*a*) that with a belt of normal width and power, it would not be possible for a complete metal charge to be loaded at one time on to the lower end of the conveyor, it probably being necessary to hand-feed each piece of iron on to the belt, and (*b*) that the moving parts of the conveyor are prone to damage and wear from heavy pieces of iron, sand, coke dust, etc.

Vertical or Inclined Skip Hoist (*Fig.* 9.)—This hoist, or one of its modifications, probably accounts for the majority of mechanical cupola charging installations in Great Britain. Details of mechanical design may vary according to the manufacturer and the site conditions, but the principle of operation is as indicated in the diagrams, the skip being hoisted from ground level and then tipped in order to discharge its contents into the cupola. The skip may be either integral or removable, one of each type being shown in Fig. 9. The hoist may be substantially vertical, or inclined at any suitable angle. The vertical type takes up a very small area in plan and is, perhaps, rather more economical in construction, but the inclined hoist has the advantage that more working space is allowed round the bottom of the cupola and the hoist loading point is relatively remote from the cupola "drop." The hoist motor may be running continuously and the skip motion controlled through a manually-operated friction clutch, but most modern hoists are completely automatic and, by means of limit switches and relays, one operation of the push-button controls all motions —hoist, pause during discharge, and lower. For one hoist of this type to serve two or more cupolas, one of the modifications illustrated in Figs. 10 and 11 must be adopted.

Vertical or Inclined Skip Hoist with Bifurcated Chute (*Fig* 10).—In this case the hoist, which may be vertical or inclined and have integral or removable skips, discharges into a twin chute arranged between the two cupolas which are to be served. In the centre of this twin chute is a hinged deflector plate having two alternative positions which govern which cupola is to receive the charge. In an alternative arrangement, the hoist may discharge on to a horizontal flat tray which is then tilted in the desired direction by means of a separate mechanism. This form of hoist may not normally be used to serve more than one pair of cupolas.

Travelling Vertical Skip Hoist (*Fig.* 11).—In this form of hoist the whole structure and mechanism is mounted on a trolley which runs on a gantry and rails parallel with the line of cupolas to be served. Thus any one cupola out of two or more can be charged by means of the one hoist. Removable skips are normally employed, these being held in a

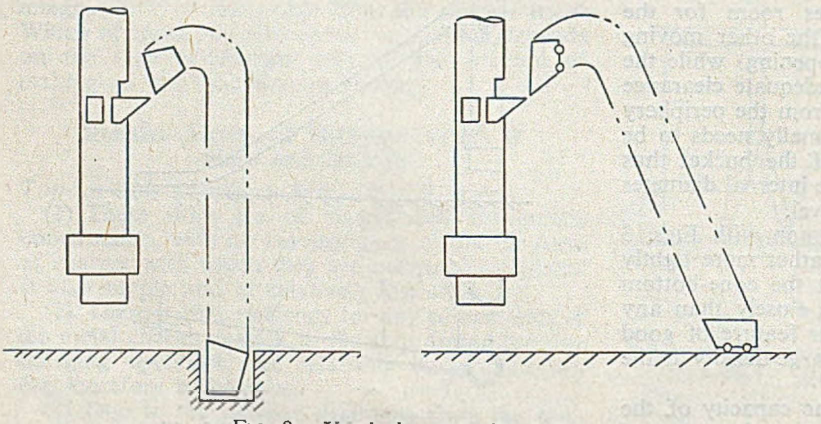


FIG. 9.—*Vertical and Inclined Skip Hoists.*

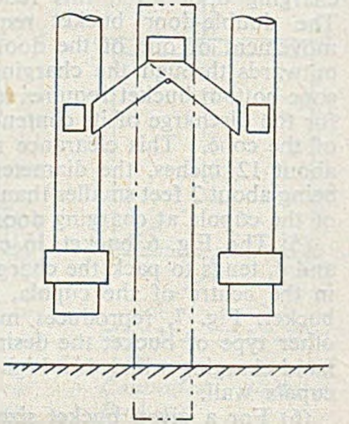


FIG. 10.—*Vertical or Inclined Skip Hoist with Bifurcated Chute.*

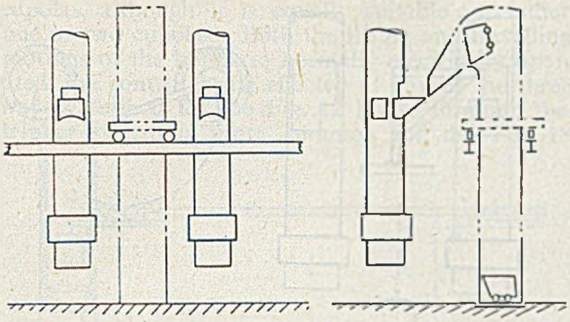


Fig. 11.—*Travelling, Vertical Skip Hoist.*

cradle which is an integral part of the hoist. The hoisting mechanism is generally fully automatic, being operated from one push-button, the traversing mechanism from one cupola to another, however, being by means of a hand-chain. The gantry supporting the hoist may form an integral part of a charging platform of the conventional type.

Transverse Monorail Skip Hoist (*Fig.* 12).—As indicated in the diagram, this form of hoist involves the use of side-discharge skips which may be either integral or removable. The skips are so designed that, when supported by the hoist cable, they tend to tip backwards slightly so that the contents are not inadvertently discharged. After a charged skip is hoisted to its upper position the pulley block is run along the monorail until it is adjacent to the cupola to be charged. As the skip is then lowered, its rear end engages with a cross-bar supported from the cupola so that further lowering results in the skip tilting forward and being discharged. The same procedure in reverse returns the skip to ground level. Any reasonable number of cupolas may be served by the same monorail, it not being necessary for them to be, for instance, equally spaced or in a straight line. Points in the monorail are not normally required. The block and hook carrying the skip should be of the non-rotating type so that the skip readily engages with the cross-bar on being discharged.

The pick-up point—the position from which the loaded skip is picked up by the hoist—may be intermediate between two cupolas or may be at one end of the monorail at a position more convenient for charging the skips. The hoisting mechanism is almost always electrically operated, power being supplied through conductors fixed along the monorail or from a spring-loaded cable feed drum. Motion of the hoist along the monorail may be either powered or by means of hand-chain, the former obviously being preferable. In the case of a fully-powered hoist (*a*) the two motions may be individually controlled from ground level or from the charging platform, this, however, requiring most of the attention of one man; (*b*) the motions may be fully automatic and started from a single push-button at ground level; or (*c*) the hoist may be of the telpher type where the operator travels in a cabin which is integral with the hoist block. Method (*a*) is not suitable where any cupola is very remote from the control point; method (*b*) is probably not practicable for more than two cupolas, and method (*c*) is most suitable for three or more cupolas or where the distance from the pick-up point to the furthest cupola is appreciable.

Monorail Skip Hoist with Bifurcated Chute (*Fig.* 13).—In this case, the loaded skips are hoisted and discharged as in the Fig. 12 hoist, but instead of being discharged direct into the cupola, the materials fall into a bifurcated chute with deflector plate as in the Fig. 10 hoist. The hoist normally, therefore, only serves one pair of cupolas although, with a suitable system of points in the monorail, more than one pair may be charged. The hoisting and travelling motions may be controlled as in the Fig. 12 hoist although it is unlikely, in most installations, that the telpher system would be justifiable.

Vertical or Inclined Bucket Hoist (*Fig.* 14).—The arrangement of this form of hoist is similar to that of the skip hoist (Fig. 9) except that bottom-discharge buckets are employed instead of skips. The buckets are generally of the controlled-discharge type (Fig. 6 or 7) so that the final downwards movement of the loaded bucket results in the bucket flange being supported on the "wish-bone" and the bottom doors or cone being opened. A hoist of this type is generally constructed to serve one cupola only.

Radial Inclined Bucket Hoist (*Fig.* 15).—As indicated in the diagram, in this form of hoist the bucket is supported by a frame which, by means of the hoisting cable, travels along the side frames

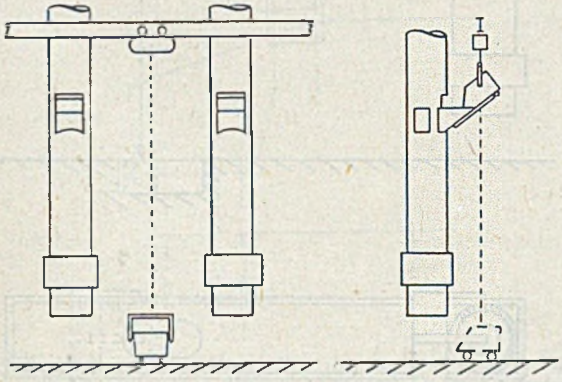


Fig. 12.—*Transverse Monorail Skip Hoist.*

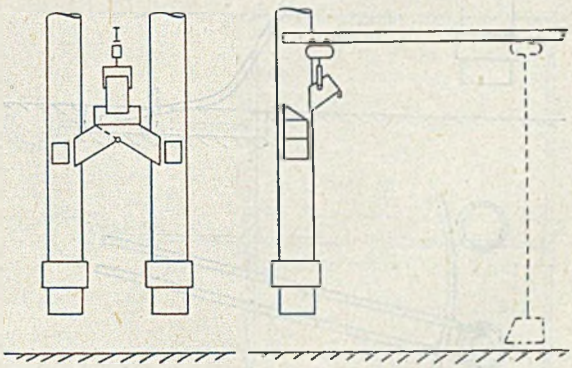


Fig. 13.—*Monorail Skip Hoist with Bifurcated Chute.*

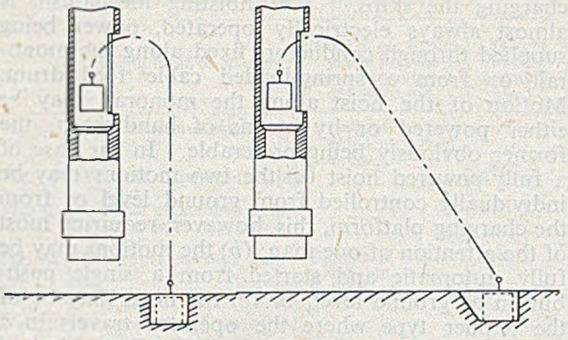


FIG. 14.—*Vertical and Inclined Bucket Hoists.*

of the hoist. The bucket is generally of the trip-discharge type so that when it reaches the top of its travel the catch strikes the block in the back wall of the cupola and the doors are released. An automatic device can be provided for closing the bucket doors as the bucket approaches the lower-most position. The hoist is normally arranged to swivel about a vertical axis through the bucket when it is in its bottom position so that the bucket is always in the same position for loading, and one hoist can be used to serve any reasonable number of cupolas arranged on the arc of a circle. The upper part of the hoist is supported by an elevated arcuate track, it being possible for the swivelling motor to be fitted with automatic indexing control so that any two cupolas working together may be charged alternately.

Jib Crane Charger (*Fig.* 16).—In this case, a jib crane mounted on the charging platform hoists the bucket from ground level and the jib is then rotated so that the bucket is swung into the cupola which is to be charged. The rotation of the jib may be either powered or manual. British Patent No. 574,404 refers to a jib crane charger the vertical member of which is slightly inclined. When the bucket reaches its topmost position and a catch

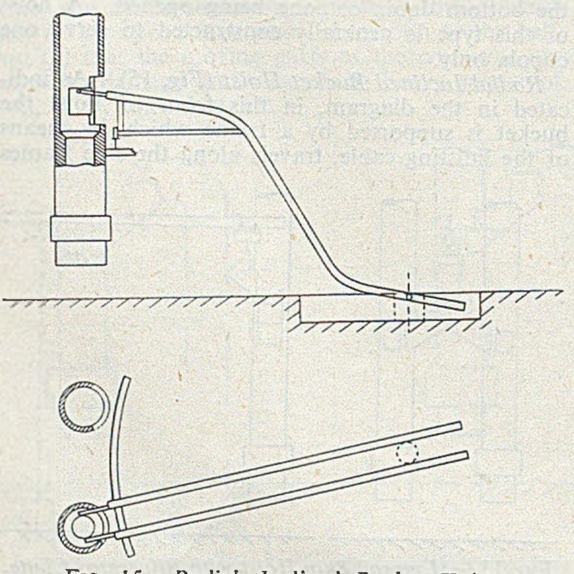


FIG. 15.—*Radial, Inclined Bucket Hoist.*

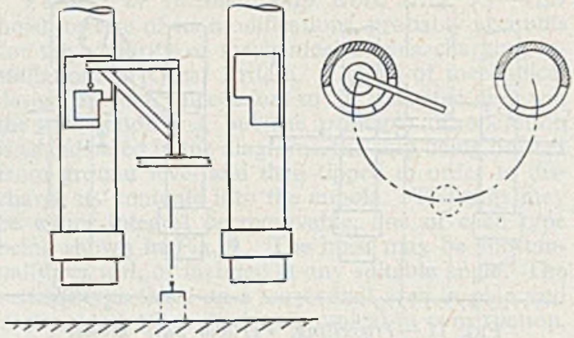


FIG. 16.—*Jib Crane Charger.*

holding the jib is released, the loaded bucket pulls the jib round until the bucket is inside the cupola, a counterpoise weight being raised at the same time. The bottom doors of the bucket are automatically tripped, the counterpoise weight pulls the jib carrying the empty bucket back to the loading position and the bucket is then lowered to ground level for recharging. A fully-electric crane, as in the case of the monorail skip hoists, may have its two powered motions manually controlled, or fully automatic. Either one or two cupolas may be served by this form of charger.

Crab (*or Horseshoe*) *Type Crane Charger* (*Fig.* 17).—In this form of charger, the crab carrying the hoisting mechanism travels along a straight fixed gantry running between the pick-up point and the cupola. As only one cupola is served, the electrical motions can conveniently be made automatic and actuated from ground level even where the cupola is at an appreciable distance from the pick-up point.

Radial Monorail Crane Charger (*Fig.* 18).—This charger is probably one of the most suitable types where it is desired to charge, by means of bottom-discharge buckets, three or more irregularly-spaced

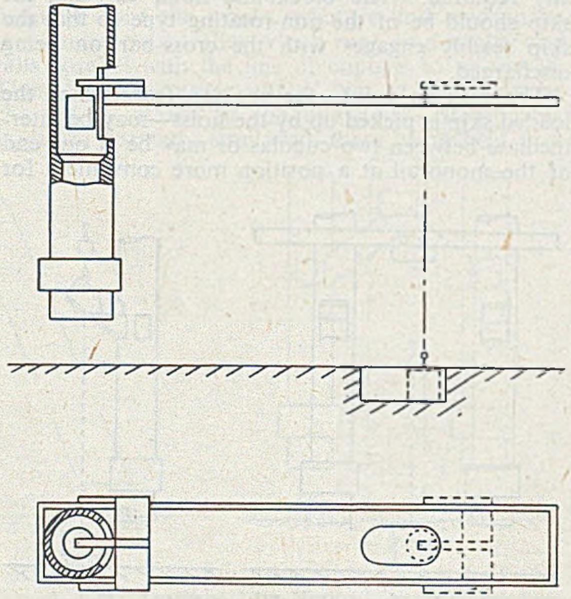


FIG. 17.—*Crab or Horse-shoe Type Crane Charger.*

cupolas, although it is equally suitable for either one or two cupolas. Both the lifting and travelling motions of the hoist are normally electrically operated, the control being effected in any of the three ways described for the Fig. 12 hoist, although the telpher system is more common for the Fig. 18 charger. Where two or more cupolas are to be served, provision must be made for directing the hoist and bucket to the cupola which is to be charged. As alternatives to the more conventional points or switches in the monorail, sections of the rail may be arranged to rotate or travel as indicated diagrammatically in Fig. 18*a*.

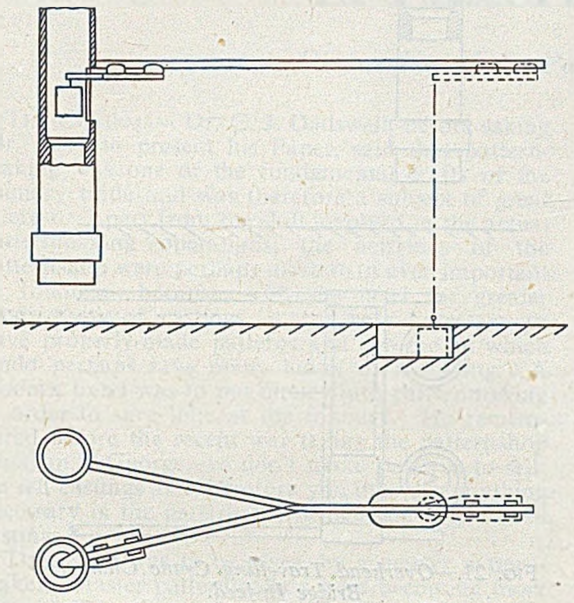


FIG. 18.—*Radial Monorail Crane Charger.*

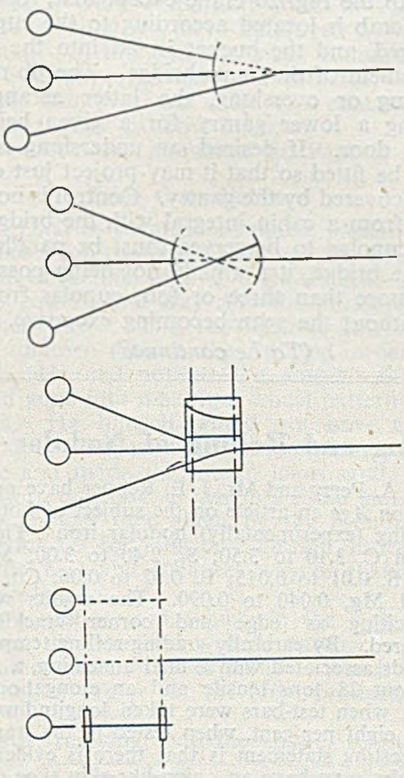


FIG. 18(*a*).—*Some Alternatives to Conventional Points or Switches in a Radial Monorail Crane Charging System.*

In the cases illustrated, the pick-up point will normally be towards the right-hand side of each diagram, although in the second case shown the pick-up point may be at the centre of the rotating portion of the monorail, in which case this portion must be long enough to accommodate the hoist in half its length. In any one case, the particular operating conditions (*e.g.*, the number of cupolas to be charged at any one time) will determine whether the points or other diverting devices are to be operated manually or electrically and whether they are best controlled from ground level, from the charging platform or from the telpher cabin. In the larger installations and where maximum reliability is required, a stand-by hoisting unit may be provided, this normally being accommodated on a spare branch in the monorail.

Travelling Monorail Crane Charger (*Fig.* 19).—The principle of operation of this form of charger is exactly the same as that of the Fig. 18 charger, but the main length of monorail travels on end-carriages as in a normal travelling crane so that the hoist may, in fact, serve as a crane over the whole stock-yard area. In addition, means may be provided, if desired, for rotating the whole hoisting unit end-for-end so that the jib may extend outside the stock-yard on the side remote from the cupolas and the hoist thus be used, for instance, for unloading from wagons on a track adjacent to and parallel with the side of the stock-yard. The telpher type of hoist is almost essential in a charging system of this type.

