FOUNDRY TRADE JOURNAL

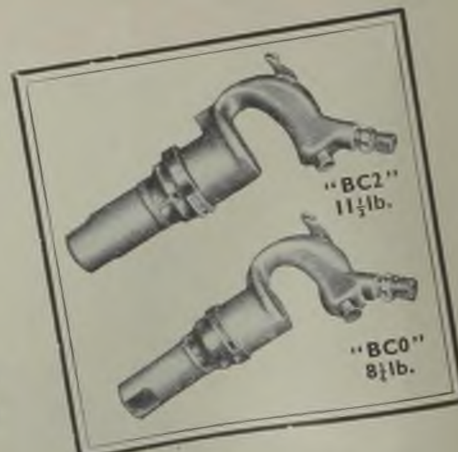
EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

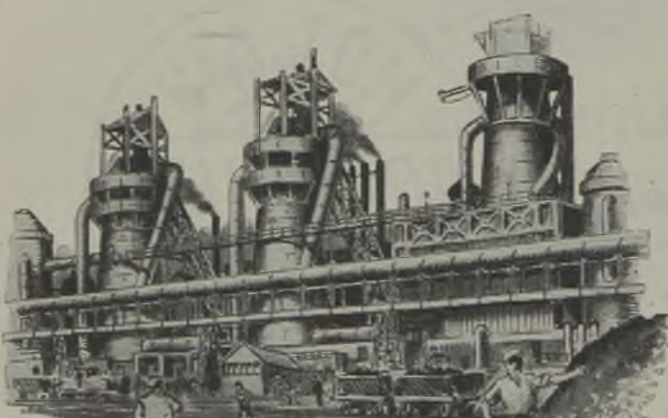
VOL. 73. No. 1459. AUGUST 3, 1944

Registered at the G.P.O. as a Newspaper *Offices: 49, Wellington Street, Strand, London, W.C.2.*

Single Copy 6d. By Post ... Annual Subscription, H... and Overseas, 21/- (Prep...


"BC2"
$11\frac{1}{2}$ lb.
"BC0"
$8\frac{1}{2}$ lb.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export



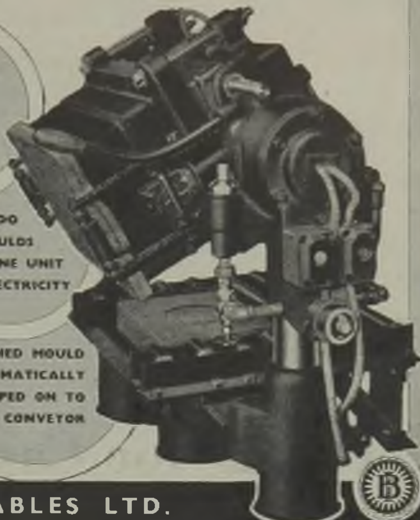
B.I. MAGNETIC MOULDING MACHINE

UTILISES ELECTRICITY AS THE DIRECT POWER MEDIUM FOR HIGH PRODUCTION WORK

DISTORTION OF MOULDS ELIMINATED

100 MOULDS FOR ONE UNIT OF ELECTRICITY

FINISHED MOULD AUTOMATICALLY STRIPPED ON TO THE CONVEYOR



ROLL-OVER TYPE MAGNETIC MOULDING MACHINES

BRITISH PATENT No. 331777.

B.I. Magnetic Moulding Machines have four outstanding features which result in four vitally important production factors—speed, accuracy, economy and reliability. By the utilisation of electricity as the direct power medium, the maximum output of accurate moulds is economically attained with the minimum of manual effort. With "rolling-over" performed before squeezing, all possibility of distortion is eliminated. Automatic stripping on to the conveyor also allows the operator's attention to be concentrated fully on mould production. Write for leaflet M.115.

BRITISH INSULATED CABLES LTD.
PRESCOT — LANCS. Telephone PRESCOT 6571.

N.R.S. stands for "NEWSTAD" RECIRCULATION SYSTEM

Every N.R.S. Conversion doubles the output and saves at least 50% on Fuel Consumption

—N.R.S. STOVES—

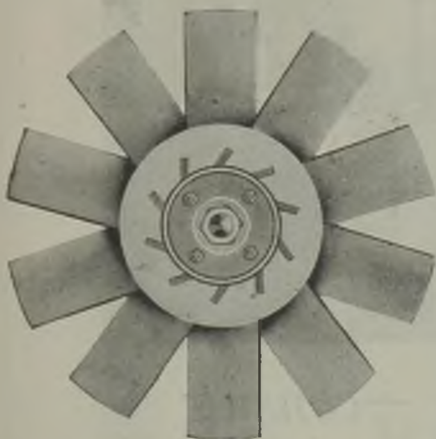
for Efficiency, Quality and Economy

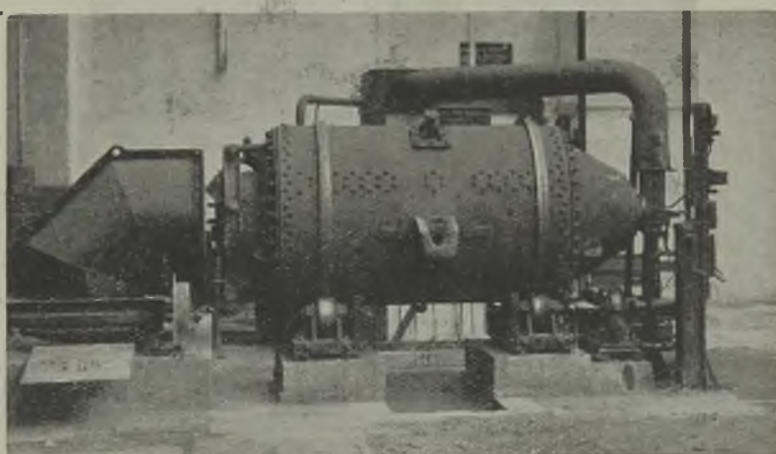
Types for any capacity and Foundry condition
Mould and Core Stoves, new and conversions
with guaranteed results
for coke, coal, gas or oil

N.R.S. Heating Units and N. MOULD DRIERS
—— Hot Air Units for Skin Drying ——

Sole Suppliers:

MODERN FURNACES & STOVES LTD.
BOOTH STREET, HANDSWORTH, BIRMINGHAM 21
Tel.: Smethwick 1334 'Grams: Mofustolim





FOUNDRY TRADE JOURNAL

Established 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

49, Wellington Street, London, W.C.2.

WARTIME ADDRESS to which all communications should be sent :—
3, Amersham Road, HIGH WYCOMBE, Bucks.
'Grams : "Zacatecas, High Wycombe."
'Phone : HIGH WYCOMBE 1792 (3 lines).

PUBLISHED WEEKLY : 21s. per annum (Home and Overseas)

OFFICIAL ORGAN OF :

COUNCIL OF IRONFOUNDRY ASSOCIATIONS

Chairman : FitzHerbert Wright, The Butterley Company, Ripley, near Derby. Secretary : V. Delport, 2, Caxton Street, Westminster, S.W.1.

Participating Associations : British Bath Manufacturers' Association ; British Ironfounders' Association ; British Malleable Tube Fittings Association; Cast Iron Axlebox Association ; Cast Iron Chair Association; Cast Iron Heating, Boiler and Radiator Manufacturers' Association; Cast Iron Segment Association ; Greensand Pipe Founders' Association of Scotland; Ironfounders' National Confederation ; National Association of Malleable Ironfounders ; National Ingot Mould Association ; National Ironfounding Employers' Federation Association of Automobile and Allied High Duty Ironfounders ; British Cast Iron Research Association (affiliated); British Grit Association (affiliated); Flushing Cistern Makers' Association (affiliated) ; Institute of British Foundrymen (affiliated).