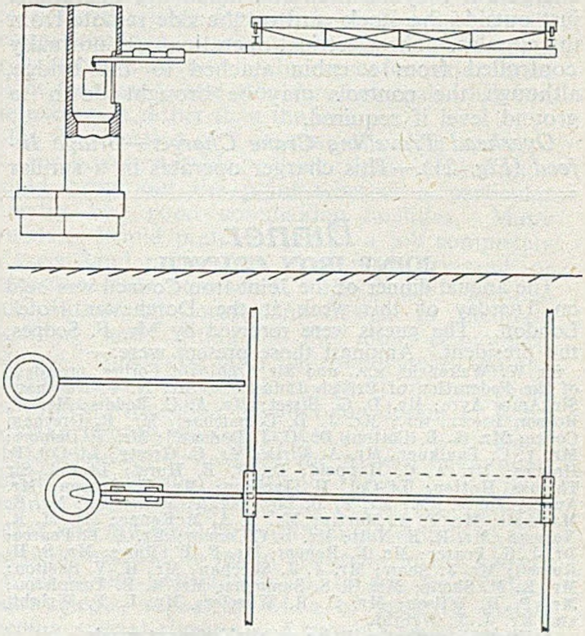


FIG. 19.—*Travelling Monorail Crane Charger.*

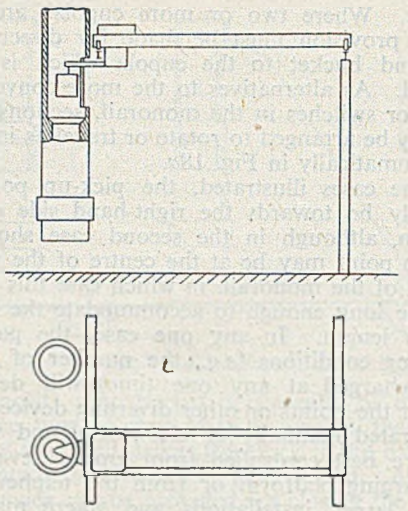


FIG. 20.—*Overhead Travelling Crane Charger—Crab In-feed.*

Overhead Travelling Crane Charger—Crab Infeed (*Fig.* 20).—The operation of this form of charger is apparent from the diagram which shows that it consists of a travelling crane, one rail of which runs adjacent to the line of cupolas to be served, and just above the level of the charging doors. The crane crab carries an underslung jib which may project under the crane rail and into any of the cupolas. Thus in operation the crane may pick up the charged bucket from any convenient point in the area covered by the crane, the bridge is run to a position opposite the cupola to be charged, movement of the crab then running the bucket into the furnace. In certain cases the jib may be constructed so as to revolve so that, as in the case of the Fig. 19 charger, it may be used for unloading operations just outside the stock-yard on the side remote from the cupolas. The electrical operations are normally controlled from a cabin atached to the bridge, although the controls may be brought down to ground level if required.

Overhead Travelling Crane Charger—Bridge Infeed (*Fig.* 21).—This charger operates in a similar manner to the Fig. 20 crane except that, for charging, the crab is located according to the cupola to be charged, and the bucket is fed into the cupola by movement of the crane bridge. The jib may be underslung or overslung, the latter arrangement permitting a lower gantry for a given height of charging door. If desired, an underslung rotating jib may be fitted so that it may project just outside the area covered by the gantry. Control is normally effected from a cabin integral with the bridge. The line of cupolas to be served must be parallel with the crane bridge, it normally not being possible to charge more than three or four cupolas from one crane without the span becoming excessive.

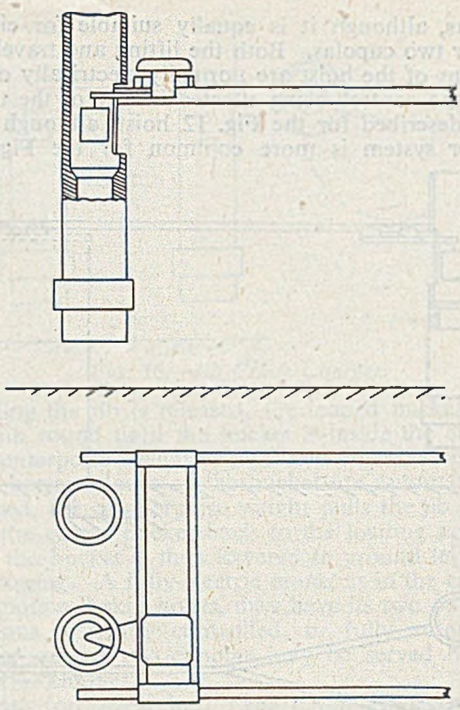


FIG. 21.—*Overhead Travelling Crane Charger—Bridge In-feed.*

(*To be continued*)

Dinner

JOINT IRON COUNCIL

The annual dinner of the Joint Iron Council was held on Tuesday of this week at the Dorchester Hotel, London. The guests were received by Mr. F. Scopes, the president. Amongst those present were:—

Sir W. Wakefield, M.P., and Sir Archibald Forbes, president of the Federation of British Industries; Mr. N. P. Newman; Sir Amos Ayre; Mr. D. G. Bisset; Mr. A. C. Boddis; Mr. W. Robson Brown, M.P.; Mr. J. D. Carmichael; Mr. R. Gresham Cooke; Mr. G. B. Cotton; Dr. C. J. Dadswell; Mr. V. Delport; Mr. V. C. Faulkner; Mr. A. Firth; Mr. C. Gresty; Lt.-Col. F. Holmes; Mr. A. C. Happold; Dr. J. E. Hurst; Lt.-Col. Sir Thomas Hutton; Lt.-Col. H. Jackson; Mr. V. Jobson; Mr. Aubrey Jones, M.P.; Mr. F. D. Ley; Mr. T. Makemson; Mr. K. Marshall; Mr. F. A. Martin; Mr. T. A. McKenna; Mr. M. R. Norman; Mr. R. E. Nutt; Mr. L. O'Connor; Mr. A. E. Pearce; Dr. J. G. Pearce; Mr. F. Rogers; Mr. F. W. Rowe; Mr. S. H. Russell; Mr. J. Shaw; Mr. J. J. Sheehan; Mr. H. V. Shelton; Mr. R. M. Shone; Mr. G. S. Summers; Mr. R. B. Templeton; Mr. P. H. Wilson; Mr. C. R. Wheeler; Mr. L. F. Wright, and Mr. J. T. Wright.

A further report will be published next week.

Forging and Rolling of Nodular Iron

Mr. J. A. Perry and Mr. J. E. Rehder have published in the *Iron Age* an article on the subject of hot-forging and rolling (experimentally) nodular iron. The metal contained C, 3.10 to 3.50; Si, 2.40 to 3.00; Mn, 0.30 to 0.50; S. 0.01 to 0.015; P. 0.02 to 0.06; Cu. 0.00 to 0.70 and Mg, 0.040 to 0.090. The results were not very exciting as edge and corner cracking was encountered. By carefully grading rolling temperatures and speeds associated with a final annealing, a material gave about 28 tons tensile and an elongation of 20 per cent. when test-bars were taken longitudinally (but down to eight per cent. when tested in the transverse). An interesting statement is that there is evidence that the nodules may have an onion-like-skin type of structure. During rolling, layers are pushed off in succession and stretched into stringers or discs.

Some Present-day Practices in Patternmaking*

Discussion of the Paper by Mr. B. Levy

THE CHAIRMAN, Dr. C. J. Dadswell, before asking Mr. Levy to present his Paper, said that patternmaking was one of the fundamental crafts of the foundry trade and was therefore a subject of great interest. Apart from the skill involved in the actual patternmaking operations, the activities of the patternshop were perhaps more than ever important to foundries because, with the need for greater productivity of castings, it was very necessary to have properly-made patterns and core-boxes which could perhaps save many hours of moulding. A modern trend was to put money into patternmaking in order to save time at the foundry. He remembered before the recent war telling the patternshop foreman, "George, we don't make patterns to sell; we sell castings and therefore you must do anything necessary in the patternshop which will help to sell castings."

The Paper was to be given by a master patternmaker. Master patternmakers were becoming more important in this country. The master patternmaker was a very important man in America because few foundries there employed a patternmaking staff. In this country, many foundries had perhaps fewer patternmakers than hitherto, yet they were busier than ever, and in his own case, the firm was having to buy patterns outside.

(MR. B. LEVY then presented his Paper.)

Prior Consultation

MR. H. HAYNES pointed out that a patternmaker could make a job costly for a foundry or otherwise on account of the fact that he might think he should make the pattern one way and the moulders prefer another way. Did the lecturer consult the foundry foremen before they placed orders for patterns? He had noticed the amount of work which had gone into making a wheel pattern about 10 ft. dia. He himself would not have used a pattern, but would just have obtained loam moulding tackle and made the job in loam sand. That was the sort of thing to which he did not think there was enough time given by the foundry and the patternmaker for joint consultation, in order to develop the best and cheapest way of making an accurate casting.

Another question was, which, in the opinion of the lecturer, was the best type of pattern to use—wooden, aluminium, brass or iron? Which would a patternmaker prefer for the mass production of castings?

MR. LEVY, replying, said the answer to the first point was most decidedly in favour of prior consultation. A most important point in patternmaking was to know precisely what the foundryman had in mind to use. He thought he had made it fairly clear at the beginning of his Paper—"number of castings to be produced in single batches and the maximum future total requirements." That was the first question that a good patternmaker would ask his foundryman. Other matters to be considered were equipment available in the particular foundry and the manner chosen for moulding, by which was meant the size of moulding boxes, tackle, whether the job would go on machines, or whether it was a Sandslinger job; and type of labour to be employed—skilled, semi-skilled or unskilled. In one non-ferrous foundry in particular the preference was definitely for a pattern suitable for a skilled moulder. If his firm supplied plastic patterns or first-class metal patterns there was more objection to that than if they sent down a loose pattern involving a very high degree of skill, simply because the staff of that foundry were skilled moulders. That was probably an exception, but nevertheless the patternmaker did want to know what type of pattern was wanted; whether a job was wanted which could be given to an unskilled operator or whether it was a job for a skilled man. More often, the request was for the former rather than the latter.

Another matter was "considerations of handling the pattern, arising from such obstacles as fragile design, compound curves on thin sections, warping or possible distortion." In some foundries there might be some gentle moulders but again that was the exception rather than the rule.

On the question of "amount of coring and type of coreboxes suitable," there again consultation would bring out the point whether a particular foundry had good coremaking facilities. Many foundries would prefer to mould a job completely in green-sand rather than have much dry-sand, or even green-sand core work. The clause "possible modification of component design to facilitate moulding and casting in the most economical manner" concerned both the foundryman and the patternmaker. Often by co-operation one could get the drawing office to alter the design in order to make it both more practical and an economical job to mould and to make the pattern equipment. Finally, "machining or absence thereof on the final casting," was another matter where the patternmaker and the moulder both wanted details so that the pattern could be made to mould in the correct way, with the best side down, to suit any feeding requirements, especially when of steel or metals needing special risering and running arrangements.

* Paper presented to the Newcastle-upon-Tyne Conference of the Institute of British Foundrymen and published in the JOURNAL, July 19, 1951.

Some Present-day Practices in Patternmaking

Referring to Mr. Haynes' point about the wheel pattern, that had been for a particular foundry where there were no loam moulders. By employing the pattern-milling machine, his firm had been able to produce the pattern at a very reasonable cost, and, although he could not mention actual figures, it proved that it was a better proposition as a pattern-moulded job than as a loam job.

Incorporation of Camber

MR. DAY asked Mr. Levy whether, in making patterns, especially patterns of large dimensions and substantial length, he prompted foundrymen as to the necessity in some cases for camber to be incorporated in the pattern? In his own experience it was a very important feature. His firm made quite a number of fairly long castings and invariably they had to take care of the camber in the actual mould at the time, whereas if that could be taken care of in the patternmaking it would be an improvement. There was now some information available on cambering, thanks to Mr. Longden, and it was possible to get very near the mark in assessing the amount of camber which would take place. His own firm allowed for camber on the pattern, but he would like to know if it was general practice.

MR. LEVY replied that it was not a general request. In his opinion, camber was still incalculable and still speculative. As a point of interest, he had, some time before, manufactured a long pattern which was quite straight. The matter of camber had been left to him, to use his own discretion, and the foundry to which it was sent had produced a casting which cambered. The patternmaker was blamed for not allowing camber on it according to some schools of thought. However, the foundry had another attempt at making the casting as on second thoughts it appeared there might be something wrong with the moulding method. This time the foundry ran the casting differently, held the box parts down more securely, or perhaps rammed the mould a bit harder, and the fact remained that they produced a sound, flat casting on the second occasion, with no camber. Despite the fact that no camber had been added to the pattern, on the second occasion the casting was flat and straight. That case had rather impressed on him to be careful about recommending cambering. It was possible on some jobs by good foundry practice to produce a straight casting.

MR. DAY pointed out that from an illustration of a bedplate it appeared to have been made straight.

MR. LEVY confirmed that this was so.

MR. DAY agreed that such matters were not things which could be laid down for every foundry: it was only when dealing with a foundry which made speciality castings that they could put camber in. It was possible to produce one casting 28 ft. long where no camber was put in and another where $1\frac{5}{8}$-in. camber was put in, and nobody could lay down a rule. It was only from experience and trial and error that one could get a perfectly straight casting.

Full Specification on the Drawing

MR. HARVEY referred to the point raised by Mr. Haynes on co-operation. Undoubtedly a lot of time could be saved by the master patternmaker by closer co-operation between the foundryman and the buyer of the firm sending out the enquiry. Quite often, enquiries were sent to four or five different patternmakers and a drawing was sent with a request for pattern equipment with no comments as to what type of pattern was wanted—whether wood or metal, or whether the equipment was to be used for quantity production. It then happened that several master patternmakers were faced with considerable trouble in order to find out the details. If suitable comments could be added to the drawings before they were sent out of the works he felt sure much better results could be achieved.

MR. LEVY agreed entirely.

A MEMBER referred to the big wheel pattern and said in his opinion there was one fault in that pattern, namely that the main plate had been cut to form spokes. Would that not be rather a delicate operation and would it not be better if it had been left solid?

MR. LEVY replied that no difficulty had been experienced in making the castings. There again, the foundry for whom they had made that particular pattern equipment had asked them to eliminate cores as much as possible and keep them down to the smallest conceivable dimensions. For that reason, only a one-twelfth segmental core in the groove for the outside of the rim had been made. That procedure had suited the particular foundry, although it might be that other foundries would have requested something different; it was another case of co-operation.

Plastic Patterns

MR. W. B. HENDRY was very interested to learn of the new development in plastic patterns and asked whether they were suitable for making thin-walled shell patterns and also if plastic patterns could be filed or machined satisfactorily after repair. He also wished to know whether there was any future in metal-sprayed patterns from the economic point of view.

MR. LEVY replied that his firm had not done very extensive work in the matter of thin-walled plastic patterns, except that he could recall a small bracket where it would only have been $\frac{3}{32}$ in. thickness, but the size of the pattern would not have been more than 4 in. square. Whether there were thin walls naturally depended entirely on the overall dimensions of the job, the same as with any other material, but thin-walled plastic patterns could be made and apparently functioned quite well because the particular bracket that he had mentioned had been a repeat job. Obviously, the foundry liked the job and got on with it very well.

With regard to machining, the plastics could be drilled, tapped, filed and repaired. When repairing there was no need to re-cook the job: it would air-harden and became homogeneous.

Metal Spraying

The subject of metal spraying was one into which he hoped to go further in the near future. So far as the metal-spraying of existing pattern equipment within the field covered by his Paper was concerned, his own feeling was that its applications were very limited. Just before the war, a cast-iron pattern had to be built up by $\frac{1}{8}$ in. over a surface in the region of 2 ft. square. After a run of perhaps two or three hundred castings off it in its sprayed-up condition, the aluminium used for the spraying seemed then to be a perfectly sound job and holding well and satisfactorily withstanding the handling. Then, the pattern was put into storage until the war ended, when it was brought out again. The result was that the pattern was quite useless; the sprayed-metal layer had peeled off and it was considered a waste of time to do anything to it, with the result that a new pattern altogether was made. The apparent conclusion was, that metal-sprayed equipment was all right if it was going to be used continuously and watch kept on it, but not if the job was going to be put into storage.

Lifting and Rapping Plates

MR. T. B. BURROWS said he sympathised with Mr. Levy on the difficulties which he met, knowing that if one was going to make an article one could ask half a dozen foundries which way they wanted the pattern made and they would all say a different way. Co-operation was absolutely essential and was more to the front now than ever. This was facilitated when the patternshop was connected with the individual foundry that was making the castings. He thought Mr. Levy would be dismayed sometimes if he could see the way his patterns were mishandled, but at the same time he was afraid the patternmaker often made a rod for his own back. On occasions, patterns arrived at the foundry with neither lifting nor rapping plates attached, and when rapping plates were provided they were often secured with the shortest screw that could be found. In the old days it was customary to use wood screws, which were liable to fly out, but now progress had been made and most foundries used lifting screws. Generally, rapping and lifting equipment were seriously neglected in patternmaking.

MR. LEVY agreed, but thought the probable explanation was competition to get the job, especially in times when work was short. Where possible, his own firm arranged for the actual metal plate, with a tapped hole to receive the eye-bolt for lifting the pattern out of the mould, to be on the underside of the equipment. With this arrangement, when the eyebolt was screwed-in, the pull was not against the screws but on to the whole plate and under-side face, which was the proper way to arrange it. Furthermore, the same eye-bolt, if it was of substantial size, of the order of $\frac{3}{4}$ in. dia. or more, could serve for rapping if another plate with a plain drilled hole was let into the pattern on the top side.

Standard Questionnaire

MR. FLEMING said he would like to add a comment on the subject of co-operation between the person ordering the pattern and the poor fellow who had to make it. He felt it was largely a matter of education, and the people who always, to his mind, had to do the teaching were the people who wanted the changes made. He suggested there was perhaps a simple way of at least doing some useful propaganda in that direction. If an order was received for a pattern, and often such an order was issued by a buyer and not by the foundryman, and did not carry sufficient information (or even if it did), when the quotation was sent back, a good idea was for the supplier of the pattern to send a free questionnaire, asking for it to be filled in the next time a pattern was ordered. Perhaps some useful propaganda would be achieved and there would be some useful results when the next order came along. It might even have the effect that the buyer, not knowing how to answer the questions, would have to send the form to the foundry so that it could be answered, thus increasing liaison between the man who had to make the casting and the one who had to make the pattern. It might even provide a channel by which the foundryman could make any alterations that he required.

MR. LEVY replied that the questionnaire seemed an admirable idea and he would do something about it when he returned to London. From the patternmaker's point of view, the difficulty of supplying patterns merely after a quotation to a buyer was enormous. It was a most unsatisfactory method of doing business, and, of course, as a master patternmaker he always preferred to deal with foundrymen. He would strongly recommend that all buyers should hand over their purchasing of patterns to the foundry foreman or manager, and then they would really get down to precise requirements. The suggested questionnaire might go some way towards doing that.

Pattern Spraying

THE CHAIRMAN regretted that he could not give a decision about metal spraying; they had a metal-spraying apparatus in their works on the engineering side for maintenance purposes and he had asked for some patterns to be sprayed but it had been reported to be impossible.

MR. ALLEN said the main reason was that when a pattern was made it was desirable to varnish as they went along, and metal could not be sprayed on varnish.

MR. CROCKETT remarked that it was possible to put aluminium paint on the pattern successfully if one used plaster of Paris as a filler for the wood-screw holes. Metal spraying on the usual fillers would not take, but one could hot-spray metal on plaster of Paris.

THE CHAIRMAN said he had started using aluminium paint fifteen years ago. Important points in the discussion had been that the patternshops were not getting the co-operation of the foundry or that they had to instruct the foundry as to what was required. The remedy was in the hands of the foundry manager, and he urged all young men who were entering the foundry business to learn to read drawings and also, even though they did not spend a long time in the patternshop, to learn how patterns were made and what was required of them. The patternshop was the tool-room of the foundry and it should never have to tell the foundry what

Some Present-day Practices in Patternmaking

was required. When he had been in daily control of a foundry he had had the greatest satisfaction in deciding, subject to the technical details suggested by the patternshop foreman (who was a real craftsman) how he wanted the pattern made and where he wanted it split, and so on.

When on one occasion he had been criticising the price asked by a master patternmaker he had received the reply, " I can sell you a pattern for any price you like: I put into it the money that you give me," and that was why the foundry should tell purchasing departments exactly what sort of pattern to buy. Concluding his remarks, he asked the meeting formally to show their appreciation of Mr. Levy's Paper.

Written Comment

Mr. T. H. Weaver wrote that Mr. Levy could be congratulated on having the courage to bring forward his viewpoint as a master patternmaker. This Paper and discussion had shown very clearly how essential it was to have attached to any foundry, a methods and planning section where free discussion may take place, not only on patternmaking, but on equipment generally. Patterns only were not the answer to efficient production.

The importance of expressing the detail of correct pattern methods and equipment was insufficiently emphasised. Whatever the quantity, one off or 10,000 off, there was one correct approach, that of technical and practical collaboration. There was still frequently a request " How cheaply can I get the pattern and castings, why do you require this and that?" and the foundry was usually blamed for scrap castings when a little extra discussion on initial layout of methods, procedure and equipment necessary would in the end prove the most efficient and economic.

With regard to plastic patterns, from experience he considered them too fragile ordinarily and uneconomic when reinforced. Taking all methods into consideration, for small plate-work, loose or odd-side patterns, an accurate master pattern, well planned, and with cast plates or run-offs made in non-shrink pattern metal, nicely cleaned-up, was most probably one of the cheapest and satisfactory processes for general production.

Machine-moulding patterns were costly in the first approach, but when quantity and repeated production could be guaranteed then the whole pattern layout and its associated pieces should be made as a first-class engineering job, machined all over, inside and outside. Ample tapers should be allowed, and when possible the design to suit foundry production studied, pattern plates should be bolted on the pattern stool and moulding-machine table with Allen screws in stout bosses; cast iron should be used whenever possible; copper should be deposited on pattern surfaces and, finally, chromium for non-rusting and longer life.

Quite recently he had been faced with the layout for a completely mechanised plant of 500 sets of patterns and production equipment. These single sets of pattern, stools, and equipment ranged from £200 to £2,000 each, complete with electric heaters. The equipment was satisfactory, even though various cheaper approaches had been suggested and tried out—the high-class all-machined engineering patterns and equipment had returned to favour. With the pattern equipment at a high standard, and all other things also, such as sand-control, metal temperature, core-shop equipment and drying speed, then top production became a pleasure. If master patternmakers would only pursue this attitude with the customer he felt certain a general and better understanding would result. Mr. Weaver thought the Paper most stimulating.

Mr. Levy wrote thanking Mr. Weaver for his written contribution to the discussion, underlining the points already detailed in the body of the Paper. The matter of plastic patterns being too fragile for a given job was purely one of using plastics for the appropriate pattern equipment, such as that illustrated in the Paper, where both suitability and economics had been found to be favourable by a large margin.

White-metal and non-shrink run-offs were still used as a stop-gap or intermediate application, but were not considered satisfactory for any long runs, owing to their extreme softness and low mechanical properties. A further point on the subject of run-offs was that to-day's price of the constituent metals was so high that from an economic point of view they might prove to be much costlier than several alternatives. Mr. Levy was pleased to note that Mr. Weaver had found first-class metal equipment to be the most satisfactory for high-production schemes.

Mystery of Three Fires

A reward of £250 is being offered by Keith Blackman, Limited, engineers, Arbroath, for information which will lead to the detention and conviction of the person or persons responsible for three fires in their works' pattern-stores recently. There were two fires at the works within 48 hours of each other in June and a third in October. The first fire broke out in a three-storey pattern-store on June 15 and thousands of valuable wooden patterns were destroyed. On June 17, a store standing alongside was destroyed and again thousands of patterns were lost.

The third fire was in the main pattern-store on October 2, when many more patterns were destroyed. The patterns represented many years' work. Before the June fires there had not been a fire at these works for 65 years.

I.B.F. London Branch Dinner

Larger accommodation at the Café Royal, Regent Street, London, W.1, has been reserved for this year's dinner/dance of the London branch of the Institute of British Foundrymen to be held on Thursday, November 29—the date being earlier this season so as to avoid congestion with Christmas engagements. Requests for tickets already received for members, their ladies and guests are indicative that these were wise precautions: others who intend to participate are urged to make early application. The function is timed to start at 6.30 for 7 p.m. and evening dress is optional. A good band and a sparkling cabaret show have been engaged and dancing will continue until midnight. Tickets price 25s. are obtainable from Mr. A. R. Parkes, Foundry Trade Journal, 49 Wellington Street, London, W.C.2, who is assisting the branch secretary on this occasion.

Foundries in the French Ardennes*

By A. R. Parkes

(*Continued from page 529*)

ACIERIES THOME (NOUZONVILLE)

This jobbing steel foundry is one of the several factories composing the group of steel factories of Thomé Cromback, established in 1871. Until 1914, production was limited to malleable iron, and after the 1914-18 war the production of steel castings was commenced, the malleable section being transferred to Stains, near Paris, in 1923. The present buildings were erected in 1930, and comprise two lofty, concrete-roofed, main bays, 350 ft. long. One of these, 50 ft. wide, and served by two 3-ton cranes, is devoted to coremaking, moulding and melting, and the other to fettling, burning-off, shot-blasting, annealing, finishing, and despatch. Hand, machine and jolt moulding are practised, machines being used for up to 5 ft. 3 in. by 3 ft. boxes, and hand moulding for the larger pieces. "Compos," and synthetic sands are used. At the side of this shop is the melting plant, which comprises two 2½-ton capacity, side-blown, acid-lined converters, served by two cupolas giving 4 tons per hr. Overall consumption of refractories is quoted at 60 lb. per ton, the converters being patched daily. The charge to the cupolas is 100 per cent. steel scrap with a ferro-silicon addition. The dressing shop is serviced by one 3-ton crane.

Adjacent to the main shops are subsidiary buildings housing, on the ground floor, core-ovens, electric generators and maintenance shops, and, on the first floor, storage bunkers and charging platforms. A particular feature of the raw-materials handling is the provision of a huge lift (Fig. 6) to elevate vertically railway trucks containing steel, sand, coke, etc., bodily to the first-floor platform and bins, some 25 ft. above ground level. These raw materials are then stored aloft on either side of a short rail track.

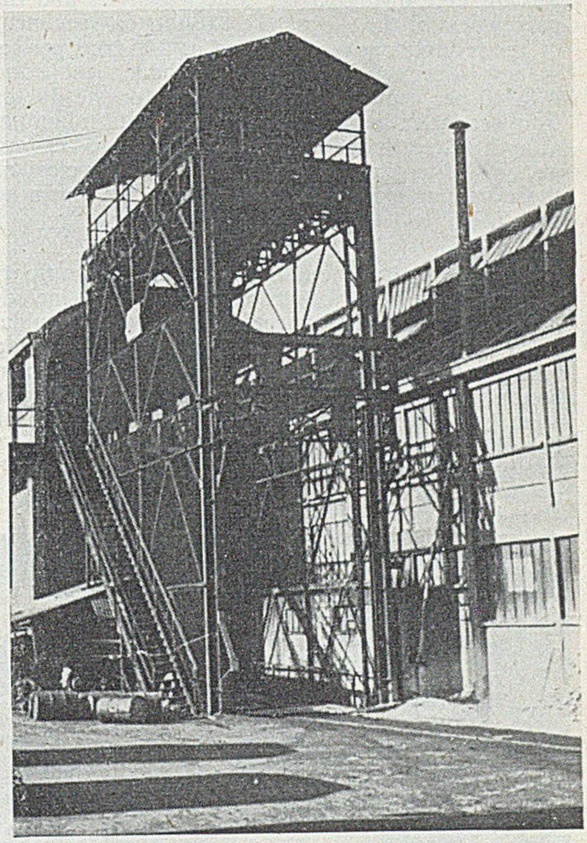


FIG. 6.—*Vertical Lift for Loaded Railway Trucks, which serve the Charging Platform and Storage Hoppers at Acieries Thome, Nouzonville.*

Products and Amenities

The qualities of steel produced range up to 40 kg. per sq. mm. (70 tons per sq. in.) as cast, practically all the production being annealed before despatch, and some castings being proof machined. Products include castings for municipal engineering (road-rollers in particular), railways, agriculture, the motor-car industry, etc., weighing per piece from two or three ounces to more than 1 ton and aggregating 250 tons per month.

A total of 250 workmen are employed for 40 hours per week and many social services, some peculiar to the French industrial set-up, are operated. For instance, employees are pensioned on retirement (since 1930); worker's lodgings are arranged or facilities for house-purchase are granted (since 1920); kitchen gardens are allocated, "honour" loans are provided for employees' children's further education; a holiday home for employees' children is established in Haute Savoie (1937) and medical services, including radiography, as well as retirement homes and canteens are available. Of the long-service medallists, 24 have had 30 years with the firm (18 still working), 11 have had 40 years (8) and one with 50 years service has just retired.

ETS. GAILLY FRERES AT CHARLEVILLE

This is a blackheart malleable foundry established in 1899 with which is now associated a steel-castings section (added 1935) and, more recently, a foundry producing ductile iron castings by the nickel/magnesium process. Also on the site is a nail-making works built in 1848, as well as various machine and maintenance shops. The firm has additional establishments at Orléans, built in 1939.

*Report of a visit paid this year by members and presented to the London branch of the Institute of British Foundrymen at the opening meeting of the session, with Mr. L. G. Beresford in the chair.

Foundries in the French Ardennes

Welcoming the visitors, Mme. Gailly representing the management explained that her husband was unable to be present, as at that time he was attending the opening of a branch steelfoundry at Skirat in Morocco (see page 524). The Charleville foundry had been extended many times, but mechanisation was difficult owing to the differing styles and the narrowness of the shops. Test results on specimens of the productions were quoted at 24.5 tons per sq. in. and 18 per cent. elongation for the malleable and 4 to 10 per cent. elongation as-cast for the ductile iron, the latter increasing to 10 per cent., minimum after heat-treatment, associated with 30 to 33 tons per sq. in. tensile. A group of castings typical of those manufactured in ductile iron is shown in Fig. 7.

Foundry

In this foundry, moulding is mainly of the floor-bank type from various types of machines, including pin-lift and jolt squeezers, employing double-sided match-plate patterns and, in some cases, snap flasks. Each moulder cores and pours his own boxes, but the knock-out and sand conditioning is done by an early-morning gang. Production is of the order of 100 moulds per day per man for a two-part box, say, 14 by 12 by 3 by 3 in. Much use is made of strainer cores.

An unusual feature was to see machines working side by side on different jobs, where in this country one machine would be on top-parts and one on bottom-parts. It appears that during the morning, top half-moulds, and in the afternoon, bottom half-moulds are produced, sometimes from the same machine, there being no pairing of output, presumably because of lack of balance in adjacent workers' efforts. There is a separate section of the foundry devoted to bench moulding, mainly from patterns in plaster oddsides. Facing sand is transported by a battery-operated tipping truck, and backing sand is conditioned by "Royers." Casting thicknesses range from $1\frac{1}{2}$ down to $\frac{3}{16}$ in. for malleable iron.

Melting

Melting is carried out in pulverised-fuel-fired reverberatory furnaces, one heat furnishing 15 tons of malleable per day. Additionally, there is a rotary 5-ton furnace for malleable (being used at the time of the visit for ductile iron) and another 4-ton rotary furnace for steel. The rotary furnaces are charged by an apron conveyor, after removal of the burner part.

Special Castings

Each ladle of ductile iron is checked for temperature with a direct-reading immersion thermocouple. Such castings as die-blocks and miscellaneous items (see Fig. 7) up to 2 tons in weight

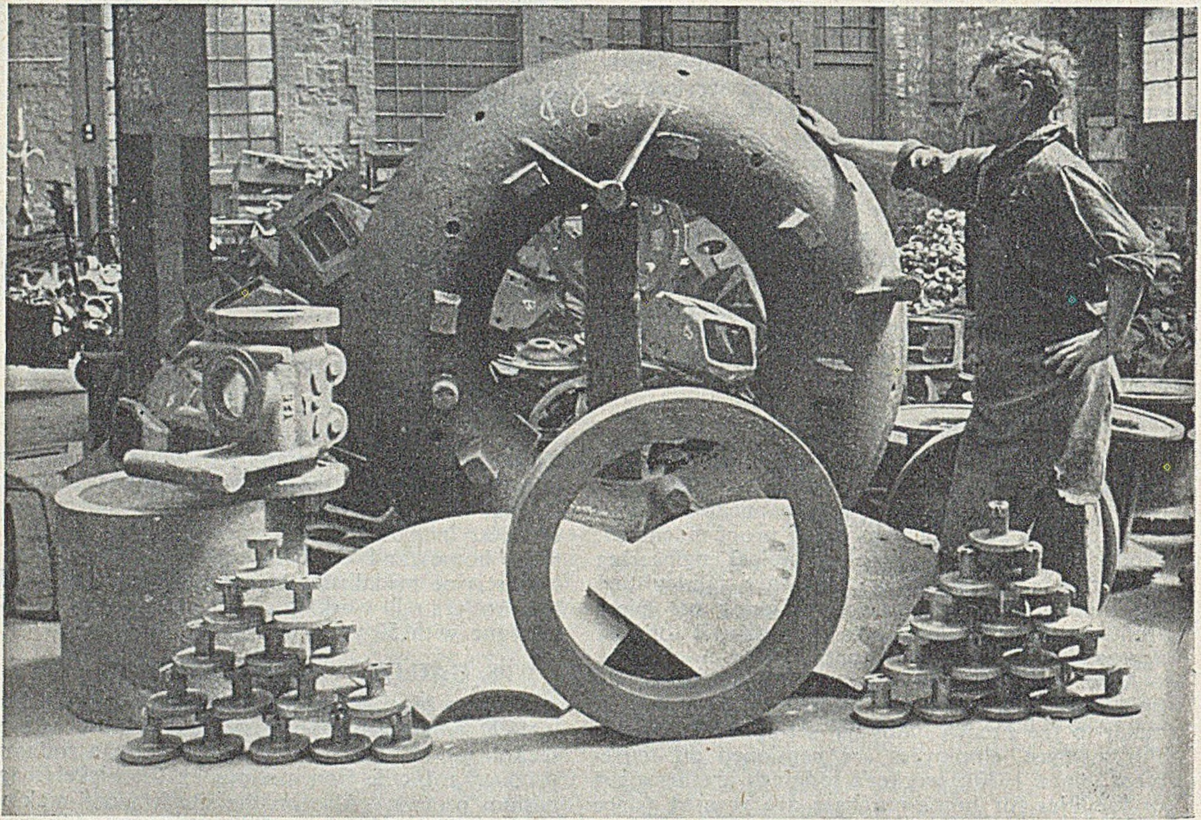


FIG. 7.—*Group of Nodular Iron Castings, illustrating the Wide Range Manufactured in this Material by Gailly Frères.*

for the Michelin tyre factory are produced in this material, in aggregate about 10 tons per month. Moulds for these were produced in a jobbing section of the foundry where steel castings (50 tons per month) and wear-resisting iron castings (10 tons per month) are also produced. The output of malleable castings amounts to 140 tons per month.

Other features include the use of wooden skimmers; a Redford and a German machine for core-blowing; an Ingersoll-Rand (Paris) machine for blasting patching material into the furnaces; and a double-table Wheelabrator with a central treatment chamber for cleaning medium-size castings. A total of 250 are employed in the foundry, including 28 machine moulders, 18 hand moulders and eight apprentices under 18 years.

At the close of the visit, each member was presented with a plated malleable-iron flamingo, about 4 in. high (the trade-mark of the concern) the long flexible neck bearing witness to one of the valuable properties of this material.

DEVILLE ET CIE., CHARLEVILLE

A rather unusual combination of foundry products is manufactured by Deville et Cie., one of the Ardennes iron foundries which was founded over 100 years ago. Alongside stove-plate work and vitreous enamelling, there is quantity production of Diesel machinery. Both stoves and engines are completely finished on the premises, and processes are so well integrated initially, and segregated finally, that no confusion or unorthodoxy is apparent to the visitor. Little or no production of castings is for outside interests.

The first impression on entering the foundry is one of space, and this is because the foundry once housing 1,200 operatives is now staffed by 450—mainly as a result of war conditions. Synthetic sand is used for facing, and this is distributed to machines by labourers. The backing sand is mixed in a normal type of pan mill, elevated, and fed into hoppers holding 40 to 50 tons (Fig. 8). Melting is by cupolas of normal design, the installation being only remarkable for the neat and compact vertical lift by which individual weighed charges are taken to the cupola stage in trucks. Pouring is all done by hand, as there are no jobs large enough to warrant the installation of a crane. Castings straight from the sand are so clean that they require little trimming.

Output per man is about 1½ cwt. per day (5-day week), average weight per piece being 3 to 4 lb. Moulders fetch their own metal (often catching at the spout and walking the whole length of the shop) cast, knock-out and get sand. Much use is made of compressed air and roller conveyors, all production being from pattern plates.

Figs. 9 and 10 show views of mechanised systems at this foundry, a feature being the provision of loose plates on rollers. These casting plants are complete with an integrated sand system. In the offices attached to the foundry, mechanised methods are used for wages computation and accounting and considerable use is made of wall charts and an adjustable " progress reporter."

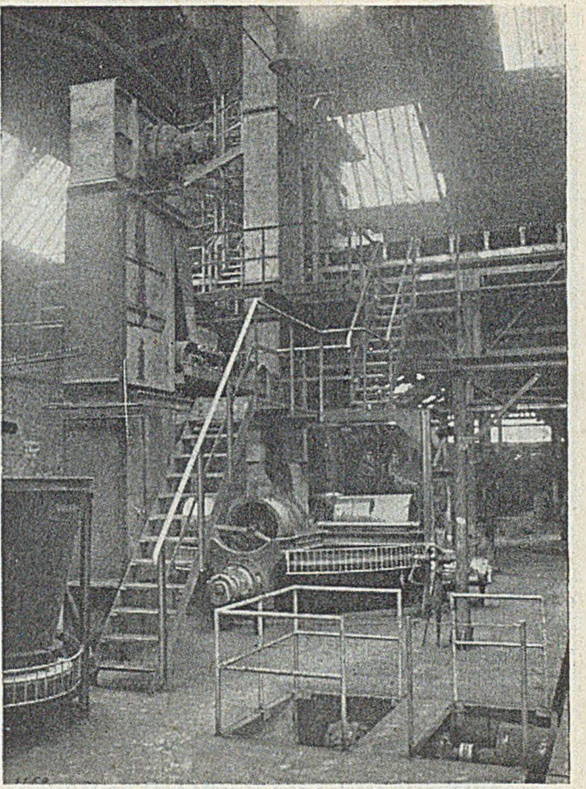


FIG. 8.—*Sand Mills, Elevators, etc., for the Mechanised Section at Deville et Cie, Charleville. Note the Elaborate Provision of Guards —this seemed the Exception rather than the rule in French Foundries.*

Finishing Process

A very old-fashioned but extremely effective method is employed to surface-grind the tops of the stoves, the top being ground complete. After grinding, all pieces pass to the enamelling shop. Here, the dry-powder process is used. The tops distort to quite a considerable extent on firing but are straightened with ease before they cool. A very considerable machine-shop takes care of the Diesel-engine parts which are finally assembled, tested and despatched as complete units; single-cylinder engines are a speciality.