INSTITUTE OF BRITISH FOUNDRYMEN

PRESIDENT, 1943-44 : D. Sharpe, Foundry Plant & Machinery, Ltd. 113 West Regent Street, Glasgow.

General Secretary : T. Makemson. Acting Secretary, J. Bolton Saint John Street Chambers, Deansgate, Manchester 3.

BRANCHES

Birmingham, Coventry and West Midlands : A. A. Timmins, F.I.C. 33, Carters Lane, Quinton. Bristol and West of England: A. Hares, 20, Greenbank Road, Hanham, Bristol. E. Midlands : S. A. Horton "Three," Mostyn Avenue, Littleover, Derby. Lancs : H. Buckley, Ellesmere, Norfolk Avenue, Burnley. London : V. C. Faulkner, 3, Amersham Road, High Wycombe. Middlesbrough (*pro tem.*) : J. K. Smithson, North-Eastern Iron Refining Company, Limited, Stillington, Stockton-on-Tees. Newcastle-upon-Tyne : C. Lashly, Sir W. G. Armstrong, Whitworth & Co. (Ironfounders), Ltd., Close Works, Gateshead Scottish : J. Bell, 60, St. Enoch Square, Glasgow. Sheffield : T. R. Walker, M.A., English Steel Corporation, Ltd., Sheffield. Wales and Monmouth : A. S. Wall, 14, Palace Avenue, Llandaff, Cardiff. West Riding of Yorkshire : Douglas Jepson, M.Sc., 9, Ambleside Avenue, Bradford. South Africa : B. P. Skok, Mutual Building, Johannesburg.

SECTIONS

Burnley : H. Buckley, Ellesmere, Norfolk Avenue, Burnley, Lancs. Cape Town : K. Zwanziger, P.O. Box 346, Cape Town, S. Africa. East Anglian : A. N. Sumner, 516, Norwich Road, Ipswich Falkirk : T. R. Goodwin, "Viewfield," Falkirk Road, Bonnybridge. Lincoln : E. R. Walter, Ph.D., The Technical College, Lincoln.

ASSOCIATION OF BRONZE AND BRASS FOUNDERS

President : H. Bissell, J. Stone & Co., Ltd., London. Secretaries: Heathcote & Coleman, 25, Bennetts Hill, Birmingham, 2

THE INSTITUTE OF VITREOUS ENAMELLERS

President : W. H. Whittle, W. H. Whittle, Limited, Eccles, near Manchester. Chairman : W. Todd, Parkinson Stove Co., Ltd., Stechford, Birmingham. Hon. Sec. : W. Thomas, A.I.C., Bank House, High Street, Rickmansworth, Herts.

FOUNDRY TRADES' EQUIPMENT AND SUPPLIES ASSOCIATION

President : G. E. France, August's, Limited, Thorn Tree Works, Halifax. Honorary Secretary : K. W. Bridges. Assistant Secretary : Miss L. Cox, 52, Surbiton Hill Park, Surbiton, Surrey.

WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION

President : W. E. Clement, C.B.E., Morfa Foundry, New Dock, Llanelly. Secretary : J. D. D. Davis, 1, St. James Gardens, Swansea.

BRITISH CAST IRON RESEARCH ASSOCIATION

Alvechurch, Birmingham. 'Phone and 'Grams : Redditch 716.

Scottish Laboratories :—Foundry Technical Institute, Meek's Road, Falkirk. (Phone : 332.)

FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL
Vol. 73 Thursday, August 3, 1944 No. 1459

The T.A.P.

We understand that after four years' continuous work the Technical Advisory Panel to the Directors for Iron Castings of the Iron and Steel Control, Ministry of Supply, is being wound up, it having completed the work for which it was originally formed.

In July, 1940, Mr. Fitzherbert Wright, then Director for Iron Castings, appointed an Advisory Panel consisting of four members to assist him and industry in meeting the situation likely to arise due to curtailment of normal supplies of raw materials, and to assist firms in the maintenance of quality under wartime conditions. The T.A.P. rapidly grew in size until it included eighteen members, with representatives of the Institute of British Foundrymen, the British Cast Iron Research Association, S.T.A.M., and other official bodies. When Mr. Fitzherbert Wright retired from the post of Director for Iron Castings, the T.A.P. continued to function under the new Joint Directors, Mr. E. A. Chell and Mr. T. Makemson. During its existence the T.A.P. has had 35 formal meetings, and it is a tribute to the enthusiasm of the individual members that in spite of blitz, fog and storm, the average attendance of members at these meetings has been close on 80 per cent. Many authorities have already paid tribute to the excellent work done by the ironfoundry industry under wartime conditions in the maintenance of quality of output. It can fairly be stated that whereas in the last war the quality of iron castings seriously deteriorated, in the present war the quality of castings has been maintained and where necessary has been substantially raised. The T.A.P. among others can claim a share in bringing about this satisfactory state of affairs.

In its early days the T.A.P. assisted the Control in the allocation of quality grades of pig-iron to special jobs, and assisted industry in maintaining production with the increased proportion of native iron, most of it of high-phosphorus content, which it was obliged to use. The production of individual items such as trench mortar bombs was in many cases assisted by personal visits by members of the Panel. As the work of the T.A.P. grew, much of it was allocated to Sub-Committees. One of the first fruits of the Panel's work was the publication of the data book on cast iron issued by the British Standards Institution under their No. 991. This book summarises information on the various grades of cast iron available. It was prepared to supply information suitable for designers and engineers, and having in mind especially the requirements of the Service departments, and with particular reference to cases where cast iron was adopted as a substitute for other metals in short supply. A considerable amount of the T.A.P.'s activity has been concerned with the production of malleable castings and special activities of the Sub-Committees have dealt with items such as the regeneration of spent annealing ore, with the influence of residual elements, and modifications in refined and other pig-irons, and with the trouble encountered for a time with "peel" in malleable castings.

Another Sub-Committee of the T.A.P. has for some time past been studying the impact properties of cast iron with a view to learning more of its behaviour under shock, and with a view to developing a satisfactory general test for use throughout the industry. Details of a recommended procedure for the test were published in THE FOUNDRY TRADE JOURNAL, July 22, 1943. This work is now nearing completion, and will, it is hoped, result in a standardised method of carrying out the impact test for cast iron. Other Sub-Committees have looked after the interests of the foundry industry in relation to moulding materials, and throughout the war period liaison

(*Continued overleaf, column* 2.)

Contents

CORRESPONDENCE

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

PUBLICITY FOR BRITAIN

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—Within 12 to 18 months of the cessation of hostilities in Europe, would it not be a most valuable addition to any British propaganda to organise a series of comprehensive exhibitions in some dozen or so Continental cities—such exhibitions to have as their purpose the stimulation of pro-British feeling? I remember well some 35 years ago, when Sir George Askwith was President of the Board of Trade, he was very keen on the idea of running exhibitions in several capital cities on the Continent, and he did, in fact, do so. This time I should like to see a far more ambitious scheme—exhibitions at each of which would be shown Britain's immense industrial achievement in wartime, and what Britain can offer for the future. I visualise, for example, as well as the usual industrial story, such things as a repertory theatre, and cinemas showing the best British films, exhibits of typical British Empire features—all presented under the management of the very best impressarios, such as Noel Coward, C. B. Cochran, and John Gielgud. Each exhibition should be *the* event of the year in the cities and countries selected. We cannot hope to take Britain over to the Continent in a more exciting way, and there is no way of bringing the Continent here.—Yours, etc.,

CLAUDE W. BELL.