In the stove-plate section, numerous different models are assembled, burning coal, wood, charcoal, gas (coal or butane) or oil fuels. Many of these models are old-fashioned by British standards, yet others are of the most modern in appearance. It is obviously a part of the firm's policy to cater for all needs and purses by a multitude of models—in lean years this is undoubtedly a valuable sales feature. One of the smallest but by no means the least attractive of the products of Deville's is a range of cast-iron vases, which, enamelled in well-chosen colours, are most elegant. It is a sad reflection, however, that the purpose of these vessels is funereal, in short, they are grave urns.

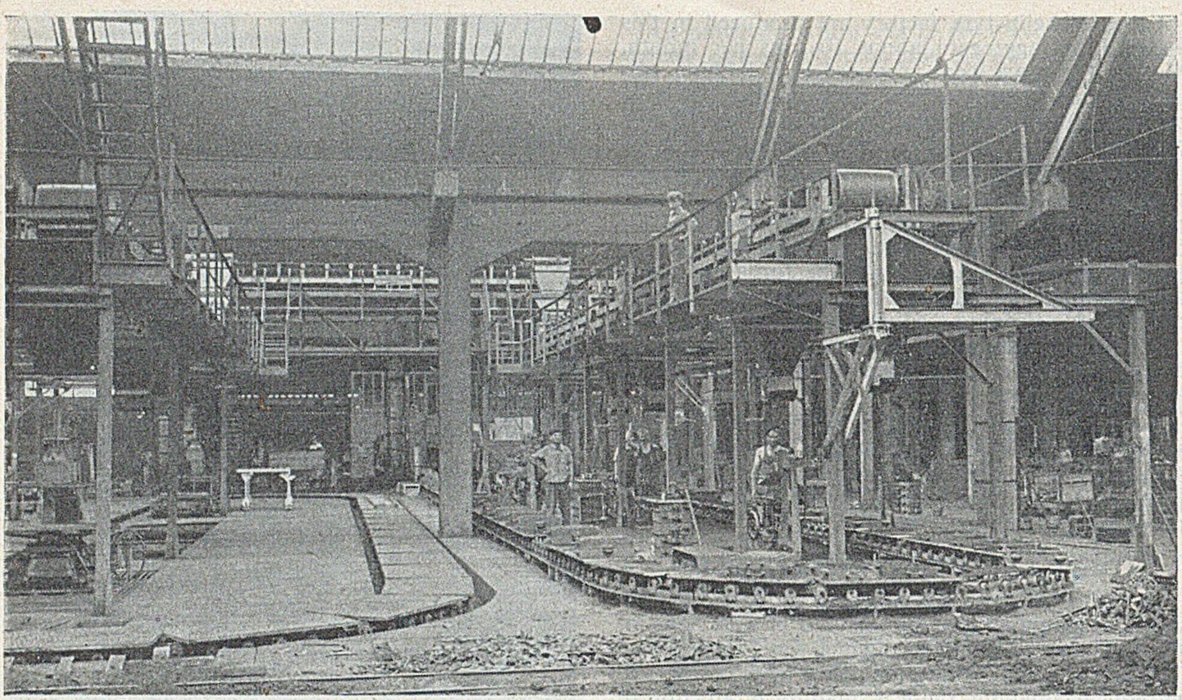


FIG. 9.—*View of Two Mechanical Loops at the Foundries of Deville et Cie. In the Foreground is a Light Rail Track on which the Finished Castings are Removed in Trucks.*

FONDERIE NOUVILLE, CHARLEVILLE

(The New Foundry)

This foundry was first established in Mézières (adjoining Charleville) in 1911 to produce ordinary and special grey-iron castings. These premises, however, were completely destroyed during the air bombardment of 1944, and the present foundry, a lofty building, 312 by 105 ft., was erected in 1946 on a new site, production beginning in 1947, although the plant in some minor respects is still incomplete. It is staffed by 92 workers, of whom 10 are executives; the hours worked are 48 per week, and the output 220 tons monthly. Low-phosphorus pig-irons with steel scrap up to 25 per cent. are used for general-engineering castings in ordinary and high-duty material, quite small runs being the rule.

Melting and Moulding

Melting is by intermittently-tapped cupolas of which there are two of 3-tons-per-hour capacity. In addition there is a small H.F. electric furnace for melting alloy additions, and an arc furnace, a 400-kw. 1,000-lb. capacity rotary model, is in course of erection. A special feature of the design of one of the cupolas shown in Fig. 11 is a very high windbelt which permits individual blast measurement on each long tuyere down-pipe. There is a division in the windbelt to permit the diversion of the blast alternately into two sets of five tuyeres. Bucket charging from a jib hoist is arranged for the cupolas. Slag is initially water sprayed and then falls continuously into a submerged stillage below ground level. Chill-test control of cupola metal is practised, and metal is transported in tea-pot ladles lined by ramming to formers. Pre-formed ganister bricks, rammed on the spot, are used for cupola patching.

Naturally-bonded unit sand is supplied to the moulding points by a completely integrated mechanised system, installed by the firm themselves. An elaborate control-board, with lamp indicators for showing sections which are working is built into the sand plant so as to synchronise its operation. The system incorporates overhead hoppers of an unusually large squat form, but even so, some sticking is experienced, the green strength being very high. A "synthetic" sand is used for facing and a similar mixture, without coal-dust, for moulding difficult jobs. The foundry floor is almost completely covered with an interconnecting system of roller-conveyor banks (see Fig. 12). A special feature of these conveyors is that they are narrow by our standards, being only some 7 in. wide. The banks are built-up with heavy-duty rollers, and with turn-tables, pivots and hinged lift-sections at appropriate points. Moulds are carried mainly on metal "bottom-boards" flanged on the under-side to keep them in track on the narrow rollers.

The moulding machines, arranged with their overhead hoppers along one side of the foundry, are grouped in pairs. They include two jolt machines for 18- by 14-in. boxes, two machines for 24-in. boxes, and two for 32-in. boxes. There is a fixed-type Sandslinger; this is placed centrally in the shop and has its sand hopper filled by one of the 3-ton overhead shop cranes. Boxes up to 4 ft. square are rammed with the Sandslinger. In addition, there is a team of hand moulders. In the core-shop, two blowing machines are operated. A typical production from a pair of machines making moulds, say, 16 by 14 by 4 in. each half, is 1,000 per day of 9½ hrs. This is from four employees—two moulders, one core-setter, and one boy helper, the latter being mainly engaged in feeding completed moulds on to the bank conveyors. Moulds are weighted by hand before pouring, a novel feature being the white painting of the weights, presumably to assist in locating the downgates. Pouring is carried out by a separate gang. A pouring basin made in core-sand and standing proud above the mould, is employed on the moulds.

Jobbing Output from Machines

The most remarkable feature of this foundry is the way in which a jobbing type of output is produced from machines. All patterns are mounted on plates, and most often wooden half-patterns are so treated, the metal pattern plates being equipped with rows of drilled holes at standard pitches to facilitate mounting. Very small numbers off each plate pattern is the rule, such as would be considered uneconomical for machine production in this country. Each pair of moulders has in front of them a blackboard on which is listed the required production, *viz.*, " Pattern *abc*—10 moulds, pattern *xyz*—35 moulds." Behind the machine, the required pattern plates are laid out in order of use. Pattern changing takes about a minute for any one of four different sizes and lifts! On the larger machines, some additional pneumatic ramming is given to the moulds and a monorail is available for mould cleaning and coring up. Sandslinger-produced moulds are similarly scheduled, and pattern plates likewise are fed into the system. Two moulding stations are served by the one slinger, which is a stationary model with its sand-hopper supplied by overhead crane. Completed moulds in this section are of the order of 15 to 30 per day for the 4 ft. square size. A jib crane facilitates the knocking-out of the larger boxes. Fig. 13 is a view of the foundry from the opposite end to Fig. 12.

Castings are carried in stillages by one of the overhead cranes (three 3-ton models are installed) to the dressing section. Here there are two shot-blast machines—a Wheelabrator barrel and a table—and the usual grinders and small pneumatic tools. Handling aids are additionally provided in the form of power-operated lift trucks.

Coremaking

Coremaking is carried out at the end of the foundry adjacent to the moulding lines. A proprietary semi-solid binder is used for the sand preparation, and this, for a 3 per cent. addition, certainly imparts a remarkably high green-strength. Several Redford coreblowers are in use; drying of cores is in batch-type ovens, one heated electrically and one by gas. One interesting coremaking job witnessed by the visitors was the quadruplicate production of strainer cores on a small stripper-plate machine. The sand laboratory is itself situated in the coreshop, but the ordinary chemical testing and the like is handled by the communal district laboratory run by the *Centre Technique* (employers' organisation).

General

The normal run of ordinary iron produced shows 12 to 14 tons per sq. in. tensile, but a large proportion enters the high-duty range at 16 to 18 tons; also a wide range of alloy cast irons up to 35 tons per

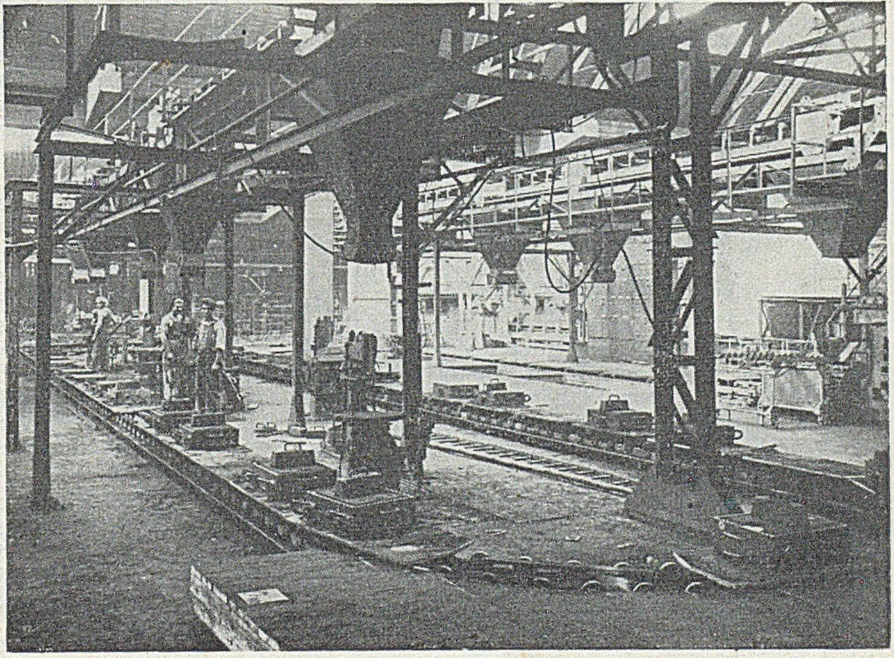


FIG. 10.—*Another View of the Mechanised Section at Deville et Cie; Note the Sharp Tapering of the Sand Hoppers which are much wider at the Top than is usual in this Country. (The Mechanised Sections were not working at the Time of the London Branch Visit.)*

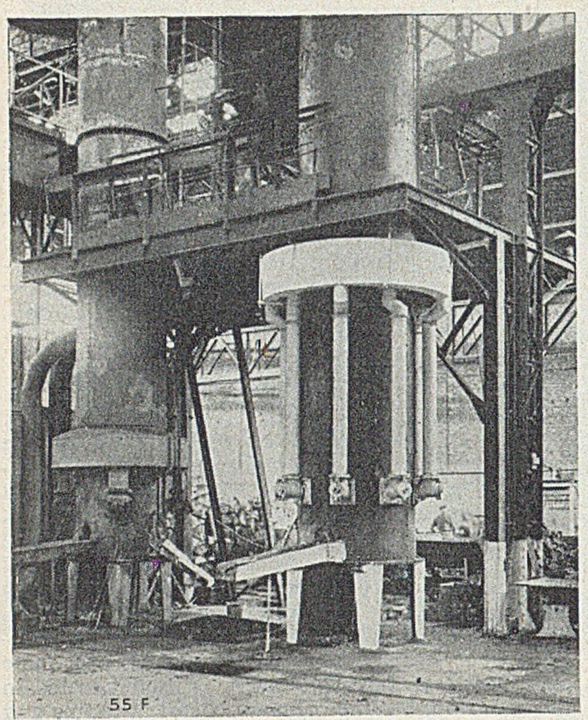


FIG. 11.—*Two Cupolas at Fonderie Nouvelle, one of which has a High Duplex Wind Box and Long Tuyeres. Between the Furnaces is a Water Bosh, with a Perforated Stillage, for Quenching the Slag.*

sq. in. tensile is produced, using nickel, chromium, molybdenum and titanium in sensible amounts. Motor-car work (gears, wheels, camshafts, manifolds, brake drums, pistons, piston rings, etc.), is a speciality of this foundry. Other lines include water-tight castings for cocks, valves, pumps and engines; electric-motor castings, machine-tool and agricultural-implement parts.

The motto of the Fonderie Nouvelle is to amalgamate the precious traditions of the past with the use of modern processes, to ally quality with production speed by mechanisation, and to match experience and manual skill with scientific control—a motto which seems to be very faithfully observed.

COMMUNAL LABORATORIES

A short visit, but one of much interest for those of the visitors who were interested in technical control, was made towards the end of the stay in France to the communal laboratories of the *Centre Technique*, presided over by the secretary of the *Syndicat des Fondeurs des Ardennes*, Mr. Durbecq. These handle on a day-to-day basis samples submitted by the various member foundries in the district, and provide a 24-hr. (or less) service. The premises, which are situated centrally in Charleville, are modest in size, but well-suited to the local needs, very well equipped and adequately staffed. Practically every type of foundry routine test-equipment is available, and in regular use. In such a renowned stove-producing area, it was not unexpected to find special apparatus available for testing the efficiency of heating equipment, but, otherwise, specialised items were few, as it is the policy to keep these laboratories for routine work, and relegate research and development to the Paris headquarters. One month's output by way of routine tests included 802 complete analyses (3,775 elements estimated), 388 mechanical tests, and 13 sand tests. It is suggested that the British foundry industry might profitably examine these French communal laboratory facilities with a view to possible emulation.

Acknowledgments

The Author makes acknowledgment, first on behalf of his fellow visitors and himself, to the French hosts, the *Syndicat des Fondeurs*, the interpreters, and all over there who helped to make the visit so enjoyable socially and so stimulating technically.

Secondly, he thanks his fellow members, in particular Mr. Mochrie, the secretary, who did all the work of arranging the visit, and was denied (through unfortunate indisposition) the pleasure of participation. Then he commends Mr. Frank Tibbenham, past-president, whose illustrations helped so much; Mr. Blandy, who sent some notes; Mr. Levy and Mr. Morton, who also supplied a short report; and the rest of his fellow travellers, *en bloc*, who by words here and there helped to fix the visits in perspective, and so make possible this Report.

DISCUSSION

MR. A. WHILES, recalling a picture showing the pouring of metal from small ladles into moulds standing on one grid at a height of about a foot above the grid on which the pourers were standing, asked if that could be regarded as safe practice.

MR. PARKES replied that that was a temporary method of pouring. A number of things were witnessed in the foundries in the Ardennes, of which it was thought the Factory Inspectorate in this country would be critical. It appeared that in the Ardennes foundries, instead of making everything foolproof, they tried to educate the workers not to be fools.

MR. A. MATTHEWS said he had understood that Factory Regulations were less stringent in the area visited. It was rather surprising, he added, that many of the workers were wearing such light footwear as plimsoles for normal foundry duties.

MR. A. R. WIZARD asked whether Mr. Parkes was quite sure that the width of the rollers in a particular conveyor in the Fonderie Nouvelle was, as had been stated, only 7 in. It had seemed to him that the width was nearer 17 in. Alternatively, were the rollers described used at the Sandslinger station.

MR. PARKES said he had not used a rule, but seven inches was his estimate; they were very narrow. Those at the Sandslinger station, however, were wider and carried 4-ft. boxes.

High Productivity

MR. F. E. TIBBENHAM (past-president of the branch), a member of the party which visited the Ardennes, congratulated Mr. Parkes on his illustrations and on the notes he had taken, which typified everything the party had seen there. The visit had proved to be extremely interesting. The foundry that was producing stove castings was getting a very big output, and he would recommend anyone interested in those types of castings to go there rather than to the foundries in America, because he felt sure the Ardennes foundries were making a larger output than those in America.

Mr. Williams confirmed the use, in some of the French foundries, of a type of natural sand which was not found in other parts of the world, and which he had noted was very sticky.

Mr. Parkes agreed that the natural sand used in some of the foundries visited was certainly very tough and played havoc with mechanised sand-handling equipment. He had read that Americans held nowadays, where high-strength natural sand was used, that mechanised handling should not be attempted.

Mr. B. Levy mentioned an interesting gadget in one of the foundries for turning the boxes over. There was a simple chute to the table of an ordinary jolt-ramming moulding machine. After moulding, the operator slid the boxes down the chute, where a trip arrangement turned them over on to the roller conveyor. The whole system was of very simple construction and might well be adopted widely for the smaller type of drag-half moulds.

Mr. Morris said that the moulds seemed to be shooting about very rapidly in some of the foundries, and he asked whether that was made possible by the sticky nature of the sand, and whether it would be satisfactory in England.

Mr. Parkes said he had not particularly associated the rapid handling of the moulds with the green strength of the sand. It certainly appeared that the moulds were moved very quickly, but he would not say that they were moved roughly; there was precision in the movement. At the turntable, for instance, the movement of the half-moulds to the point of assembly was rapid, and the boxes were closed rapidly, but not with violence. That precision was typical of other foundries where there was high-speed movement of moulds.

Regional Laboratories

Mr. A. R. Wizard, discussing the regional laboratory system which was in operation in France, said he did not know whether or not it was a matter for the Institute of British Foundrymen to consider in this country—it might be one for the C.F.A. or the J.I.C.—but it seemed to him that we should give very urgent consideration to the possibility of doing something similar here. The foundryman in France was able to secure day-to-day attention to his affairs, and he could obtain test results within a few hours. It seemed that such a system could be of equally great assistance to foundrymen here, and he asked if Mr. Parkes had any ideas as to how the suggestion could be put forward in the appropriate quarter.

Mr. Parkes, whilst endorsing Mr. Wizard's observations, said a number of foundrymen had thought that such a scheme would be desirable, but the means of bringing it about were not immediately obvious. The British Cast Iron Research Association had a regional laboratory in Scotland, and might be considering establishing others.

Mr. V. Delport (branch past-president) said that the *Centre Technique de Fonderie* was an organisation formed towards the end of the last war and received considerable help, including financial help, from the French Government. Well over a hundred full-time engineers were employed in the laboratories, and the organisation served all kinds of foundries—ferrous, non-ferrous and light-alloy

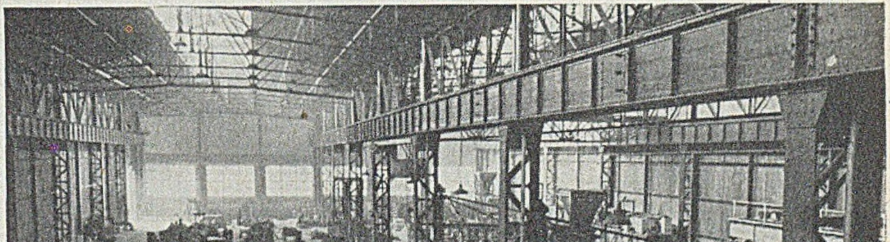


Fig. 12.—*General View of Fonderie Nouvelle with the Narrow-roller Conveyor Banks in the Foreground. These are used for Storage and Pouring, Transfer to the Knock-out and Fettling Section being Arranged on the Extreme Left.*

Foundries in the French Ardennes

foundries. Every foundry in France contributed, and the *Centre Technique* was able to do very big things. It had eight, if not ten, local laboratories—one in the Ardennes, one at Lille, one in the South of France, and so on—each of those laboratories being staffed from headquarters, and prepared to help local foundries in their analyses and research work.

The French Government took a keen interest in the whole of the work. The organisation was going to open a very fine laboratory near Paris, which he hoped the foundrymen from this country would have the opportunity to visit during the next twelve months. It would be well worthy of a visit, but he felt it would be a long time before we could hope to emulate that activity in this country.

Mr. W. G. Mochrie (branch hon. secretary) added that the branch visit to the French organisation's new laboratory during the present session had been arranged. It was a most remarkable set-up, and was not a laboratory in the normal sense of the word. All the satellite laboratories throughout France were more or less subservient to the headquarters in Paris. Subscriptions paid to the organisation were based on the turnover of each foundry.

Mr. J. N. Burns said that some of the main problems in French foundries were overlooked; for example, he criticised the sticky natural sand that was used there. If he were a foundry manager and could not obtain a better sand, he would want to know something about it from his sand engineer or the purchase department. A mass-production foundry needed to use suitable sand, otherwise a lot of scrap would be produced.

Centralisation Opposed

With regard to the regional laboratory service, he said it was cheeseparing to cut down on technical expense and do away with the home laboratory in a mechanised foundry, and the result in so doing would be high costs. In the case of a jobbing or other small foundry he would support the remarks made concerning the value of the regional service. In this country we could refer technical problems to bodies such as the B.C.I.R.A.; but a mass-production foundry could not afford to be without its own technicians. He was very much opposed to too much centralisation even on a regional basis.

Mr. Parkes said that Mr. Burns had rightly put the other side of the question concerning laboratories.

The foundry which had experienced the most trouble with its mechanised sand system was a new one. The first reaction of the visitors was to ask why there was not a change to another grade of sand. The guide had replied that the whole system in their old foundry—patternwork, mould fineness, casting finish and enamelling—had been built up on the use of that particular sand, and he was loath to change it.

Mr. B. Levy endorsed Mr. Parkes' remarks concerning the functions of the regional laboratories which were intended equally, he said, to serve the smaller and jobbing foundries, which obviously could not afford to run their own laboratories and

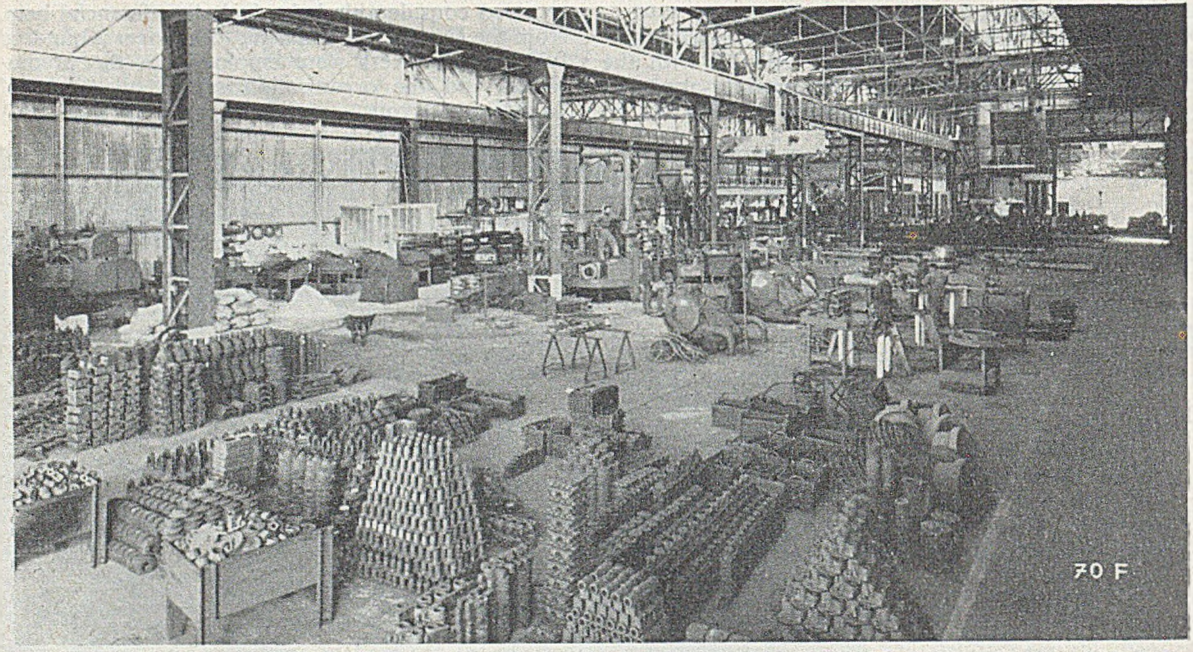


Fig. 13.—*View of Fonderie Nouvelle from the Opposite Direction to Fig. 12. The Stacks of Finished Castings in the Foreground are Typical of the Range Manufactured. On the Left is the Core-shop and in the Background, Moulding Machines and the Sand-treatment Section.*

technicians. He was pleased the provision of such a facility in England to assist the smaller foundries had been advocated, because, after all, those foundries comprised a large proportion of the foundry industry as a whole.

MR. DELPORT emphasised the point, mentioned by Mr. Parkes, that the regional laboratories did not limit their help to the smaller foundries. The central organisation in Paris also did considerable fundamental research work and contributed a large number of Papers to various local and national meetings, international conferences, and so on.

MR. BURNS said he had understood from Mr. Parkes that one of the large foundries was having its routine work done by the regional laboratory.

MR. PARKES replied that that was the case with the Fonderie Nouvelle. It was a fairly large foundry, but it was not much more than a stone's throw from the regional laboratory and could get its samples there almost as quickly as some of the works in this country could get samples to their own laboratories. By this practice it seemed to get the results required on the metal side. Nevertheless, it had its own sand-control laboratory. The initial choice of a sand laboratory instead of metal control was a rather unusual one. However, the foundry was new; perhaps a laboratory for metal testing was envisaged as a development.

British Facilities

MR. BRIGG pointed out that a number of private companies in this country operated testing houses and provided laboratory facilities. His firm sent away samples regularly for analysis, and received the results by return of post. Such companies would undertake analysis and testing work for any industry in the engineering world. Samples despatched by the last post in the day reached the laboratories next morning, and the results could be telephoned later on the same day. He added that there was a standard cost for the work, based on the number of determinations to be made.

MR. PARKES agreed that there were external commercial organisations which would carry out analysis over a wide range of materials; but his own experience was that they were never sufficiently specialist in respect of any one particular alloy such as cast iron.

MR. MOCHRIE recalled that some years ago he had advocated at a meeting of the London branch of the Institute that technical queries concerning chemical analysis or physical matters should be addressed to the suppliers of the raw materials. He knew that a number of such firms made no charge for dealing with these, and this service was still available. In the United States the provision of such facilities was, he believed, called " service with sales."

MR. HUGHES stated that a few years previously a small group of engineers and ironfounders had formed a laboratory organisation. Realising that they were not large enough individually to run their own laboratories, they had all contributed to the scheme, and those laboratories had done remarkably good service. The system was in many respects similar to that in France, and had been operated in the north of England for many years.

[Several questions were interposed at this stage about relative conditions of employment in France, but it was decided that matters like family allowances and cost-of-living comparisons were so abstruse that no worthwhile assessment could be made.]

MR. BIRKIN said it had been stated by Mr. Parkes that at the steel foundry which the party had visited they ran on 100 per cent. scrap and merely added ferro silicon. Later, however, a photograph was shown of a heap of pig-iron on the charging platform.

MR. PARKES replied that the party were given to understand that the cupola charge for converter metal was 100 per cent. scrap, and they had seen that charged with only a ferro-silicon pig. The foundry might also have melted iron separately in its cupolas for making iron castings. Steel scrap alone was used considerably in this country during the war for converter metal, and was still being used.

Vote of Thanks

MR. R. BLANDY, proposing the thanks to Mr. Parkes, for his address said it had proved instructive. He had learned more from it than when he had visited the foundries. The Charleville area, he understood, had 103 foundries, most of them small, and only one of them was non-ferrous. Some might wonder, he added, why one visited foundries abroad, having regard to the fact that there were so many in this country. The reason was that it was so instructive to visit types of foundries which were not seen here. A point not mentioned in the address was that women were employed to drive gantry cranes. In another foundry, as an additional incentive, the moulders, when they had finished their job, paired up, and every time they took a ladle of metal they received a ticket which they were able to cash at the end of the week. Finally, Mr. Blandy added his tribute to the interpreters who had accompanied the parties every day in all the foundries visited and whose services, as Mr. Parkes had stated, were invaluable.

MR. G. C. PIERCE, who was seconding the vote of thanks, complimented Mr. Parkes on having covered such an enormous amount of ground in his address.

MR PARKES, in a brief response, expressed his appreciation of the kind remarks made and for the attentive hearing the meeting had given him. He repeated the thanks of the parties to the valuable work of the French organisers and the interpreters, to whom the party was very much indebted. The least we could do, he said, when our friends from France came over here, as we hoped they would for one of our functions, was each one in his own sphere to emulate the hospitality they had offered us.

THE NATIONAL GAS AND OIL ENGINE COMPANY, LIMITED, Ashton-under-Lyne, announces that Mr. J. Jones has now been appointed managing director, and Mr. C. F. Barnard general manager, and a director. The Honourable A. C. Geddes has resigned from the Board.

British Cast Iron Research Association

Thirtieth Annual Report of the Council for the Year 1950-51

At a general meeting of the British Cast Iron Research Association held yesterday at the Waldorf Hotel, London, the following report was presented:—

The extensions opened at the beginning of the year under review, to which reference was made in the last report, are now in full operation. The Council has since approved of further extensions, and work has already begun on the first of these, a heavy stores for pig-iron, sands, refractories and other material required for the experimental programme. This will be followed by new buildings to house the chemical laboratory and the sands laboratory, and a fuels and furnaces building.

During the year, the Council approved a suggestion put forward by Sir Ben Lockspeiser, F.R.S., secretary of the Department of Scientific and Industrial Research, to set up a survey panel to review the resources and work of the Association in relation to the economic needs of the industry. This panel has held two meetings, and in addition to Sir Ben Lockspeiser as chairman and a secretariat provided by the D.S.I.R., comprises Prof. R. S. Edwards (University of London), Dr. J. E. Hurst, Mr. K. Marshall, Prof. A. J. Murphy (University of Birmingham), Mr. N. P. Newman, Mr. F. Scopes, Mr. C. A. Spencer, C.B.E., Dr. A. King, C.B.E., and the director of the Association.

Reference has been made on many previous occasions to the conservative policy adopted by the Association in meeting capital expenses out of income. During the year the Council came to the decision that the time had now arrived to spread capital expenditure over a period and to make provision for renewals in accordance with ordinary commercial practice. A committee has been set up under the chairmanship of the hon. treasurer, Mr. E. P. Major, comprising the Council's advisory committee and the chairmen of the other main committees of the Association. The recommendations of this committee were presented to and approved by the Council on July 4, 1951, and are put into effect, with the co-operation of the auditors, in the accounts for the year ended June 30, 1951.

Council and Committees

At the annual general meeting, held in London on November 15, 1950, Dr. J. E. Hurst, J.P., succeeded Mr. P. H. Wilson as president, and Mr. T. M. Herbert, Mr. T. A. McKenna, Mr. A. E. Pearce, Mr. W. Rennie, and Mr. S. H. Russell were elected vice-presidents. In addition, Mr. F. Scopes, president of the Joint Iron Council, and Mr. J. J. Sheehan, president of the Institute of British Foundrymen, were also elected as vice-presidents. The retiring members of the Council were re-elected, together with Mr. E. C. Dickinson and Mr. E. P. Major, the treasurer, who were co-opted during the year, and Colonel H. H. Jackson who replaced Mr. R. K. Nicholson. Mr. Robert Dickson, J.P., of Kirkintilloch, who had been elected a vice-president, and who gave considerable assistance to the Scottish committee in connection with the transfer of the Scottish laboratories from Falkirk to Blantyre, to the opening of which by Lord Bilsland reference was made in the last report, died subsequent to his election, and the Council greatly deplore his loss. At a subsequent extraordinary general meeting the Articles of Association were made to conform with the Companies Act, 1948.

The Council unanimously elected Mr. J. J. Sheehan as chairman, and six meetings have been held during the year, together with five meetings of the Council's advisory committee. The research board and its two committees (the Fundamental Research Committee and the Industrial Research Committee), re-elected Mr. A. E. Peace as chairman and six meetings were held during the year. The Operational Research Team Committee re-elected Mr. Arthur Watson as chairman, while Mr. Sheehan continues as chairman of the Development Committee. Mr. R. L. Handley succeeded Mr. T. M. Herbert as chairman of the Information Committee. The Scottish committee elected Mr. John Arnott as chairman in succession to the late Mr. Robert Dickson. These committees have held nine meetings during the year, and the Foundry Atmospheres Committee, constituted during the year, and to which reference was made in the last report, elected Mr. C. Gresty as chairman and has held five meetings. Mr. N. L. Evans was elected chairman of the Methods of Analysis Sub-committee; otherwise the nine Sub-committees of the Industrial Research Committee and the panels, dealing with the research programme, have continued unchanged, and during the year have held twenty-two meetings.

Towards the close of the year the Association co-operated in the formation of a panel of the Council of Ironfoundry Associations to deal with shortages of certain materials vital to ironfoundries, particularly nickel and molybdenum. The president, Dr. J. E. Hurst, acts as chairman to this panel, and the director as secretary, the remaining members being Mr. M. M. Hallett, Mr. K. Marshall, Mr. P. A. Russell and Mr. J. J. Sheehan. The panel held its first meeting on May 3, 1951.

On June 20 and 21, 1951, the D.S.I.R. visitors, Professor H. O'Neill of Swansea, and Mr. W. Barr of Glasgow, visited the Association's headquarters at Alvechurch. Prior to this, Mr. Barr paid a visit to the Scottish laboratories at Blantyre on June 19.

Research Department

The work of the research department has continued during the past year with few changes. Two investigations have been terminated and three new ones have been added to the programme.

Good progress has been made on the study of factors influencing the fluidity of cast iron. The work has been based on the use of a spiral test piece. The effects of the important elements have been evaluated and field tests have been carried out to investigate the phenomenon of "oxidised" metal. The work indicates that low-phosphorus high-carbon irons can be as fluid as the high-phosphorus irons. No evidence has been obtained of "oxidised" metal, nor of any lowering of fluidity due to this cause. The investigation has now been terminated and a comprehensive final report will be published shortly.

Sands.—Experimental investigations on moulding sands have included further work on the study of scabbing defects. The apparatus for the determination of stress/strain curves on dried sand test-pieces has been improved and an attempt has been made to compare the curves obtained with the incidence of scabbing defects. Some correlation has been observed. Work has been carried out to show the effect of wood

British Cast Iron Research Association

flour in moulding sand. A study is also being made of the shatter test as a control test for moulding sands.

Cavitation.—The laboratory work on the cavitation erosion of cast-iron ship propellers (in conjunction with the British Shipbuilding Research Association) has been substantially completed, and interim reports dealing with, for instance, the mechanical properties of ship propellers, the corrosion of cast iron in moving sea water, cavitation in a Venturi nozzle, and the behaviour of cast-iron specimens in the jet impact test, have been issued to the appropriate committee. Field tests on the manufacture of ship propellers in nodular cast iron have also been carried out. The results of field tests using inserts in propellers are awaited in order to assess the correlation between the laboratory tests and behaviour in service.

Phase Separation.—Work on phase separation by electrolytic methods has been temporarily discontinued. Methods suitable for steels were found to be unsatisfactory for cast irons, due mainly to the presence of graphite. Chemical analytical research has been concentrated on exploring methods for the determination of calcium in cast iron, but in addition, much co-operative work has been accomplished by the newly formed Methods of Analysis Sub-committee.

Spectrography.—During the year, the work of the spectrographic section has undergone review in connection with the impending delivery at the Association of an A.R.L. quantometer, a grating spectrograph and a high-precision source unit, which are being made available under the E.C.A. technical assistance scheme. In the meantime, work has been centred on the application of spectrography to slag analysis and also on the completion and preliminary trials of a direct-reading attachment, constructed at the Association, to the existing Hilger instrument. For the slag analysis the powdered sample is fused with borax, an internal standard such as nickel is added, and after grinding the sample is pelleted with graphite. By this technique very promising results have been obtained. Further work will involve the assessment of the quantometer for routine work, the use of the grating spectrograph in the visual region, and the use of the precision-source unit to study some of the outstanding problems.

Gases in Cast Iron.—During the year a good deal of work has been accomplished on the estimation and the influence of the gaseous elements in cast iron. The staff working on these problems has been increased. The vacuum-fusion apparatus, using high-frequency heating, has been improved and has worked very satisfactorily. This is an extremely difficult field of investigation and progress is expected to be slow. Techniques of sampling have been studied. Gas adsorbed on the specimen's surface, and the influence of various metallurgical treatments on the gas content of cast iron have received attention. The oxygen content of many cast irons is found to be very low.

Enamelling Properties.—At the request of the Light Castings Sub-committee, the Association has allocated an investigator to study the factors influencing the enamelling properties of iron castings, with special emphasis on the production of castings suitable for enamelling. The investigator is making a preliminary study of these problems in the foundries of various co-operating member-firms.

Malleable.—In connection with malleable cast iron, two investigations have been proceeding in the laboratory. One is concerned with the effect of graphitisation on the rate and extent of decarburisation, which is pertinent to the whiteheart process, and the other deals with the mechanism of formation of the carbide film which can occur at the edge of blackheart malleable castings. In addition, many field tests have been carried out on the use of higher manganese/sulphur ratios than are normal in the whiteheart malleable industry.

Shrinkage and Porosity.—A long-term investigation has been started on shrinkage and porosity defects in cast iron. As a preliminary, the investigators have spent three months visiting foundries of member-firms to obtain information on the nature of the problems and the state of knowledge on the subject. A report giving a preliminary survey of the situation has been presented to the Engineering Castings Sub-committee and the following items have been approved for investigation.

(1) The use of reduced pressures to study the influence of gas.

(2) The use of thermocouple techniques to investigate mode of solidification and feasibility of feeding.

(3) The use of thermocouple techniques to investigate the effects of pouring temperatures.

(4) The determination of the usefulness of such devices as atmospheric blind feeders applied to cast iron.

(5) The determination of the bulk densities of cast irons of varying graphite structures.

Transverse Properties.—Work has been completed and a report published (*Journal of Research and Development*, April, 1951) on the transverse properties of bars of various section shapes. From this work it has become clear that there is no simple relation connecting the transverse strength and modulus of elasticity with a constant of the section. From a theoretical consideration of the conditions of equilibrium in a beam under load, a method has been given whereby the strength of a cast-iron beam of any section shape can be found.