21, Dukes Lodge,
Holland Park, W.11.
July 22, 1944.

BUILDING USES DEPARTMENT

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—In recent leading articles you have, rightly I think, indicated some concern in the industry over the public's reaction to-day to cast iron where this material is used in building or building equipment and fittings, including domestic as well as building uses. The public know little of the many efficient uses of this material, of all the metallurgical research work that has produced cast iron of almost any required strength and with many splendid finishes, clean, hard, simple and beautiful, and do not realise that modern building can, and does, incorporate these. They are influenced by the quality of material and quality of design of those parts of a building and its equipment that can be seen and handled. Unfortunately, this quality of material has often been lower than was advisable, and the record of design in cast iron for building applications can show little evidence of improvement on the fussy reproduction work of 50 years ago.

Thus the public to-day are apt to think of cast iron as a cheap, brittle, old-fashioned material with plenty of knobs, scrolls and enrichments to catch dirt and dust, whilst technical opinion to-day seems to be somewhat concerned with the welter of new materials that appear likely to take the place of cast iron in the near future—particularly plastics, glass, asbestos, pressings, etc.

The Ministry of Works and Buildings has suggested that British Standard Specifications for cast-iron equipment be set up, dealing with sizes and quality of material. The latter may be difficult, but is obviously of importance. It is of even greater importance that the design of cast-iron goods should have the serious study and attention of competent designers. There are very few, if any, cast-iron articles of equipment in building that could be improved from the practical, engineering or functional point of view by the substitution of any of the newer materials. But if the design of articles in the new materials is so much better and more attractive, the public will prefer them in spite of the basic material being less efficient. If that portion of a great industry dealing with building materials and equipment will be careful of the quality of cast iron and really concerned about design, it need not fear any competitive materials.—Yours, etc.,

D. L. BRIDGWATER,
Consulting Architect.

Building Uses Department,
British Cast Iron Research Association,
Alvechurch, Birmingham.
July 21, 1944.

THE T.A.P.

(*Continued from previous page.*)

has been maintained with the Service departments with regard to production problems on iron castings. Much of the work carried out by the T.A.P. has for security reasons been available immediately only to those directly concerned, but it is hoped that when happier times return a great deal of the work now in report form can be published for the benefit of the industry as a whole. There is no doubt that during its existence the T.A.P., although working in the background, has been of real service to industry and to the Iron and Steel Control. It was set up in the first place in anticipation of difficulties before the industry arising from wartime conditions, and the fact that specification limits for castings are higher to-day than at the beginning of the war is a tribute to the healthy state of the ironfoundry industry, towards which the T.A.P. has played no inconsiderable part.

Attendances at the annual conferences of the Institute of British Foundrymen sink into insignificance compared with the meetings American Foundrymen's Association. For the Buffalo Congress no fewer than 6,000 visitors were expected. Naturally, there was a shortage of accommodation.

AN OUTLINE OF GRAVITY DIE-CASTING*

A general survey of development in its application

By M. R. HINCHCLIFFE

The progress of foundry technology in recent years has been greatly accelerated by the development of highly specialised casting methods differing widely in principle to the accepted sand-casting practice, resulting in nothing less than a revolutionary effect on production. Many of the outstanding achievements attained can be attributed to development in the technique of gravity die-casting, or permanent mould casting as it is sometimes termed.

Gravity die-casting is a process of producing metal castings from permanent moulds, or dies as they are generally called, usually constructed in cast iron or steel and designed in such a manner as to be readily collapsible to facilitate removal of the solidified casting. The term "gravity" die-casting implies that the metal enters and fills the mould by virtue of its own weight or gravity only, no additional pressure applying devices being used. In this way the process differs fundamentally from its allies centrifugal casting and pressure die-casting, where, in the former process, pressure is created through the action of centrifugal force acting on a rotating mass of metal and in the latter case where the metal is injected into a highly finished mechanically operated steel die, under the action of intense hydraulic pressure.

By far the widest application of gravity die-casting lies in the manufacture of light alloy castings, particularly aluminium alloy castings for the aircraft and motor industries, and it is for this reason and because of the author's particular experience that most of the general principles and practices outlined in this Paper are those relating to aluminium alloy gravity die-casting.

Before casting, gravity dies for alloys, other than copper alloys, are specially prepared by heating up to a temperature sufficient to take on a spray of refractory coating consisting of whiting and water with a little water glass. This serves as an insulator, preventing too rapid chilling of the metal when in contact with the die, and also as a venting medium in that it constitutes a permeable layer on the die surface which facilitates escapement of air trapped between the metal and the mould, thus allowing the metal to lie "kindly" on the die. Dies for copper base alloys are usually coated with colloidal graphite. The heat given out by the metal in the die cavity during solidification is almost invariably sufficient to maintain the die at a uniform temperature throughout operation. On completion of this the dies are heated by means of either gas flames or muffle furnaces to a temperature of between 250 and 350 deg. C., at which they are ready for operation.

* Extracted from a Paper read before the Scottish Branch of the Institute of British Foundrymen.

Advantages of Die-Casting

Producing castings from gravity dies is a continuous manual operation and due to the nature of the material from which the moulds are made thousands of good castings can be made from the same die at a comparatively high rate of production. When one refers to gravity die-casting as permanent mould casting as is the practice in the U.S.A. and on the Continent, this is not to say that the moulds last indefinitely; the inevitable wear takes place resulting in loss of accuracy, repairs have to be made and in certain cases a complete replacement may be necessary before the die has produced its quota of castings; the actual die life depending, of course, on the nature of the alloy being cast and the intricacy of the component.

The outstanding advantages of gravity die-casting over sand casting are as follow:—(1) Greatly increased rates of production; (2) production of castings to consistently closer limits of dimensional accuracy with improved surface finish; and (3) enhanced mechanical properties of the casting.

The economic savings resulting from the higher rates of production from gravity dies as against sand moulds is perhaps the most outstanding advantage of the process and one which, it is probably true to say, has influenced its progress more than anything else. This is because financial considerations usually predominate when viewing the relative merits of manufacturing methods, although in certain instances other factors of no economic significance may decide the issue, particularly in the case of specialised aircraft components where strength and accuracy are of paramount importance.

The maintenance of closer limits of dimensional accuracy as a second advantage of gravity die-casting is a function of the permanency of the moulds, the accuracy with which they can be machined and the extent to which contraction of the casting can be controlled. Allowing for all these variables, die-castings can be produced to an accuracy of $\pm$ 0.010 in. The control of casting dimensions to such fine limits is of immense value to production engineers machining large quantities of castings by mass-production methods, in that advantage can be taken of the consistency in the use of jigs locating from predetermined faces on the casting and the reduction in the machining allowances necessary.

Improvement in Mechanical Properties

Finally, as the strength of an alloy is largely determined by the size of the grains or crystals constituting the mass, which in turn is, to a great extent, governed by the rate of cooling of the alloy during the process of solidification, the fact that a gravity die

Gravity Die-Casting

is virtually one large chill results in the production of castings having a very fine grained structure. The resultant improvement in mechanical properties is very marked; for instance, the ultimate tensile strength of aluminium alloy N.A.226 (fully heat-treated) is increased from 18 to 24 tons per sq. in. when die cast, the percentage elongation increasing from 4 to 9. With R.R.50 the figures are 11 tons per sq. in. ultimate tensile strength and 2.5 per cent. elongation in the sand-cast condition; 12.5 tons per sq. in. ultimate tensile strength and 4 per cent. elongation in the die-cast state.

The value of gravity die-casting is limited in one sense by the large initial cost of the die compared with the cost of wood or metal pattern equipment in sand-casting practice. Furthermore, once a die has been machined and constructed, a major alteration to the design of the component would be disastrous, as this would either mean making a new die or replacing certain parts of the obsolete one.

When this problem is approached broad-mindedly, however, die cost is not quite so prohibitive as it may at first appear. Assuming first of all that the design of the component will remain reasonably standard and given demands for large quantities, when the cost of the die is divided amongst the number of castings to be produced, it ceases to be of any great significance.

Fig. 1.—Representative Group of Gravity Die-castings for Heavy Vehicle Engine.

The effect of the design of the component on the minimum number of castings which would warrant die-casting is very important, the reason being that in certain instances an order as low as 200 may be sufficient, whereas normally at least 1,000 castings would be necessary. In the case of very large and intricate components when the size and weight of the dies would impose the necessity of mechanical manipulation, with a resultant increase in die cost, an order of many thousands of castings would be necessary to make the job a profitable proposition.

A further drawback is introduced with the use of aluminium alloys in that a lower yield of finished castings to rough castings is obtained than in sand casting, due to the particular casting technique necessary for these alloys. This involves melting large quantities of metal which may only yield one-half or one-third of its weight of casting. The surplus metal in the runners and risers is, however, perfectly good metal and need only be remelted before being re-used. The net loss is the cost of melting the metal, the reduction in the real melting capacity available and the cost of removing the excess metal from the castings.

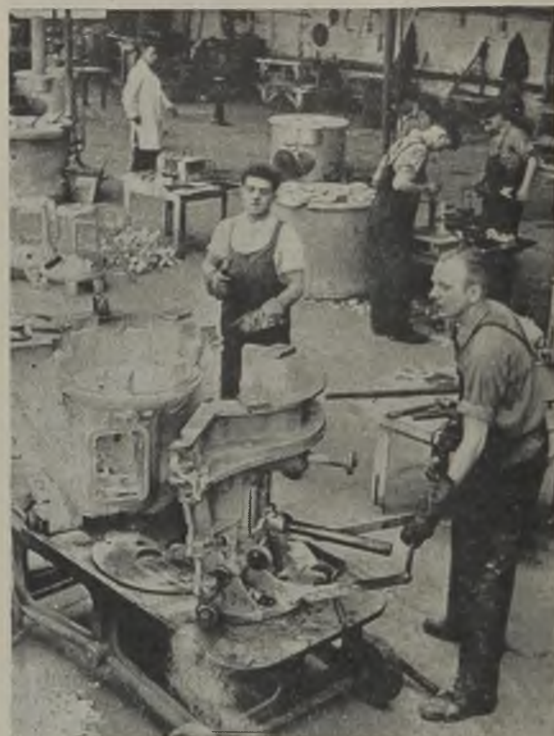


Fig. 2.—Die for "Leyland" Gearbox Shown in Fig. 4 in Operation.

Scope

Technically, the scope of gravity die-casting is very extensive; almost any metal that can be sand cast can be die cast, although it may not always be practicable to do so. The following classes of alloys are die cast on a commercial scale:—(1) Low-melting-point alloys having lead or zinc base; (2) higher-melting-point alloys of the light alloy class, with aluminium or magnesium base; and (3) high-melting-point alloys of copper base. Castings made in the alloys of class (1) are almost all of the white metal type used for automobile and aircraft engine bearings. A number of gravity die-castings are made in zinc-base alloys, but these alloys are used almost exclusively for pressure die-castings.

The scope of aluminium-alloy gravity die-castings

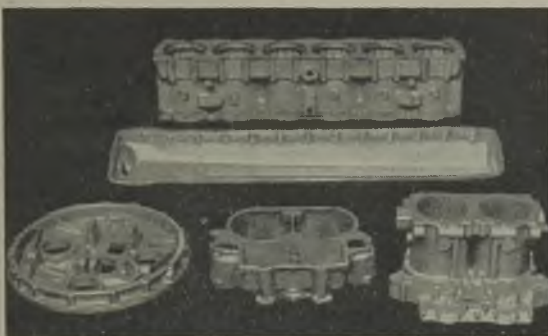


FIG. 3.—REPRESENTATIVE GROUP OF GRAVITY DIE-CASTINGS FOR ROLLS-ROYCE MERLIN ENGINE.

FIG. 4.—TYPICAL SEMI-DIE-CASTINGS WITH THEIR SAND CORES.

covers a very wide field indeed, having important applications in the automobile and aircraft industries. In peacetime die-casting finds its widest application in the manufacture of a large variety of castings for the motor-vehicle industry. Aluminium-alloy pistons for motor-cycle, motor-car and heavy-vehicle engines are made exclusively as gravity die-castings, and were probably the first components to be die-cast on a large commercial scale. In any modern motor-vehicle factory examples of gravity die-castings may be found in the form of crankcases, sumps, gearboxes and clutch housings. A group of typical gravity die-castings for a well-known heavy-vehicle engine are illustrated in Fig. 1.

These are made in an aluminium alloy of the following composition:—4 per cent. Si, 2 per cent. Cu, 2 per cent. Ni, and balance Al. The gravity die for the gearbox visible in the top of the picture is shown in operation in Fig. 2. The die consists of two main die halves mounted on a base, one large top core forming the clutch housing and a collapsible core in nine parts, the complete die weighing 1 ton. Castings are produced from this die at the rate of four per hour, employing three men. In changing over from sand-casting to die-casting, the sectional thickness of the casting was reduced by 25 per cent., and a saving of £1 2s. 7d. per casting was effected.

Since the outbreak of war gravity die-casting has found extensive application in aircraft engine production, due to the demand for large quantities of castings in high-duty aluminium alloys to meet rigid Air Ministry specifications. The significance of this is obvious when one realises that in the famous Rolls-Royce Merlin aero engine no less than approximately 80 per cent. of the total number of castings on the engine are die-castings, the majority of which are made in aluminium alloy R.R.50 (D.T.D. 133B). A

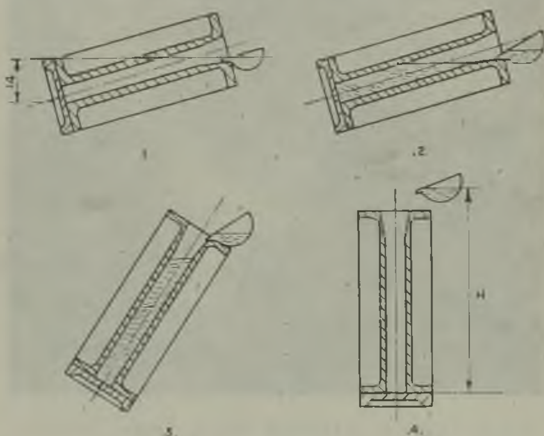


FIG. 5.—SHOWING PRINCIPLE OF POURING INTO TILTED DIE (DIAGRAMMATIC).

number of such castings are shown in Fig. 3, and include cylinder skirt, weighing 53 lbs. in the finish-cast condition; Rocker Cover, made in L.33 aluminium-silicon alloy; front gear casing, and top and bottom half carburetter bodies.