Impact Test.—A comprehensive examination of the meaning of the impact test applied to cast iron has been made. A programme of work has been started using a Charpy impact machine to test notched, V-notched and keyhole-notched specimens of geometrical similarity and varying dimensions. A wide range of grey cast irons, including austenitic, acicular and nodular cast irons, is being studied. Companion slow-bend tests are being carried out using similar specimens in order to examine the possibility of correlating resilience in the slow-bend test with the impact value. Work is also proceeding on the possibility of ferritic malleable and nodular cast irons developing temper brittleness and also on the transition temperatures of these materials.

Fatigue.—Work has been continued on the fatigue properties of cast iron, with special reference to nodular cast iron. A prototype fatigue machine has been completed and others are under construction. Considerable attention has been paid to the production of sound test-bars of uniform mechanical properties and comprehensive mechanical tests have been carried out on materials supplied by member-firms. Some work has been carried out on the electrical resistivity of cast iron and a brief report will be published shortly. The White and Chilled Iron Castings Sub-committee has been reconstituted. A programme of work on the influence of phosphorus, carbon, manganese and sulphur, inoculation, and casting and melting temperatures on chill and mottle formation, has been begun.

Residual Elements.—Work has been carried out to study the influence of residual elements on the efficacy of the magnesium process in the production of nodular cast irons and a procedure has been developed to inhibit the harmful effects of some of these elements.

Development Department

The development department was originally formed to give specific advice on technical matters to foundries and firms requiring it, and in the course of some six years a staff has been built up capable of dealing with most of the metallurgical and specific production problems which arise in a foundry, whether related to sand, melting practice, metal control, or the general utilisation of materials. In recent years, however, the scope of the department has been enlarged and there have been gradual changes in the character of the work devolving on it.

The type of problems originally dealt with were of a technical character and called for supplementary routine tests by the chemical, mechanical and microscopical laboratories, the results from which, in each case, were collated and embodied in a technical report.

Following the publication of the Garrett report, it became apparent that, in addition to such specific technical problems, there was an increasing demand for advice and information on questions of ventilation, mechanical handling and general organisation, and members of the staff have been called upon more and more to advise on matters of this sort.

The establishment of the Operational Research Team was largely due to this additional demand, with the result that a great deal more attention is now paid to problems of organisation than has been hitherto possible. The establishment of the Operational Research Team, however, has not reduced the work of the development department in this direction, but has rather revealed the interdependence of organisation problems and technical problems. In many instances, members of the development staff have been asked to carry out a preliminary technical survey before the members of the Operational Research Team have made their report on reorganisation; in other cases requests for technical advice have followed the Operational Research Team's visit.

Foundry Atmospheres.—Another new development has been the appointment by the Foundry Atmospheres Committee of three full-time ventilation engineers to obtain factual information and ultimately to give advice on matters of general ventilation, dust prevention and removal. A dust-count laboratory is in process of being set up to provide data on the occurrence and prevention of dust. Further appointments are to be made to deal with this aspect. Ventilation and related problems, such as heating and lighting, are assuming increasing importance. One consequence of the work carried out so far is that two members of the original development staff have been devoting considerable time to the investigation of the incidence of carbon monoxide in foundries.

In spite of these new commitments, the attention paid to the specific technical enquiry has not been allowed to decrease. There has been a marked tendency for the simpler form of technical enquiry to diminish in numbers, probably due to improved technical knowledge within the industry. The enquiries which are now being received tend to be of a more complex character. It is particularly satisfactory to note that outside enquiries relating to the engineering uses of cast iron are increasing in number and frequently require a detailed knowledge, not merely of the ironfounding process, but of the properties of the material, and an understanding of the conditions under which it is to be used. Shortages of raw materials are also creating demands for information on the use of substitutes.

Considerable use has been made of the staff of the development department in the training of foundry personnel. One important innovation has been the commencement of a series of study groups dealing with foundry sand. The first of these courses, lasting a full week, was held in April, 1951, and the response from the industry was so heavy that it has been found necessary to run a one-week course every month for at least nine months to deal with the number of applicants. This experiment is of considerable interest and importance; by the end of 1951, upwards of 100 members of the industry will have received basic instruction of the most up-to-date character on the properties and control of moulding sand.

Additional investigations which are being undertaken by members of the development department include work on the welding of cast iron, wear of slide rests and lathe beds, and carbon pick-up.

A considerable amount of work has also been done on the production of prototype castings in nodular iron; in particular, several large propeller castings have been made in this material for use in conjunction with the work carried out by the research department on propeller erosion.

Scottish Laboratories

The year ending June 30, 1951, has witnessed a considerable increase in the volume of work carried out at the Scottish laboratories. No fewer than 396 problems have been dealt with, compared with 172 problems for the previous year. Of this total, 61 enquiries were from members who have joined the Association since the inauguration of the new basis of membership introduced in 1948. This figure was 40 in the preceding year.

In following-up many of the problems, members of the Scottish staff paid 180 individual visits to the works of 37 members, involving 120.5 man/days on these visits, or 26 per cent. of the total man/days available. These figures compare favourably with 78 individual visits to 36 firms, involving 93.5 man/days (or 18 per cent. of the total available man/days) for the previous year. Similarly, the work carried out in the mechanical, chemical and metallographic laboratories in each case showed a marked increase over that in the previous year. The present impression is that this increase in work will be maintained in the forthcoming year.

Operational Research

A team consisting of two members, Mr. J. Hunter and Mr. J. A. Ballard, commenced operations on June 1, 1950. On January 1, 1950, a third member, Mr. A. A. Timmins, joined the team, Mr. J. Hunter being appointed as leader. Mr. Ballard has since resigned to take up an industrial appointment.

Up to June 30, 1951, the team has surveyed and reported on 67 foundries, while a further 15 special visits and 8 return visits have been made, totalling 90 visits in all. Sixty-six sketches have been prepared and submitted with the reports. Layouts have also been sent to two Australian foundries. A further 72 foundries have requested the services of the team.

The team has endeavoured to spread its services as equitably as possible over the whole country in accordance with the number of enquiries received from each district and the date upon which the request was made. Close co-operation is maintained with the other departments of the Association in dealing with detailed problems.

Intelligence Department

During the year under review, 49 research reports have appeared in the *Journal of Research and Development*. The Journal has considerably increased in size during the last three years and from the commencement of the new volume (vol. 4) in August, 1951, certain changes will be made. In view of the heavy increase in the quantity of material published, six issues in future will constitute a volume, *i.e.*, there will

British Cast Iron Research Association

be one volume each year instead of as at present one volume every two years. Advantage will also be taken of the beginning of the new volume to introduce a more easily readable type face. The expanding size of the Journal has increased the editorial work of the department to a considerable degree. The Journal was made available on a subscription basis to non-members from August, 1949, onwards, and there is now a small but substantial list of subscribers, particularly in the United States.

A further volume of the *Bulletin* (vol. 10) was completed during the same period, and indices to this and to vol. 3 of the Journal are now completed and will shortly be issued. It has been necessary to adjust the subscriptions to both these publications to meet the greatly increased publishing and printing costs, the changes taking effect in each case from the beginning of the new volume.

Six external reports and nearly 60 translations of foreign papers were made available to members during the year. Library loans and acquisitions of new books, periodicals and pamphlets are given below:—

Library Loans	
Books	609
Periodicals	1,722
Pamphlets	993
Library Acquisitions	
Books	199
New periodicals	3
Pamphlets	562

The reason for the apparent falling off in some of the loans is due to the fact that members of the internal staff now consult certain publications in the library instead of borrowing them, as was formerly the practice. In actual fact, the loans to member-firms have risen during the year.

The staff of the department has received three additions to fill vacancies caused by resignations during the year. Miss G. E. Nottley was appointed as secretary to the manager of the department, and Mr. J. Fricker and Mrs. A. Sage have joined the library staff. Mr. Fricker received his early training in the Guildhall Library, London, and Mrs. Sage in the Coventry Central Public Library.

Three conferences have been held at Ashorne Hill, the first two being held in October and November, 1950, to discuss technical aspects of the Grey Ironfounders' Productivity Report. The duplication of this conference was necessary because of the wide interest aroused and the heavy demand for accommodation. The third conference, in March, 1951, was devoted to malleable cast iron and was again well attended. Papers presented at these conferences have been published, or will shortly be published, in the Journal.

Towards the end of 1950, the Association was invited to submit castings to fill a small space allocated to ironfounding in the South Bank Exhibition of the Festival of Britain, and the department, with the co-operation of members, contributed castings for the Power and Production Pavilion and the Minerals of the Island Pavilion. The department has been responsible for assisting to organise a stand at the 1951 Engineering and Marine Exhibition at Olympia in collaboration with the Council of Ironfoundry Associations. Notices or references to the work of the Association which have appeared in the technical and newspaper press totalled 300 during the period under review.

Finance and Membership

The total number of members of the Association in all classes as at June 30, 1951, was 1,239, representing a marked increase of 96 during the year. The total income for the year exceeded £96,000. the increase over the previous year being due in part to provision made by the Joint Iron Council for the work referred to above on foundry atmospheres. Since any ironfoundry in the United Kingdom may become a member by completing a form of application, without financial obligation, the Association can ultimately look forward to a membership covering the entire ironfounding industry, together with firms engaged in processing iron castings as users, and makers of foundry equipment and supplies, all of whom are eligible for election at prescribed annual subscriptions.

The Council extends its thanks to those members of the Association who have made voluntary contributions during the year under review. The Report is signed by Dr. J. E. Hurst, president; Mr. J. J. Sheehan, chairman of council; and Dr. J. G. Pearce, director and secretary.

Correspondence

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

PURCHASING OFFICERS' ASSOCIATION

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—We appreciate the friendly remarks regarding this Association contained in your Leader of November 1, but should perhaps point out that we are not quite so young as you have led your readers to believe. Having been formed in 1931 we are just about to celebrate our "coming of age."

Although we were not formed during the period of a sellers' market it is true to say that our greatest development has taken place during such conditions. In 1946, our membership numbered 600; now it approaches 3,000.

We realise the importance of the utmost degree of co-operation between buyer and seller—not only in the present hectic purchasing conditions.

Yours, etc.,
Purchasing Officers' Association
J. R. BLINCH, *Secretary*.

146A, Queen Victoria Street,
London, E.C.4.

Mechanical Handling Exhibition

The Third Mechanical Handling Exhibition and Convention to be organised in Great Britain are to be held at Olympia, London, from June 4 to 14, 1952. The Exhibition will occupy about 250,000 sq. ft. and will be the largest of its kind in the world. For the convenience of visitors, many of whom are expected from abroad, it will be accommodated entirely on the ground floor, both the Grand and National Halls of the Olympia building being used, with a Convention hall seating 750 on the gallery level of the National Hall.

There will be nearly 200 exhibitors covering every type of mechanical aid—pallets, trucks, cranes, aerial ropeways, overhead conveyors, belt conveyors, elevators, wagon tipplers, winches, power units, chains, gears, controls and all other accessories.

About 12 papers by leading specialists will be read during the Convention and the Institution of Production Engineers is to have an all-day session on June 7. The Convention programme will be available later.

HIGH DUTY ALLOYS, LIMITED, announce that Mr. L. A. Jarvis and Mr. G. A. Hunt have been appointed to the Board. Both have been with the Company for a number of years; Mr. Jarvis from the formation of the Company 23 years ago and Mr. Hunt for 10 years.

British Blast Furnaces in the September Quarter, 1951

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 the third quarter, 1951. 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	—	—	3	—	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 ..	—	—	3	—	3	3.6	4
Stewarts and Lloyds : Corby	—	4	—	—	4	3.6	4
Wellingboro' Iron	—	2	—	—	2	2	3
TOTAL	—	6	18	—	24	24.2	30

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

Brymbo Steel	—	1	—	—	1	1	1
Darwen & Mostyn..	—	—	—	1	1	1	2
Lancashire Steel Corp'n	—	2	—	—	2	2	4
TOTAL	—	3	—	1	4	4	7

North-West Coast.

Barrow Ironworks..	2	—	—	—	2	1.7	2
Charcoal Iron	—	—	1	—	1	0.3	1
Millom & Askam	2	—	—	—	2	2	3
United Steel : Workington	2	—	—	1	3	3	3
TOTAL	6	—	1	1	8	7	9

Lincolnshire.

Appleby-Frodingham	—	8	—	—	8	7.6	8
Lysaght, J. : Scunthorpe	—	5	—	—	5	4.1	5
Thomas, R., & Baldwins : Redbourn ..	—	2	—	—	2	2	2
TOTAL	—	15	—	—	15	13.7	15

North-East Coast.

Cargo Fleet Iron	—	2	—	—	2	2	2
Consett Iron	1	1	—	—	2	2	2
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	2
TOTAL	5	16	—	2	23	23	36

Scotland.

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.

Briton Ferry Works	—	1	—	—	1	0.5	1
Guest Keen Baldwins : Cardiff ..	1	2	—	—	3	3	4
Thomas, R., & Baldwins : Ebbw Vale ..	—	2	—	—	2	2	3
Steel Company of Wales : Margam ..	—	2	—	—	2	2	2
TOTAL	1	7	—	—	8	7.5	10

Appeal for Intensified Scrap Drive

A new approach to the scrap problem on the part of every individual throughout industry was needed, said Mr. George Wood, chairman of Thos. W. Ward, Limited, at the company's general meeting in Sheffield recently. There should be a constant feeling of urgency, even to the extent of it being looked upon as an offence to neglect starting any scrap for which the individual is responsible on its way to the melting works. Only by the most intensive personal effort could the hidden scrap resources of industry be uncovered, and every ton was needed if the country's steel requirements were to be met.

There were many hundreds of thousands of tons of valuable scrap lying about all over the country in the form of derelict plant, obsolete equipment, waste material, and the miscellany of items under the benches and at the back of the storerooms in every kind of industry. Its quick recovery would be of immense benefit to the country generally. The scrap merchants of this country were able to undertake the dismantling of plant and equipment where this was necessary.

Mr. J. C. L. Train, member of the Railway Executive for civil and signal and telecommunications engineering, said that British Railways are at present renewing on the average about 2,000 miles a year, of which rather more than 64 per cent. has been completed. To do this work required 60,000 men; to-day they had only 51,600, and Mr. Train said it would be appreciated that their resources were at present considerably strained, and they were obliged to have recourse to mechanised expedients.

European Aluminium Production

Western Europe's failure to use more than 45 per cent. of her full production capacity for aluminium in 1950 is the background of an appeal by the council of the Organisation for European Economic Co-operation to member countries to provide increased supplies of electric power to the industry. Abundant rainfall in 1951, permitting the increased generation of electric power, has enabled the industry to make use of 75 per cent. of its full capacity. If total production capacity could be used, member countries would be able to provide from their own resources a great part of their 1952-53 consumption requirements, which are estimated at 500,000 tons.

With this end in view, the council has addressed an urgent appeal to the countries concerned, requesting them to authorise such allocations of power as would be necessary to enable aluminium factories to work at full capacity. There must be no diversion to other uses of power from stations set up specially to serve aluminium producers, the council states.

British Blast Furnaces in the September Quarter, 1951—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of the third quarter, 1951.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	0.9	2
Lilleshall	—	—	1	—	1	1	2
Round Oak Steelworks	—	—	1	—	1	1	2
Shelton Iron, Steel & Coal	—	3	—	—	3	3	3
Stewarts and Lloyds: Bilston	—	3	—	—	3	3	3
TOTAL	—	6	3	—	9	8.9	12
Sheffield.							
Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	13	59	26	4	102	99.3	139

Weekly Average Number of Furnaces in Blast during September Quarter, 1951, and Previous Four Quarters

District.	1950.		1951.		
	Sept.	Dec.	March.	June.	Sept.
Derby, Leics., Notts., Northants, and Essex	24.4	25	24.8	23.9	24.2
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	4.2	4.6	4.4	3.9	4
Lincolnshire	13.8	14	13.3	13.5	13.7
North-East Coast	22.8	23	23	23	23
Scotland	8.7	9	9	9	9
Staffs, Shrops., Worcs., and Warwicks	8.9	9	9	9	8.9
S. Wales and Monmouth	7.7	8	7.2	7	7.5
Sheffield	1.5	2	2	2	2
North-West Coast	6.4	7	7.5	7.5	7
TOTAL	98.4	101.6	100.2	98.8	99.3

The following companies have furnaces in course of construction or rebuilding:—Barrow Ironworks (2) Cargo Fleet Iron; Consett Iron; Lancashire Steel Corporation; R. Thomas & Baldwins (Redbourn) Sheepbridge; Skinningrove Iron; Steel Co. of Wales; South Durham Steel & Iron.

Jet Engine Manufacture at Sunderland

An important new industry for the manufacture of jet engines is to be set up at Sunderland by the Bristol Aeroplane Company, Limited, next month. The premises of Sunex, Limited, Pallion, a post-war concern manufacturing perambulators and tricycles, are being taken over for this purpose, and 600 workers, including most of the 200 already employed there, will be engaged for the new works. With a conversion of a further 50,000 sq. ft. of factory space to the jet engine works, the staff will be increased to 3,000. Apart from a number of key workers from Bristol, the men will be recruited locally.

SIR HAROLD YARROW, chairman and managing director of Yarrow & Company, Limited, the Glasgow shipbuilders returned recently from a fortnight's goodwill trip to Canada. He said that he had met naval authorities in that country, with whom the company held contracts, in addition to private concerns in Ottawa, Torono, Montreal, Hamilton, and Galt. Sir Harold, who is also a director of the Steel Company of Scotland, Limited, served during the war as president of the Scottish area board set up to speed up production.

Italians for Welsh Steel Industry

More Italian workers are being introduced into South Wales and those already working in the steel and tinplate industries were playing a vital part towards achieving industrial prosperity, Sir Percy Thomas, chairman of the Welsh Board of Industry, told a Press conference at Port Talbot recently. There are 380 Italians employed in Wales at present and they were being introduced on a short-term policy with the option of renewing their contracts after a year's time.

Sir Percy also spoke about the importance of recovering scrap, stressing that for every ton of scrap recovered it was possible to turn out a ton of steel. Asked if he thought that compensation for scrap contributed by farmers was adequate, Sir Percy replied that the cost of handling and transportation made it uneconomic to pay higher prices.

MR. R. R. STOKES, Minister of Materials in the late Government, is rejoining Ransomes & Rapier, Limited, as chairman and managing director, and Cochran & Company, Limited, as managing director.

Personal

MR. E. H. SMITH, director of David Rowan & Company, Limited, Glasgow, has been elected vice-chairman of the National Association of Marine Enginebuilders.

MR. P. J. C. BOVILL, B.Sc., local director and general manager of the chemicals branch of Newton Chambers & Company, Limited, has been appointed a vice-chairman of the local Board.

MR. B. E. STOTT has resigned his position as managing director of Ferrous Castings, Limited, Warrington, owing to ill-health. MR. D. ROBERTSON, general manager, has been appointed a director.

MR. W. PATE, works manager for 22 years, has resigned from Albion Motors, Limited, Glasgow, for health reasons, and has been succeeded by Mr. Wm. P. Kirkwood, who has been with the company for 32 years.

MR. H. W. BOSWORTH, chairman of Lancashire Dynamo Holdings, Limited, and Lancashire Dynamo & Crypto (Mfg.), Limited, is leaving this country on November 21 to make an extensive tour of Australia and New Zealand.