Magnesium Die-castings

More recently, a great deal of attention has been directed towards magnesium alloys, in the founding of which gravity die-casting has played an important part. The unique physical and chemical properties of magnesium rendered the use of its alloys difficult and not without danger when first attempted, which created rather a strong prejudice against them. Fortunately,

Gravity Die-Casting

however, through the accumulation of knowledge from research and experience the casting characteristics of these alloys is now more fully understood and proper technique has been developed. Consequently magnesium alloy castings for many purposes are used on a large scale. This is particularly marked in the case of die-castings as a result of the demand for such in aircraft structures and equipment. To-day, some very large aircraft landing wheels are being made as gravity die-castings, and it need not be emphasised that these have to be perfect. Probably, the best example of magnesium-alloy die-casting on a large scale is the

FIG. 6.—TYPICAL CASTINGS MADE FROM GRAVITY DIES TILTED DURING POURING.

manufacture of the incendiary bomb body. Colossal quantities of bombs are being continually produced by very ingenious and highly developed production methods using gravity dies.

Copper-base Alloys

The commercial copper-base alloys of class (3) lending themselves to gravity die-casting are as follow:—(*a*) Aluminium bronze; (*b*) brass; (*c*) phosphor bronze; and (*d*) silicon bronze. The use of this class of alloys is accompanied with great difficulties compared with the other alloys, due to the high pouring temperatures involved. This results in the rapid breakdown of the die surfaces due to erosion and thermal fatigue, finally resulting in collapse after a comparatively short die life. By the use of special alloy iron or steel dies, however, the effect of high temperature is rendered less harmful.

Aluminium bronze is an alloy which is finding more and more important applications in engineering, due to its remarkable mechanical and corrosion-resisting properties. It is not surprising, therefore, that there are found many examples of aluminium-bronze gravity die-castings in the automobile, aircraft and electrical industries. These are characterised by good definition and surface finish. The chilling effect of the die results in a marked reduction in the grain size, with corresponding increase in the mechanical strength and hardness.

Brass gravity die-castings are also produced in very large quantities, brass being a cheaper alloy than aluminium bronze. In certain respects, similar problems are encountered. Phosphor-bronze die-casting is largely confined to the production of bars and bushes in very simple dies, better described as chill moulds than as dies. Recently, a material of special importance in certain spheres has come to the fore in the form of silicon bronze, in which some very fine gravity die-castings are being made. Besides the above classes of alloys, gravity die-castings are now being

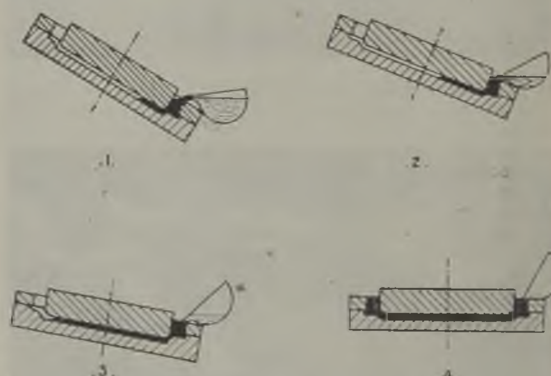


FIG. 7.—PRINCIPLE OF POURING PLATE-LIKE CASTINGS (DIAGRAMMATIC).

successfully made in cast iron using specialised methods.

The scope of gravity die-casting is limited to the intricacy of casting from which it would be impossible to withdraw the cores and die blocks. Fairly intricate castings can be made by using collapsible cores and loose pieces, *i.e.*, parts of a main die block or core which remain on the casting when the die is opened and are afterwards picked off by hand. The scope of gravity die-casting, however, is expanded to almost unlimited proportions by the use of sand cores where the design of the casting prohibits the use of steel or iron cores. The sand cores are, of course, only used once and are afterwards removed from the casting by knocking out. When this method is employed, the process is more aptly termed semi-die-casting, and even though the cost of the casting is increased by the use of sand cores, important gains are still to be had over sand-casting. A collection of typical aluminium-alloy semi-die-castings, together with their sand cores, are shown in Fig. 4.

Die Design

From the outset it must be fully appreciated that there are no laws for designing gravity dies, although there are certain fundamental principles to be observed; principles controlling the crystallisation of metals and alloys for instance, and the principles of mechanics. It is the difference in fulfilling these principles between one die designer and another which sometimes leads to the evolution of radically different designs of dies for producing the same casting. In certain cases a casting may only lend itself to one form of design, as in the application of gating and feeding principles the use of the ideal method may be prohibited merely because a die is constructed in rigid permanent material and must be easily dismantled from around the solidified casting which includes the runners and risers.

It is this latter fact which makes it essential for a die to be designed according to certain pre-determined principles. Once a gating system has materialised in the form of cast-iron and steel die blocks, it cannot be basically altered very easily; the practice of trial and error, instead of being used to discover the correct gating system, can only be employed to perfect the already determined one. Very few dies produce perfect castings on the first trial; a period of "teething" usually follows the "first off" when attention has to be directed towards small metallurgical and mechanical adjustments. After this and the necessary dimensional alterations to the die cavity a die may be considered suitable for production. A well designed and constructed die, therefore, will demand very little skill for its operation, and should be capable of manipulation by semi-skilled labour.

From the point of view of die design, the process of making a casting may be considered in three stages, all necessarily inter-related. These are: (1) The stage during which the mould is filled with liquid metal; (2) the stage during which the liquid metal in the mould solidifies; and (3) the operation of assembling and dismantling the die. These can be resolved into the following studies:—(1) the flow of the metal-hydraulics; (2) solidification of the metal-crystallisation; and (3) simple mechanical design. We will now consider each principle in detail.

Running Systems—the Flow of the Metal

The strength and value of a casting is largely dependant on its freedom from inclusions in the form of oxide and bubbles of gas or air. These defects are almost invariably caused through the metal stream being subject to turbulence during its passage through the die. Turbulence causes eddies or whirlpools, resulting in small pockets of air becoming entrained in the metal stream, these tend to escape in an upward direction, but are invariably trapped in the metal as it solidifies and appear in the form of internal smooth spherical or pear shaped cavities. In the case of metals with a great affinity for oxygen, such as the light alloys, turbulence also create oxide films due to the larger surface area exposed to the atmosphere. Therefore, on principle, it is essential that the metal enters and fills the die in the form of an unbroken stream with complete absence of turbulence.

In practice, it is obviously impossible to achieve this 100 per cent., but it is an ideal worth while aiming for. The following methods may be used as a means to this end, each one being applicable to particular designs of castings:—(1) top pouring down inclined mould wall; (2) gating into lowest point in mould; and (3) running through vertical strip gate.

To examine each system in turn consider the example of a small round stick or billet die. The necessity of achieving the ideal thermal conditions makes it imperative that the casting be poured from the top. Pouring into a vertical mould would subject the metal to considerable splashing at the bottom by virtue of the velocity attained in falling through the distance H, Fig. 5 (4). By tilting the die at a suitable angle as shown at Fig. 5 (1), and pouring the metal down one side of the cavity the drop is reduced from H to about ½ H. As soon as the metal level reaches the top of the die, Fig. 5 (2), the mould is slowly lowered into the vertical position, keeping the metal surface in the same position relative to the die, until the mould is full, Fig. 5 (4).

This is the fundamental principle to which a large number of dies are run. Fig. 6 shows a few typical examples of castings complete with runners and risers made from dies which are tilted during pouring. A further instance when it is necessary to tilt the die is when a plate-like casting is being made horizontally. The difficulty here is not connected with velocity and turbulence, but rather with the tendency for a metal stream, when flowing over a horizontal area, to break up and scatter into a number of smaller streams which, when rejoining, trap air and form "shuts" in the casting. To avoid this it is the practice to tilt the die to about 20 deg. so that the runner is at the lowest point thus forcing the metal to flow uphill in the form of a single advancing stream, taking care to maintain the runner full by lowering the die as pouring proceeds. This principle is illustrated diagrammatically in Fig. 7.

(To be continued.)

The Paper prepared by Mr. Ian Ross, of High Duty Alloys, Limited, as an Exchange from the London Branch of the Institute of British Foundrymen to the Metropolitan Chapter of the American Foundrymen's Association was presented on May 1 to a large audience. It was presented by Mr. Harry G. Lamker, foundry superintendent of the Wright Aeronautical Corporation. The subject covered was the making of a large casting in magnesium. At a meeting of the Chicago Chapter, held the same evening, which was preceded by a dinner, the members were addressed by two members of the R.A.F.

DISPOSAL OF SURPLUS GOVERNMENT STORES

TRADES TO BE CONSULTED

The general lines on which the Government propose to proceed in disposing of surplus stores are indicated in a White Paper (Cmd. 6539, H.M. Stationery Office, 1d. net) published recently. The paper does not deal with the disposal of fixed assets such as land, buildings and factories or with machine tools, on which separate announcements will be made.

Government-owned stores which are likely to be surplus to requirements are divided into three classes:—(*a*) Raw materials; (*b*) munition stores, *e.g.*, ammunition, fighting vehicles; (*c*) manufactured stores suitable for, or adaptable to, civilian uses.

Surpluses of raw materials, including scrap, will be notified to the appropriate Department, and will be allocated or disposed of in accordance with its instructions. In many cases the surpluses will become part of a Control's stocks, and there will, therefore, be no need for any new marketing machinery. Trade and other interests concerned will be consulted in connection with plans for disposal. Stores such as guns, ammunition, etc., the White Paper states, can have no direct civilian use. But some may be broken up for scrap—which will be handled by the appropriate Raw Material Control—or spare parts, which will be dealt with as manufactured civilian stores. The treatment of surplus aircraft supplies raises special problems which require separate consideration. Manufactured civilian stores consist of a great variety of articles. Some of these are suitable for sale through retail shops to the general public; others, for example, industrial equipment and components, are of use only in industry.

General Principles

The general principles which the Government intend to adopt in disposing of surplus goods are as follow:—

(*a*) To release the stocks at a rate which, while fast enough to get the goods into the hands of consumers when they are most required and to clear badly needed storage and production space, aims at avoiding adverse effects on production through flooding the market.

(*b*) Unless there is good reason to the contrary, to distribute the goods through those traders or manufacturers who would normally handle or use them, and to secure that ultimate consumers in all parts of the country have a fair opportunity to buy them.

(*c*) To ensure, if necessary by statutory price control, that the prices charged to the ultimate consumer are fair and reasonable in relation to the current prices of similar articles, to prevent profiteering on the part of dealers handling the goods, and to keep down the number of intermediaries to the minimum compatible with a proper distribution.

The way in which these principles can best be applied to the disposal of the various classes of

(*Continued at foot of next column.*)

(*Continued from previous column.*)

surplus goods will be decided with due consideration for the needs of consumers and after consultation with representatives of the industries and trades concerned. Provisional disposal plants will be prepared for all those classes of goods which the Government consider important before the time when they are actually available for disposal in any quantity.

FUTURE FOR LIGHT METALS

Presiding at the annual meeting of Birmid Industries, Limited, Mr. C. C. Maudslay, the chairman and joint managing director, pointed out that a large proportion of the company's normal manufacturing activities was linked with the motor-car and automotive transport trades. With the expected early resumption of the manufacture of cars and lorries in the post-war period, it was to be assumed that those portions of the various factories supplying this trade would find a fairly immediate opportunity for employment. It was also hoped that while there would be a very heavy reduction in the requirements of light alloys for the aircraft industry, there would remain a considerable amount of business in this connection. Apart from this, there was reason to believe that the increased amount of light metals available from the big expansion in production facilities, and the improvement in the manufacturing and fabricating technique resulting from the war programme, would cause a much wider application of light alloys for all kinds of purposes for which they had not hitherto been used, ranging from shipbuilding to household appliances. It was also expected that this would be further intensified by a reduction in final cost of articles made in light metals.

BRITISH FLUORSPAR PRODUCERS' ASSOCIATION

Following several conferences with the Fluorspar Control of the Ministry of Supply, the Derbyshire Fluorspar Producers' Association has now enlarged its scope and has become the national representative body of the fluorspar industry. The name has been changed to the "British Fluorspar Producers' Association," and representatives added to the Executive Committee to cover all areas.

The Executive Committee now comprises a representative from each of the following firms:—Clay Cross Company, Limited; Constables Quarries, Limited; Wm. Smith (Fluorspar), Limited; Ernest Hinchliffe, Limited; R. C. Conway; Blanchland Fluorspar Mines, Limited; Weardale Lead Company, Limited; Horace Taylor; and James Wilkinson & Sons, Limited (Glebe Mine).

Mr. Frederick Franks is chairman, and Mr. Charles A. Jones deputy chairman. The secretary is Mr. H. Hebblethwaite, 5-6, Huttons Buildings, West Street, Sheffield.

SANDSLINGER MOULDING PRACTICE

The Sandslinger as a general-purpose machine

By W. Y. BUCHANAN

(*Continued from page* 253.)

Technique of Ramming

The common reaction of workmen to the first introduction of a Sandslinger to an old-established foundry is usually antagonistic. This sort of opposition has been evident throughout the industrial era, and no doubt will continue to recur with each successive advance in mechanical production. However, having overcome this obstacle, the training of operators presents no difficulties except that moulders accustomed to hand moulding seem to require some time to become sufficiently mechanically minded. The best type of labour seems to be the machine moulder, but greasing should be carried out regularly by some labourer attached to the maintenance squad.

The elevator and conveyor system of the machine presents no difficulty, provided sand is not allowed to cake up hard in the boot of the elevator. The rammer requires frequent attention as the liner wears, and is usually changed once in four shifts so as to keep it in close contact with the impeller cup. This impeller cup is also changed at intervals of about two shifts. These parts can be run much longer, but the machine tends to ram softer as the clearance between the cup and liner increases. An example of soft ramming due to this cause is shown in graph No. 4, Fig. 4.

In ramming, the mechanism should be set in motion *before* the head is moved over the box, so that the impeller is delivering its proper flow of sand; otherwise the best ramming will not be obtained. Suppose the rammer head were kept steady over one corner of a corebox, the action of ramming would build up a hard heap in that corner, while the flash sand would fill up the lower levels with relatively loose sand. This loose sand would absorb much of the energy of the impinging wads of sand when the rammer head is subsequently directed on this section of the box, causing a soft area. Thus, for good ramming the head should be steadily moved across the box in parallel lines and the operator should see that he has elbow room to cover the box before starting. Gate pins can be secured by various means, such as blocks attached to the pattern or plate, and the operator can ram up the mould without stopping to straighten them up with a hand rammer. The soft ramming referred to here is not usually any worse than is encountered in similar circumstances with other methods of ramming, but the criticism directed at the newcomer allows nothing to pass.

Feeding the Sandslinger

There are very large types of Sandslingers with very wide span of arm and mechanical feed from a trailer or hopper. According to American illustrations, the largest type carries the operator on the head, from where he directs all movements by push-button control. The first cost and upkeep of this type of machine would of necessity limit its application to very large foundries employed in high production of large miscellaneous castings.

The portable type of modest proportion and first cost alike has many applications, having a maximum working radius of 10 ft., with an 18-in. ramming head ramming 4 to 5 cwts. per min. This means a corresponding rate of feeding to the elevator by shovel. In fixing piece-work rates for machine moulding of small boxes, a figure of 10 tons per hr. is considered reasonable, but, of course, the effort is only maintained for about 1 min.