MR. E. TOON has been appointed works director of Weldall and Assembly, Limited, engineers and fabricators in steel, of Stourbridge, a member of the Triplex group of companies. Mr. Toon was formerly works manager of the company.

MR. W. J. HARPER, of Wolverhampton, managing director of the Ash Foundries, Limited, Willenhall, Staffs, has been appointed commissioner for Wolverhampton groups of Scouts. Mr. Harper is an associate member of the Institute of British Foundrymen.

MR. J. GREGORY has been appointed a director of General Refractories, Limited, Sheffield. Mr. Gregory, who joined the firm in 1921, was for many years in charge of the company's Worksop works, and since 1947 has held the position of works superintendent in England and Wales.

MR. E. H. DISCOMBE, a delegate director and commercial manager of Murex Welding Processes Limited, Waltham Cross, Herts., has recently retired after over 35 yrs' service with the Company. Before leaving he was presented with a cheque on behalf of the staff by the managing director, Mr. H. J. Penn.

MR. J. MATHIESON, of Dundee, sails on November 22 to take up an engineering appointment with the Pacific Pulp & Paper Mill Company at Ocean Falls, B.C. He went into the engineering trade in 1927 at the Wallace Foundry of Urquhart Lindsay & Robertson Orchar, Limited, and worked for a time in Monifieth Foundry and an aeroplane factory in Bristol before returning to Dundee in 1936 to the Caledon Shipbuilding & Engineering Company, Limited. In the last few months he has been employed by the National Cash Register (Manufacturing), Limited.

MR. A. L. COCHRANE, chairman and managing director of Cochrane & Sons, Limited, Selby, has been appointed president of the Shipbuilding Employers' Federation. He succeeds Mr. Charles Connell, chairman of Chas. Connell & Company, Limited, Glasgow. Senior vice-president is Mr. John G. Stephen, director of Alex. Stephen & Sons, Limited, Glasgow, and junior vice-presidents, Mr. T. Eustace Smith, joint managing director of Smith's Dock Company, Limited, North Shields, and Mr. Charles A. Winn, joint managing director of C. H. Bailey, Limited, Cardiff. Mr. Robert Cousland, shipbuilding manager of J. Samuel White & Company, Limited, Cowes, was elected chairman of the conference and works board, and Mr. Hugh H. Hagan, director of Lobnitz & Company, Limited, Renfrew, was appointed vice-chairman.

Steelworks Chemistry

B.I.S.R.A. Conference

Spectrographic analysis of the alloying elements in steel may greatly increase in usefulness as a result of standardisation proposals discussed at a conference organised by the British Iron and Steel Research Association recently at Leamington Spa. Dr. E. Gregory, of Edgar Allen & Company, Limited, presided.

Although spectrographic analysis may take minutes where older established chemical methods take hours, results obtained in different works often disagree, so that chemical methods are used for arbitration. The problem is being tackled by a B.I.S.R.A. sub-committee (chairman, Mr. S. D. Steele, of Babcock & Wilcox, Limited). Mr. J. H. Oldfield (Bragg Laboratories, Naval Ordnance Inspection Dept.) described the work of the sub-committee and outlined its proposals for the analysis of low-alloy steels. The proposals include the use of a quartz prism spectrograph; graphite counter electrodes; an exciter with high voltage and a low capacity condenser with "uncontrolled" spark; calibration and standardisation of photographic conditions by the use of specified iron spectral lines and line pairs of fixed intensity ratios for evaluation. Generally, the standard deviation for commercial low-alloy proportions of manganese, nickel, chromium, silicon, molybdenum, vanadium and copper was between 2 per cent. and 4 per cent. of the amount present.

Other Subjects Discussed

Other Papers discussed at the conference included:—"Determination of Gases in Iron and Steel," by Mr. G. E. Speight (United Steel Companies, Limited); "Determination of Molybdenum in Low-alloy Steels," by Mr. S. W. Craven (I.C.I., Limited, Alkali Division); "Conflicting Behaviour of Molybdenum, Tungsten and Vanadium in Absorptiometric Analysis," by Mr. C. H. R. Gentry (Philips Electrical, Limited); "Determination of Vanadium in Ferro-vanadium," by Mr. B. Bagshawe (Brown-Firth Research Laboratories); and "Determination of Nickel in Highly-alloyed Steels," by Mr. S. Harrison (Kayser, Ellison & Company, Limited).

Finally, Mr. W. Bullough (B.I.S.R.A.) gave a Paper on "Disposal of Pickle Liquor with particular reference to Conservation of Sulphuric Acid," in which he discussed batch and continuous pickling.

The various methods were outlined of manufacturing sulphuric acid from the ferrous sulphate remaining after free acid had been recovered. B.I.S.R.A. had developed an autoxidation method of producing dilute acid (possibly up to 40 per cent.). In this process ferrous sulphate was roasted with coke to give iron oxide and sulphur dioxide, which was absorbed in water and catalytically oxidised to sulphuric acid.

Diamond Jubilee Celebration. Philips' Lamp Works, of Eindhoven, Holland, recently celebrated the sixtieth year of its establishment. The house organ, *Philips Technical Review*, of this concern appears as a special issue covering the history of the firm.

News in Brief

JOHN NEEDHAM AND SONS LIMITED have had plans approved to erect new foundry stores at Offerton Street, Stockport.

THE FOLLOWING FIRMS were affected by an explosion at Derby power station on November 5:—Qualcast Limited; Parker Foundry (1929) Limited; Aiton and Company, Limited.

HIGH DUTY ALLOYS LIMITED announce that the new address of their northern-area sales office is Colwyn Chambers, 24, Mosley Street, Manchester, 2. Telephone: Manchester, Central 2758.

THE BUTTERLEY COMPANY, LIMITED, Ripley, near Derby, supplied four electric overhead cranes to serve the heat-treatment bay of the new heavy-forge building, at the East Hecla Works, of Hadfields, Limited, Sheffield.

THE TECHNICAL AND SCIENTIFIC REGISTER of the Ministry of Labour and National Service has moved from York House, Kingsway, London, W.C.2, to Almack House, 26/28 King Street, St. James's Square, London, S.W.1. 'Phone TRAfalgar 7020.

THE GLACIER METAL COMPANY LIMITED, manufacturers of engine bearings, have taken over a 15,000 sq. ft. factory at Carfin Industrial Estate, Lanarkshire, where they hope to begin production in February. It is expected that 60 persons will be employed. The firm at present have a factory at Kilmarnock.

THE INTERNATIONAL TIN STUDY GROUP, 7, Carel van Bylandtlaan, The Hague, Holland, has issued "Tin, 1950-1951: A Review of the World Tin Industry," covering the year to June 30 last. It is recorded that the price of tin rose rapidly after the outbreak of the Korean war in the middle of 1950; after reaching an unprecedented height in February, 1951, it collapsed almost as dramatically.

A METHOD for low-frequency induction annealing and tempering of steel bars has been developed at Böhler Bros., Kapfenberg, Austria. This installation is particularly interesting since it is able to operate off a.c. current of the normal "grid" frequency (50 cycles per sec.) and the expense of the high-frequency generators normally required is thus avoided. The unit was constructed by Brown Boveri, of Kehlheim.

INSTALLED by his predecessor, Mr. J. Lanaghan, as chairman of the Tees-side branch of the North-East Coast Institution of Engineers & Shipbuilders, Mr. T. P. Everett, who is resident director at Hartlepool of Richardsons, Westgarth & Company, Limited, claimed that the high esteem in which the engineering industry in the north east was held in the markets of the world was due to the high quality of design and workmanship.

ABOUT FOUR YEARS AGO Stanton Ironworks, Nottingham, opened a Training Centre to give their apprentices basic instruction before they entered the workshops. This scheme has proved so successful that a plan may be put forward to extend a student's time at the Centre. At present there is a course for foremen who wish to study for the Foremanship Certificate of the Institute of Industrial Administration. About twenty foremen have taken advantage of this course at the moment.

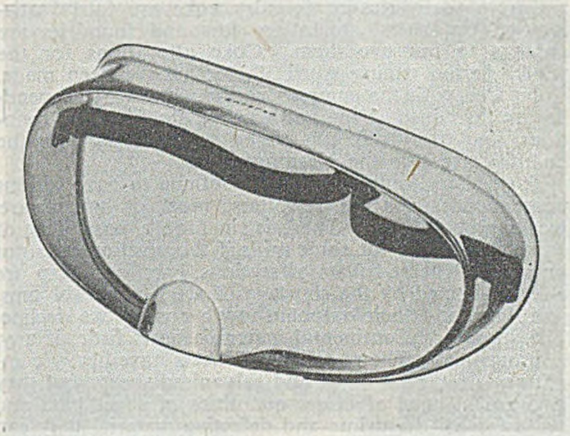
AT ITS MONTHLY MEETING, in November, the Midland Regional Committee of the Engineering Industries Association determined upon an immediate campaign to collect evidence from member firms on the effect of metal shortages, particularly steel, with the object of submitting such data to the Ministry of Supply by a deputation, "The method of allocation of materials to smaller firms must be overhauled and speedy help given," said the Committee in a statement issued after its meeting.

HEAD, WRIGHTSON & COMPANY, are to build a new ore-preparation plant for the Appleby-Frodingham Steel Company, at Scunthorpe, Lincs, which will comprise screening, fine crushing and sintering equipment to deal with the special problems encountered in treating British low-grade iron ores from Lincolnshire and Northamptonshire. The plant, which will treat three and three-quarter million tons per annum, will incorporate all the latest British and American technical developments and will, it is thought, be the most modern of its kind in the world.

THE FOURTH INTERNATIONAL MECHANICAL ENGINEERING CONGRESS will be held in Stockholm from June 4 to 10, 1952, when papers and discussions will be centred on improvements of materials used in engineering manufacture. This congress is organised by the trade associations serving the mechanical engineering industry of twelve European countries. Visits to six important works have already been arranged around Stockholm during the congress and in the following week there will be an optional tour of the principal industrial centres of Sweden. Information concerning the congress is available on request from the British Engineers' Association, 32 Victoria Street, London, S.W.1.

Industrial Eye Shield

J. & S. Newman, Limited, of 100, Hampstead Road, London, N.W.1, have designed and placed upon the market an industrial eye-shield carrying the trade name of "Safespex." The model rests only on the forehead and cheek bones and is secured by an elastic band passing to the back of the head. Ordinary spectacles can be worn beneath. Coloured or plain unsplinterable shields to suit various industrial applications are fitted. One of the models is illustrated below.



Latest Foundry Statistics

The British Bureau of Non-ferrous Metals Statistics reporting for September states that the output of pure copper castings during that month was 500 tons and for the first nine months of this year 4,500 tons, the same as 1950. The quantity of copper-containing castings was 5,629 tons in September, and 47,283 tons for the first nine months as against 33,452 tons in 1950.

Raw Material Markets

Iron and Steel

No improvement is yet apparent in the supply of pig-iron to the foundries, all of which continue to be faced with supply difficulties. Outputs of pig-iron in some areas are on the upgrade, but the priority given to steel-making grades is, of course, of no help to the foundries. Production of foundry iron remains fairly steady, but there is a wide gap between supply and demand, and, with stocks almost entirely eliminated, many foundries are working from hand to mouth. The position is further aggravated by delays in despatch or *en route,* and some instances have been reported of short-time working. It is difficult, too, for the foundries to fix their mixtures from day to day owing to the varying analyses of the iron received.

Foundrymen generally are well supplied with business. The engineering and speciality foundries are carrying heavy order-books and are in need of much larger tonnages of pig-iron. The low- and medium-phosphorus irons are very short of requirements. The improved outputs of hematite are mostly benefiting the steel-makers, and the production of the refined irons is lower on account of a shortage of their base materials. Users of high-phosphorus pig-iron are calling for much larger tonnages than are available; their anxiety is reflected in the number of inquiries for Continental pig-iron, the purchase of which naturally adds appreciably to production costs. The closing down of a further furnace producing high-phosphorus iron in the Northamptonshire area has, it is understood, been deferred for the time being, and this news will bring relief to users obtaining supplies from that source.

Scrap supplies remain at a very low level. There is heavy pressure for cast-iron and steel cupola scrap, particularly for heavy cast-iron scrap. Supplies of ganister, limestone, and firebricks present no difficulties, and the foundries in need of ferro-alloys are generally able to satisfy their needs.

Current deliveries of foundry coke are fairly satisfactory, but users' stocks are low and foundries are anxious to improve them. Coke allocations for the winter period ending April 30, 1952, have been made. Compared with the summer period, they vary, depending on the consumption and existing stocks at the foundries, and every effort is to be made to increase the quantities sent to the blast furnaces.

The reduced outputs of steel continue to have serious consequences for the re-rollers, most of whom are working short time. There is, in fact, a possibility of complete closure for some mills if the position does not improve. The re-rollers of sections, bars, and strip are chiefly affected by the shortage of steel billets, blooms, and slabs, and their outputs show a continuous decline. The supply of Continental material shows little, if any, improvement. The re-rollers of sheets have heavy commitments for both black and galvanised sheets, but they also are in need of larger quantities of sheet bars and are using all the prime and defective material they can obtain.

Non-ferrous Metals

The British Bureau of Non-ferrous Metal Statistics has issued the customary monthly details of stocks and consumption in the U.K. In September our total usage of copper was 46,546 tons, divided between 28,291 tons of virgin copper and 18,255 tons of secondary metal. This compared with 36,248 tons in August, of which 21,764 tons were virgin and 14,484 tons secondary. Stocks on hand at September 30 stood at 132,249 tons, less than half of which belonged to consumers. At August 31 the corresponding figure was 126,653 tons.

The situation in lead showed stocks standing at 43,902 tons at September 30, which was only 57 tons lower than at August 31. Consumption during September was 27,352 tons, compared with 25,778 tons a month earlier. Consumption of zinc, primary and secondary, in September amounted to 24,886 tons, compared with 19,249 tons in August, and the cumulative total to the end of September was 209,527 tons, about 35,000 tons below the comparable figure in 1950. Stocks of virgin zinc of all grades stood at 35,528 tons at the end of September, as against 37,074 tons a month earlier.

In tin, September consumption was 1,916 tons, compared with 1,735 tons in August, when activity declined owing to the holidays. Stocks in consumers' hands at September 30 were 1,803 tons.

Trading in tin last week was quiet, and price fluctuations were confined within fairly close limits.

It has now been announced that the cutback in copper scrap prices is to be £8 per ton, with a corresponding fall in the alloys of copper. It is believed that the Order will be published at any moment. There will, of course, be a ceiling price for secondary copper ingots and cathodes. Scrap supplies are no better, and production is suffering through the lack of secondary metal to help out the diminished supplies of virgin.

In the United States, too, the supply situation in both old and new metals is very difficult and great efforts are being made to encourage a higher rate of output from the mines. The U.S. Government is giving financial assistance to a number of companies where costs are so high as to prohibit selling profitably at current levels.

London Metal Exchange official tin quotations were as follow:—

Cash—Thursday, £995 to £1,005; Friday, £992 10s. to £995; Monday, £987 to £987 10s.; Tuesday, £962 10s. to £965; Wednesday, £972 10s. to £975.

Three Months—Thursday, £967 10s. to £970; Friday, £962 10s. to £963; Monday, £958 to £960; Tuesday, £940 to £945; Wednesday, £945 to £947 10s.

Ownership of Darwins

A change of ownership, announced on November 6, of approximately 90 per cent. of the ordinary capital of Darwins, Limited, the Sheffield steelmakers, brings back to this country the control which passed to Indian interests in 1947. The sale of 915,581 10s. shares out of the issued total of 1,028,300 has been arranged by the liquidator of Rahon Steel, the principal shareholder in which is the Nawab of Bhopal.

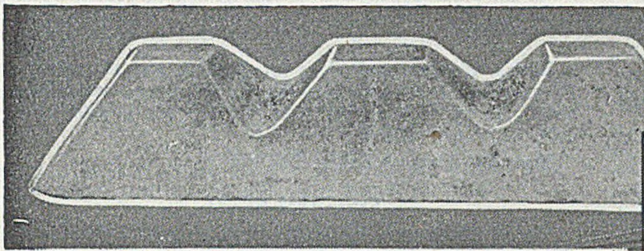
The shares have been acquired at 12s. 1d., less ½d. commission, by a London firm of stock brokers, whose senior partner, Mr. F. Thompson-Schwab, joined the board of Darwins two years ago as chairman.

The board is to be immediately reconstituted under the present chairman. Sir Alexander Dunbar, who was formerly associated with Vickers, Limited, and was chairman of the English Steel Corporation, Limited, will join the board.

Specialloid's Affairs

The shareholders' committee of Specialloid, Limited, piston manufacturers, etc., of London, N.12, has informed shareholders that negotiations for the provision of finance for the company and for changes in the directorate have made progress.

These negotiations, it is stated, cannot be finalised or submitted to shareholders for their consideration until audited accounts are available for the year ended March 31 last with an up-to-date and audited statement on trading in the current financial year.



Cut down costs in your cupolas by using

STANTON

FOUNDRY PIG IRON

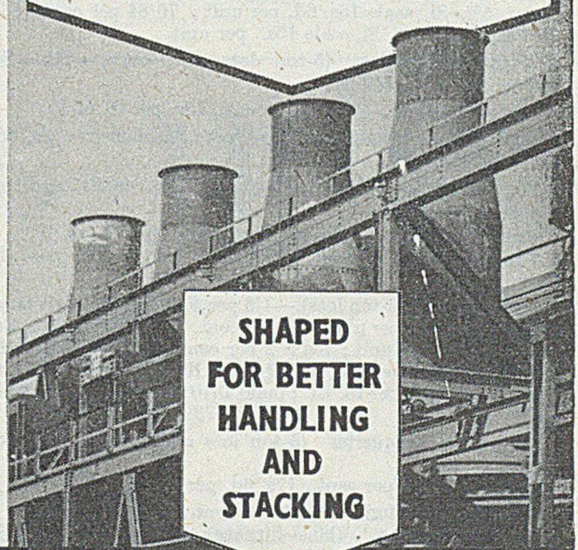
Stanton Machine-cast Pig Irons are clean-melting, and economical in cupola fuel.

All types of castings are covered by the Stanton brands of pig iron, including gas and electric fires, stoves, radiators, baths, pipes, and enamelled products generally ; repetition castings requiring a free-running iron, builders' hardware and other thin castings.

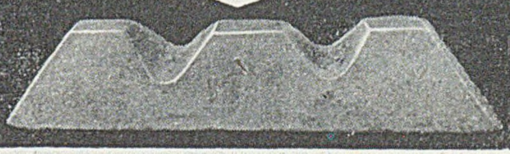
Other grades of Stanton Foundry Pig Iron possess the necessary physical properties and strength ideal for the production of fly-wheels, textile machinery, etc.

Stanton Foundry Pig Iron in all grades is also available in sand cast form.

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



SHAPED FOR BETTER HANDLING AND STACKING



THE STANTON IRONWORKS COMPANY LIMITED – NEAR NOTTINGHAM

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

(Delivered, unless otherwise stated)

November 14, 1951

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2:—Middlesbrough, £11 10s.; Birmingham, £11 4s. 6d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £13 0s. 6d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £13 12s. 3d.

Scotch Iron.—No. 3 foundry, £13 1s., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £15 7s.; South Zone, £15 9s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £15 17s.; South Zone, £15 19s. 6d.

Cold Blast.—South Staffs, £17 5s. 6d.