It is therefore difficult to get one person to feed a machine requiring 15 tons per hr., even on short intervals, as in ramming small boxes, continuously throughout the day. When the size of the box gets up to the region of 30 in. square by 9 in. deep, two people are required during ramming, and even then the machine does not usually get a fair chance. There is, however, nothing to prevent the box from being rammed up in stages, the only objection being the waste of time.

On larger work an additional man can be put on temporarily, and this works well if the odd man is taken away as soon as he ceases to be required. A mechanical system of feeding is nevertheless much better and considerably cheaper in the end. Fig. 7 illustrates a system used by the author. The portable Sandslinger is mounted on a bogie just an inch or two above the floor and a specially constructed wagon run close up behind. By this means the Sandslinger and the wagon can be hauled from one bay to the other to suit the shop planning. The Sandslinger has as yet not been modified to move under its own power.

The capacity of the wagon is 5 tons, approximately, which was found to suit best. Extending the wagon upwards to hold 12 tons was tried, but this extension was subsequently removed again. The milled and mixed sand is transported in steel boxes, 6 ft. by 3 ft. by 3 in., with drop bottom, facing sand coming from the sand plant and hand-mixed backing sand turned over into one of these boxes sunk to floor level in front of a knock-out pen. This reduces the amount of crane handling without making the boxes (which hold 2 tons 10 cwts.) too difficult to move on a bogie.

The moving of sand from the bottom of this wagon at a uniform steady rate could no doubt be best accomplished by means of a belt conveyor, as in the standard design favoured by foundry-plant manufacturers both here and in America. This, however, requires, for truly automatic operation, almost vertical sides in the wagon and a considerable height above

Sandslinger Moulding Practice

floor to accommodate the large belt pulleys driving gear, etc., under the hopper.

For discharging, a simple windlass arrangement was first tried. By means of suitable gearing two chains were wound on a shaft under the wagon, thereby drawing a mild-steel plate from the back of the wagon towards the front. This plate remained at right angles to the bottom of the wagon and carried before it the entire load of sand. This was therefore delivered gradually over the whole front end of the truck. This arrangement worked more or less satisfactorily, but was not quite suitable owing to the fact that the very wide stream of sand could not be easily directed into the narrow elevator boot.

A reduction gear being available, it was decided to construct a screw and incorporate this in a trough along the bottom of the wagon. Screw conveyors doubtless work well on granular, non-bonded materials. With clay-bonded moulding sand in the moist condition, the problem becomes more difficult as, if the screw is too small, it may tunnel a clearance and stop delivering any more until the packed sand is pushed down.

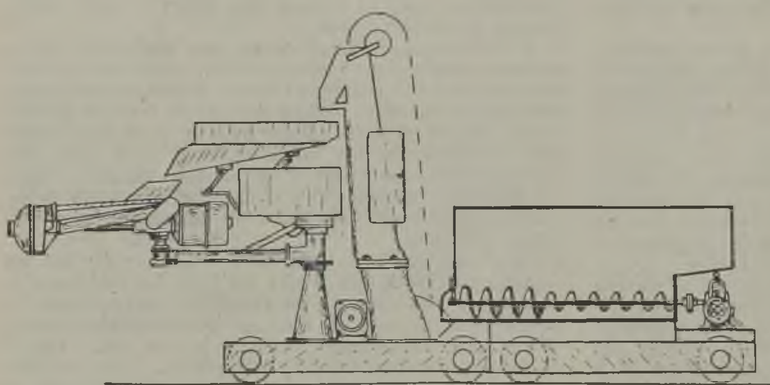


Fig. 7.—Type of Sandslinger Used by the Author.

When the screw is running in a half-circular trough the moulding sand sleeks on, becomes hardened and begins to wear the screw. At the same time, a piece of scrap can become jammed between the edge of the trough and downwards moving edge of the screw. This stalls the motor and the obstruction has to be dug out, even if the wagon is full of sand.

Many methods of mechanical agitation were considered in order to overcome the packing of the tunnelled sand, but it was decided that these were all unsatisfactory, and any additional machinery undesirable owing to the risk of damage by labourers dumping sand into the truck. The screw was eventually increased in diameter to 14 in. for a length of 2½ ft. from the delivery end and the remainder left at 6-in. diameter, the the power required to operate the larger screw is considerable with a delivery in the region of 20 tons per hr.

The half-circular trough was removed and a square trough substituted. It became evident from observation that the screw quickly moulded its own shape in the sand, and this packed sand trough worked as well as a metal one. The square trough allowed about 3-in. clearance all round the screw, so that pieces of scrap iron likely to get in could not in any way interfere with its operation.

The screw is driven by a 5-h.p. motor through 30-to-1 reduction, has a pitch of 8 in., and delivers sand in excess of the requirements of the Sandslinger. The drive is controlled by a push-button and the delivery is steady.

There is a certain amount of mixing associated with the screw conveyor which is very beneficial; coupled with the mechanical elevation, riddling and ramming, the sand in the mould, finally, is in an ideal condition. It was expected that the life of the screw would be relatively short, requiring a renewal after handling, say, 6,000 tons of sand. With this in mind, a simple method of constructing these screws was devised.

A pattern block was made, giving the pitch of the screw required and two castings made. These fit together on a vertical guide spindle unmachined and are used to form the screw segments. Discs of quarter-plate are cut with acetylene torch and heated to a mild forging heat, then pressed to shape in one operation.

The shaft is a piece of bright steel bar, and these segments are placed on the shaft one at a time and electric welded to the shaft, each additional segment being welded to the previous one. By this means a very rigid shaft is formed and, since the pitch need not be regular nor the outside of the screw machined, the new screw can be easily constructed in one and a half days by the foundry maintenance staff. However, it appears that the life of the screw will be twelve to twenty thousand tons, so far as can be judged at present, and it must be admitted that this is quite a quantity of sand.

Types of Castings

The work to be done consisted of all parts of machine tools, principally lathes that from the largest to the small parts comprising the internal mechanism of the various gear boxes, etc., common to such machines. The upper limit of size is only reached when the span of the rammer head arm is insufficient to travel over the box so that in the making of these particular castings none was too large. Even a bed 33 ft. long could easily be rammed by moving the sand along the side of the box. The smaller work could readily be made down to boxes 20 in. square where the spillage is not very bad.

There is a great deal of work which is flat on one side and can be rammed without registration on a plate. This operation is accelerated by using a large plate such as is suitable for boxes, say, 4 ft. square, and on this four or more boxes can be rammed at once. Flat top parts are particularly easy to work in this way, and can be made by the half dozen.

A movable Pridmore stripping machine is very convenient for fixed plate patterns. This is a similar method of operation to that in common use for high production of such castings as valve bodies, etc., where perhaps four stationary stripping machines are located round a fixed Sandslinger and the machines have an underground belt for returning the spillage sand.

Savings in Time

There seems little point in enumerating a series of examples of the increase in production obtained using the Sandslinger as compared with hand moulding in large moulds, particularly at this late date when to quote from "Better Methods," 1926, one concern used 22 such machines on bath tubs with as high a production on individual machines as 120 tubs per 9 hr. Quoting further, "the production per man on tubs, based on figures available from seven plants, is 13 to 15 per day, as opposed to 6 under the old method with one man and helper." Thus the ultimate production of such a machine in a jobbing foundry or semi-mass-production foundry is not so much what the machine can do as what labour, and floor space can be found for laying out, finishing and closing the moulds for casting.