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. Coast and N.-W. Coast of England, £12 17s.; Scotland (Scotch iron), £13 3s. 6d.; Sheffield, £13 13s. 6d.; Birmingham, £14 0s. 6d.; Wales (Welsh iron), £13 3s. 6d.

Spiegeleisen.—20 per cent. Mn, £18 15s. 9d.

Basic Pig-iron.—£11 15s. 6d. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered.)

Ferro-silicon (6-ton lots).—40/55 per cent., £40 15s., basis 45% Si, scale 15s. 6d. per unit; 70/84 per cent., £56 2s. 6d., basis 75% Si, scale 16s. per unit.

Silicon Briquettes (5-ton lots and over).—2lb. Si, £48 5s.; 1lb. Si, £49 5s.

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

Ferro-molybdenum.—65/75 per cent., carbon-free, 9s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £175; ditto, copper-free, £190.

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

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

Ferro-chrome (6-ton lots).—4/6 per cent C, £74, basis 60% Cr, scale 24s. 6d. per unit; 6/8 per cent. C, £70, basis 60% Cr, scale 23s. 3d. per unit; max. 2 per cent. C, 1s. 8¼d. per lb. Cr; max. 1 per cent. C, 1s. 8¾d. per lb. Cr; max. 0.15 per cent. C, 1s. 9½d. per lb. Cr.; max. 0.10 per cent. C, 1s. 9¾d. per lb. Cr.

Chromium Briquettes (5-ton lots and over).—1 lb. Cr, £78 9s.

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

Metallic Chromium.—98/99 per cent., 5s. 11d. per lb.

Ferro-manganese (blast-furnace).—78 per cent., £40 8s. 9d.

Manganese Briquettes (5-ton lots and over).—2lb. Mn, £50 6s. 6d.

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

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic: Soft, u.t., £21 11s. 6d.; tested, 0 08 to 0.25 per cent. C (100-ton lots), £22 1s. 6d.; hard (0.42 to 0.60 per cent. C), £23 19s.; silico-manganese, £29 15s.; free-cutting, £24 15s. 6d. Siemens Martin Acid: Up to 0.25 per cent. C, £27 16s.; case-hardening, £28 4s.: silico-manganese, £30 16s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £25 15s.; basic, hard, over 0.41 up to 0.60 per cent. C, £26 15s.; acid, up to 0.25 per cent. C, £28 4s.

Sheet and Tinplate Bars.—£21 16s.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £25 6s. 6d.; boiler plates (N.-E. Coast), £26 14s.; chequer plates (N.-E. Coast), £26 15s. 6d.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £23 15s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £27 11s.; flats, 5 in. wide and under, £27 11s.; hoop and strip, £28 6s.; black sheets, 17/20 g., £35 15s. 6d.; galvanised corrugated sheets, 17/20 g., £49 18s. 6d.

Alloy Steel Bars.—1-in. dia. and up: Nickel, £44 17s. 3d.; nickel-chrome, £65 2s. 9d.; nickel-chrome-molybdenum, £72 10s. 3d.

Tinplates.—52s. 1½d. per basis box.

NON-FERROUS METALS

Copper.—Electrolytic, £227; high-grade fire-refined, £226 10s.; fire-refined of not less than 99.7 per cent., £226; ditto, 99.2 per cent., £225 10s.; black hot-rolled wire rods, £236 12s. 6d.

Tin.—Cash, £972 10s. to £975; three months, £945 to £947 10s.; settlement, £972 10s.

Zinc.—G.O.B. (foreign) (duty paid), £190; ditto (domestic), £190; "Prime Western," £190; electrolytic, £194; not less than 99.99 per cent., £196.

Lead.—Good soft pig-lead (foreign) (duty paid), £175; ditto (Empire and domestic), £175; "English," £176 10s.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £210 10s.; rolled zinc (boiler plates), all English destinations, £208 10s.; zinc oxide (Red Seal), d/d buyers' premises, £205.

Other Metals.—Aluminium, ingots, £124; antimony, English, 99 per cent., £365; quicksilver, ex warehouse, £73 10s. to £73 15s.; nickel, £454.

Brass.—Solid-drawn tubes, 25d. per lb.; rods, drawn, 32⅞d.; sheets to 10 w.g., 29⅝d.; wire, 31¼d., rolled metal, 28⅜d.

Copper Tubes, etc.—Solid-drawn tubes, 26d. per lb.; wire, 254s. 9d. per cwt. basis; 20 s.w.g., 281s. 9d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £255 to £280; BS. 1400—LG3—1 (86/7/5/2), £265 to £300: BS. 1400—G1—1 (88/10/2), £330 to £360; Admiralty GM (88/10/2), virgin quality, £330 to £360 per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £340 to £370; L.P.Bl, £295 to £315 per ton.

Phosphor Bronze.—Strip, 38¼d. per lb.; sheets to 10 w.g., 40⅜d.; wire, 42¾d.; rods, 38d.; tubes, 36¼d.; chill cast bars: solids 4s., cored 4s. 1d. (C. Clifford & Son, Limited.)

Nickel Silver, etc.—Ingots for raising, 2s. 7d. per lb. (7%) to 3s. 6¾d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 3s. 1d. (7%) to 4s. 0¾d. (30%); to 12 in. wide × .056, 3s. 1¼d. to 4s. 1d.; to 25 in. wide × .056, 3s. 3¼d. to 4s. 3d. Spoon and fork metal, unsheared, 2s. 10d. to 3s. 9¾d. Wire, 10g., in coils, 3s. 6¾d. (10%) to 4s. 6⅛d. (30%). Special quality turning rod, 10%, 3s. 5¾d.; 15%, 3s. 10½d.; 18%, 4s. 2¾d. All prices are net.

Forthcoming Events

Institution of Mechanical Engineers

NOVEMBER 19

Midland branch graduates' section:—"Engineering Failures," by D. Dudgeon Stockley, B.Sc., 6.30 p.m., in the James Watt Memorial Institute, Great Charles Street, Birmingham, 3. (Teas will be served from 6 p.m.)

Purchasing Officers' Association

East London branch:—Film, "Light Alloy Castings," 7 p.m., at the Valentine Hotel, Perth Road, Ilford.

NOVEMBER 20

Institute of Fuel

Midland section:—Film show, 6 p.m., at the James Watt Memorial Institute, Great Charles Street, Birmingham, 3.

Institute of British Foundrymen

East Anglian section:—"Core-blower Applications and Operations," by G. W. Fairfield, 7 p.m., in the Central Hall, Public Library, Ipswich.

Sheffield Metallurgical Association

"Spectrographic Analysis of Slags and Refractory Materials," by G. L. Mason, and "Spectrographic Analysis of Alloy Steels," by R. H. Tyas, 7 p.m., in the Grand Hotel, Sheffield.

Purchasing Officers' Association

Birmingham branch:—"Super Refractories," 6.30 for 7 p.m., in the Colmore Room, Grand Hotel, Birmingham.

Chemical Engineering Group

"Recent Trends in Chemical Engineering," by Prof. D. M. Newitt, 5.30 p.m., at Burlington House, Piccadilly, London, W.1.

NOVEMBER 21

North-western section:—"Comparative Tests on Commercial CO_2 Recorders," by L. J. Flaws and W. Hill, 6.30 p.m., at Engineers' Club, Manchester.

Institute of British Foundrymen

London branch:—"Recruitment and Apprentices," by A. Talbot, 7.30 p.m., at the Waldorf Hotel, Aldwych, W.C.2.

Scottish North-eastern section:—"Foundry Sand Control Technique," by W. Y. Buchanan, 7.30 p.m., at the Imperial Hotel, Arbroath.

Institute of Welding

North London branch:—"Argon Arc Welding," by W. A. Woolcott, and "Atomic Hydrogen Welding," by P. J. G. Heath, 7.30 p.m., at the Enfield Technical College.

Institution of Mechanical Engineers

Scottish branch graduates' section:—Visit to Stewarts and Lloyds, Limited, Clydesdale Tube Works, Coatbridge. The party will meet at 7.15 p.m. at the Works Gate.

Southern branch:—"Some Problems in the Manufacture of Experimental Gas Turbines," by L. H. Leedham, 7.15 p.m., in the Royal Air Craft Establishment Technical College, Farnborough.

Institution of Production Engineers

Birmingham section:—"Management and Production," by Prof. J. R. Immer, 7 p.m., in the James Watt Memorial Institute, Great Charles Street, Birmingham, 3.

Purchasing Officers' Association

Northern Ireland group:—"Stores and Storekeeping Procedure," by W. H. Richardson, 7.30 p.m., at the Queens Hotel, Victoria Street, Belfast.

NOVEMBER 22

Institute of British Foundrymen

West Riding of Yorkshire branch:—Annual dance, 8 p.m., at the Alexandra Hall, Halifax.

Institute of Metals

Birmingham local section:—"Metal Economics," by Prof. A. J. Murphy, 7 p.m., at the James Watt Memorial Institute, Great Charles Street, Birmingham, 3.

Institution of Mechanical Engineers

North-western branch:—"Designing for Production," by C. A. Sparkes, 6.45 p.m., in the Engineers' Club, Albert Square, Manchester.

Institution of Production Engineers

Wolverhampton graduate section:—"Air-operated Fixtures," by C. M. P. Willcox, 7.30 p.m., at the Green Room, Civic Hall, Wolverhampton.

Institute of Metals

NOVEMBER 23

London local section:—Annual dance, at 4, Grosvenor Gardens, S.W.1. (Further details from the secretary.)

Institution of Mechanical Engineers

Western branch graduates' section:—"Design Development of the Aircraft Gas Turbine," by B. A. Peaster, 7 p.m., in the College of Technology, Unity Street, Bristol.

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

ANALYTICAL CHEMIST (25) requires progressive position in Manchester area. Capable of starting own laboratory, experienced in ferrous and non-ferrous metals, sand control, foundry materials, etc.—Box 1390, FOUNDRY TRADE JOURNAL.

FOUNDRY/GENERAL MANAGER (45), A.M.I.P.E., M.I.B.F., life experience, specialist medium, light general, auto and repetition grey and malleable castings, some non-ferrous, semi and full mechanisation, specialist on metal cupola, sand control, etc., excellent commercial connection sales, labour control, incentive rating, etc., desires change to small Midland foundry requiring organising and expansion, development. Salary/results basis, with prospects and directorship. West Midland district only considered. Post must be capable of development to salary/results. £1,500/£2,000 p.a. Confidential.—Box 1383, FOUNDRY TRADE JOURNAL.

FOUNDRY EXECUTIVE, engineer trained, M.I.B.F., A.M.I.P.E., over 20 years' technical and administrative experience founding Light Alloys, specialising in Gravity Die-Casting, widely travelled, well connected, and lecturer in Foundry Practice, desires change of appointment. Willing to accept full responsibility of medium-sized foundry which requires revivifying. Midland area preferred.—Box 1374, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

ESTIMATOR, age approximately 21, required by Midland Ironfounders. Applicants must be able to calculate weights and prepare estimates. Successful applicant will be required to maintain progress records.—Apply first instance, stating age, previous experience and salary required, Box 1387, FOUNDRY TRADE JOURNAL.

SMALL Iron Foundry near Leeds requires WORKING MANAGER, to take charge of the running of the Foundry. Must be proved technician, as the general quality of castings must be raised well above the present level. Opportunity to acquire shares and directorship for suitable man.—Box 1378, FOUNDRY TRADE JOURNAL.

AN Engineering Company operating in the Midlands has a vacancy for a FOUNDRY METHODS ENGINEER. Applications will be considered only from men possessing initiative and drive, with sound technical and practical experience in Light Grey Iron Foundry practice, covering floor moulding and mechanised plant, with hydraulic and electric machines, handling about 25 tons of metal per day. There is plenty of scope for a capable engineer to reduce costs and improve production.—Applications, giving full details of experience and salary required, will be treated in strict confidence, and should be addressed to Box 1379, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

SKILLED SAND MOULDERS for Light Non-ferrous Foundry. Top rates and bonus.—Full details age, experience, etc., GRAVINER MANUFACTURING CO., LTD., Gosport Road, Gosport, Hants.

STEEL FOUNDRY FOREMAN required for mechanised Foundry in Yorkshire, specialising in pressure castings—mainly green sand practice.—Apply giving full details of age, experience, and salary desired, to Box 1385, FOUNDRY TRADE JOURNAL.

CORE SHOP FOREMAN required. Good salary and permanent position. Core blowing experience essential, including knowledge of the design of core boxes for blowing. London 20 miles.—Box 1376, FOUNDRY TRADE JOURNAL.

ASSISTANT FOREMAN, to act as Chief Inspector of castings in a mechanised foundry in Midlands. Staff position. Preference given to applicants with patternmaking or machine shop experience.—Reply, giving full particulars of experience and salary required, Box 1380, FOUNDRY TRADE JOURNAL.

TECHNICAL ASSISTANT required for Metallurgical Research Dept., experience in Metallurgy of light alloys essential and possession of Higher National or equivalent certificate desirable. Age about 21-23. Apply in writing with full particulars to: SECRETARY, Magnesium Elektron, Ltd., Lumm's Lane, Clifton Junction, Nr. Manchester.

FOREMAN METAL PATTERNMAKER required. Good disciplinarian, accustomed to handling large numbers of first class patternmakers producing highest class Metal Pattern Equipment to dead-on limits, with mirror finish. Used to modern methods, backed by the largest and most modern Plant and Equipment in the trade. Applicant must be good Estimator, with inspection experience and Foundry knowledge.—Write, stating full experience, age and wages now received, and expected, and when available, to WRIGHT & PLATT, LTD., the World's Largest Engineering Master Patternmakers, 45/58, Irving Street, Birmingham, 15.

A VACANCY exists in our Gravity Diecasting Section for a fully qualified SENIOR FOREMAN. Applicants must have the following qualifications:—(*a*) Fully experienced in Gravity Diecasting and able to train unskilled and control semi-skilled labour in this class of work. (*b*) Preferably a qualified Toolmaker to trade and if possible experienced in the manufacture of dies. (*c*) Accustomed to a high standard of work. (*d*) Have the necessary drive, initiative, good disciplinarian, and able to take responsibility. Only fully competent men need apply. This post offers excellent prospects for the right man. Good prospects of a house. Attractive Superannuation Scheme.—Write in the strictest confidence, giving full particulars of age, experience, qualifications and salary expected, to the PERSONNEL MANAGER, Renfrew Foundries, Ltd., Hillington, Glasgow, S.W.2.

SITUATIONS VACANT—*Contd.*

VACANCY for experienced PATTERNMAKER with old-established Firm. London district.—Apply Box 1382, FOUNDRY TRADE JOURNAL.

DRAUGHTSMEN required by Foundry Plant Manufacturers. Two Seniors, one Junior. Experience of structural or furnace work an advantage.—Full details in confidence to the SECRETARY, The Constructional Eng. Co., Ltd., Charles Henry Street, Birmingham, 12.

ASSISTANT METALLURGIST required to take charge of Metal and Sand Control in Foundry producing Light Engineering Castings. Age 21 to 25 years. National Certificate in Chemistry or Metallurgy.—Write, giving full details of training, experience, and education to PERSONNEL MANAGER, Newman Industries, Ltd., Yate, Bristol.

FOUNDRY FOREMAN required for Malleable Foundry. To control foundry and ancillary departments. Must have sound experience of jobbing and repetition moulding, coremaking and production control. Good disciplinarian. Excellent future prospects. Accommodation available. Write with full details of training, experience and present salary to—Box 1367, FOUNDRY TRADE JOURNAL.

PATTERNMAKING FIRST - CLASS ESTIMATOR required. Apply in writing, stating age, wage, and full experience; references essential.—State when available, to WRIGHT & PLATT, LTD., the World's Largest Engineering Master Patternmakers, Irving Street, Birmingham, 15.

PLANT DRAUGHTSMAN REQUIRED.—Excellent opening exists for keen man to start a Section in conjunction with Engineer responsible for Foundry Plant Development Schemes. Applicants with Structural and/or Mechanical experience only would be considered. Duties involve site visits to various companies controlled.—Box 1342, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required for mechanised and jobbing Malleable and Grey Iron Foundry in East Coast. Experience of mass production and ability to maintain high production of good quality castings. Good disciplinarian. Knowledge of pattern layout an advantage. Give details of previous experience and salary expected to Box 1346, FOUNDRY TRADE JOURNAL.

FOUNDRY INSPECTOR.—The Stanton Ironworks Co., Ltd., near Nottingham, require a Man for the inspection staff of one of its foundries in the Midlands. Applicants should be aged about 22-32, and have had an engineering training with pattern or machine shop experience. The work is mainly supervision of the inspection of unfinished and finished castings, and a knowledge of foundry work would be an advantage.—Write to the STAFFING OFFICER, stating date of birth, whether married, and full details in confidence of present post, education, technical training and experience, and salary required.

SITUATIONS VACANT—*Contd.*

FOUNDRY FOREMAN required by Midland Ironfounders to supervise production of Grey Iron Castings in green sand from mechanised foundry, working three shifts. Applicants with experience of Slinger Moulding preferred.—Apply first instance, giving full details of previous experience, age, and salary required, Box 1386, FOUNDRY TRADE JOURNAL.

ASSISTANT METALLURGICAL CHEMIST (Graduate preferred) required for Marine Engineering Works in Belfast. Apply stating age, experience and salary required to Box 1351, FOUNDRY TRADE JOURNAL.

FACTORY PREMISES WANTED

GREY Iron Foundry Premises required in Midlands. Approximately 10,000 sq. ft.—Full details and price to Box 1322, FOUNDRY TRADE JOURNAL.

DISUSED FOUNDRY or Premises suitable for smelting required within 25 miles London, either Surrey or Sussex. Approx. 5-8,000 sq. ft.—Full details and price to Box 1106, FOUNDRY TRADE JOURNAL.

BUSINESSES FOR SALE

BROMSGROVE FOUNDRY Moulding Sand Supplies business for sale owing to ill-health. Lorries. Pulveriser. Loader. Spare parts and tools. Large deposits sand.—Box 1365, FOUNDRY TRADE JOURNAL.

FOR SALE.—South London. Small Non-ferrous Foundry. Suit two working partners. Reason, ill-health.—Box 1375, FOUNDRY TRADE JOURNAL.

AGENCIES

LONDON AREA.—Engineers' Agents, with good offices in Westminster, require AGENCY for Malleable or Steel Castings. If principals have established connections amongst users in the area, remuneration required would be correspondingly moderate.—Box 1061, FOUNDRY TRADE JOURNAL.

FINANCIAL

ENGINEERING OR ALLIED INDUSTRY.—Advertiser, with substantial financial resources, desires to acquire an interest in (or would purchase outright) an Established Concern with good profit-earning record. Continuity of management and personnel essential.—Address Box 1268, FOUNDRY TRADE JOURNAL.

PLANT FOR SALE

2 ELECTRIC FURNACES, in good condition. Suitable for vitreous enamelling, 140 k.w., size 9 ft. by 13½ ft. high, complete with equipment.—Apply Buyer, PLATERS & STAMPERS, LTD., Burnley.

MACHINERY WANTED

4-5 ton ROTARY MELTING FURNACE required. Brackelsburg, Sesci or Stein & Atkinson. Give full details to Box 1373, FOUNDRY TRADE JOURNAL.

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MACHINERY WANTED—*Contd.*

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5 pairs 18¼ in. by 18¼ in. by 8 in. by 8 in.: 20⅝ in. centres; ¾ in. fixed pins.
6 pairs 26 in. by 18 in. by 4 in. by 4 in.; 28½ in. centres; ¾ in. loose pins.

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