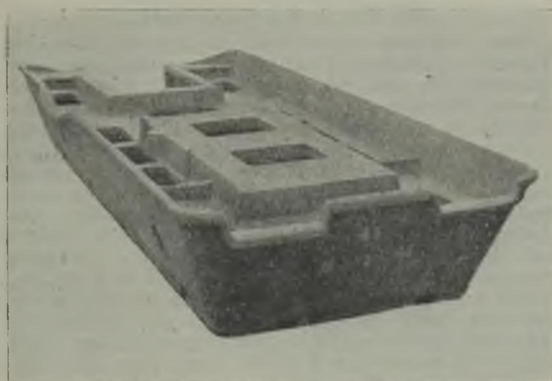


Fig. 8.—A Tray Casting Requiring 90 Man-Hours for Making by Hand and 60 by Sandslinger.

Another important factor is that in attempting to apply a Sandslinger to miscellaneous patterns attention is focussed sharply on details of pattern design and the all important question of making partings. Skilled moulding is very largely the art of making partings, and it is in this operation that the bulk of moulding time is expended. Thus in preparing for the Sandslinger many improvements in patterns are made giving a further improvement in production in addition to that due to the much enhanced speed of ramming the actual mould.

It will suffice, therefore, to give a brief reference to the moulding of one casting, a "tray" or hollow bed plate of overall dimensions 10 ft. 8 in. × 4 ft. 6 in. × 21 in. (Fig. 8). This casting has hitherto been cast in a box sunk below floor level. The only reason for its being below floor level was that when not in use the box could be filled up to the top with sand and provide a flat floor for other moulding operations. A permanent ash bed was of course used instead of a drag and the ramming done by hand.

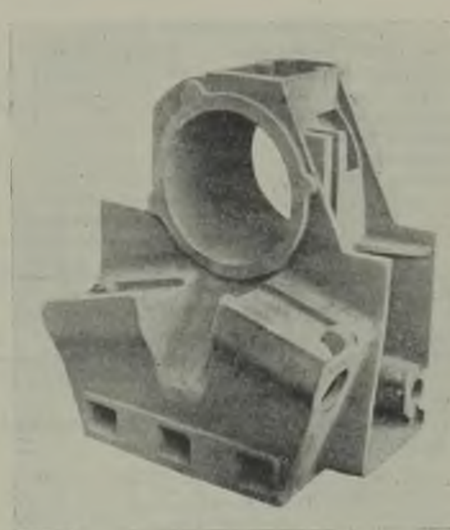


Fig. 9.—This Drum Housing Required 36 Man-Hours for Hand Ramming and 6 by the Sandslinger Method.

In preparing plant for ramming with the Sandslinger a permanent cement odd-side was made on which the pattern was placed wide-side down, and after fixing the gate pins in holes in the odd side and setting vent pins, etc., the mid part was rammed up then the drag rammed up. The box was then secured and rolled over and the odd side removed, the parting finished, and the top rammed up. A summary of times for each method is given below.

On examining these above comparative figures it will be observed that the finishing time remains the same so that times of ramming the box are 51 hrs. and 18 hrs. It should also be noted that the first tray was

(*Continued overleaf, column* 1.)

SANDSLINGER MOULDING PRACTICE

(*Continued from previous page.*)

actually rammed by the Sandslinger in 4 hrs. in all, including rolling the box over. The time the machine was actually worked being only 1½ hours.

Moulding Tray by Hand.

Bedding in	6 total hours	51 hrs.
Ramming drag	16 „ „	
Making parting	4 „ „	
Ramming top part	25 „ „	
Finishing drag	26 „ „	
Finishing top part	15½ „ „	
	92½ hrs.	

Moulding Tray by Slinger Machine.

Preparing pattern for machine ..	2 total hours	18 hrs.
Ramming drag and mid part ..	20 „ mins.	
Finishing parting	3 „ hours	
Hand ramming hangers and joint ramming top part	13 „ „	
Finishing drag	26 „ „	
Finishing top part	15½ „ „	
	59 hrs.—50 mins.	

In this instance the hangers were not hand rammed, but the result was not quite satisfactory as the bars of the box interfere to a considerable extent with the ramming. If the top part were re-designed and a grid used to reinforce the sand the ramming time assessed here at 13 man hours could be reduced to as many minutes.

Two other castings which might be mentioned as being typical are:—

Casting.	Total Moulding and finishing time.		Weight.
	Hand.	Sandslinger.	
	Hrs.	Hrs.	Cwt.
Drum housing ..	36	6	17
Gearbox ..	24	7	15

The drum housing, shown in Fig. 9, has overall dimensions:—3 ft. 4 in. × 3 ft. 1 in. × 2 ft. 2 in., and is cast with the slide rests downwards, *i.e.*, with the front side in the illustration downwards. The gearbox has overall dimensions 3 ft. 2 in. × 2 ft. 10 in. × 2 ft. 7 in., and is of square design internal partitions and slide grooves and bosses. The time given as 7 hrs. for ramming, moulding and finishing includes hand ramming of the top part.

In conclusion, the Author would like to acknowledge his indebtedness to John Lang & Sons for their permission to present this Paper to the Institute.

IRONFOUNDRY FUEL NEWS—XIV

Where two or more drying stoves are in use in a foundry an appreciable saving of fuel will result if it is possible to concentrate the work to be dried into fewer stoves than are at present used. This means, of course, that the maximum weight of work which a stove is capable of taking should be loaded in, not forgetting, however, to allow sufficient space between the boxes or plates for the free circulation of the hot gases. It is sometimes found by visiting members of the Regional Panels of the Ironfounding Industry Fuel Committee that either the hottest part of the stove—the top—is not used at all, the furnace not being filled to capacity, or that there is a waste of space at the bottom due to the use of high-wheel bogies.

Continuous core stoves are not exempt from consideration on this question, of course, and these should be fired for the shortest possible time consistent with the amount of work to be done. The sixth article in this series (The Foundry Trade Journal, June 8, 1944) described how a reduction in fuel consumption of 36 per cent. was obtained by such means.

NEW CATALOGUE

Dust Collection.—The Visco Engineering Company, Limited, of Stafford Road, Croydon, have just issued catalogue No. 441, which in 24 well-illustrated pages details the plant they manufacture for collecting dust created by industrial processes. Such a publication must obviously have great interest for the foundry industry, for which much has been done and more remains to be accomplished in making working conditions comparable with those in other trades. One foundry plant is illustrated. It deals with 100,000 cub. ft. per minute. The air volume is conveyed through three main ducts, each about 3 ft. 6 in. dia., which are so designed that the whole or only part of the plant may be used according to requirements. The plant, which is designed for counter-current cleaning under natural atmospheric conditions, has three fans with impellers of the non-overloading type mounted at ground level, each fan being driven by an 80-h.p. slip-ring motor.

NOTES FROM THE BRANCHES

London Branch, East Anglian Section.—At a meeting held on July 13 at the Central Library, Ipswich, over which Mr. C. H. Kain presided, the President of the Institute, Mr. J. W. Gardom, personally presented the Report on "Mechanical Handling, with Special Reference to the Foundry." The local branch of the Institution of Production Engineers were present as visitors. There followed a short lively discussion.

It was announced that through the courtesy of the management, the next meeting would take the form of a visit to the works of Lake & Elliot, Limited, Braintree, on August 24. The party will be restricted to members of the Section.

UNDERFEED STOKERS FOR METALLURGICAL HEATING FURNACES

ADVANTAGES AND LIMITATIONS

In the course of a Paper on "Underfeed Stokers for Furnaces," read by Mr. H. C. Armstrong, M.Inst.C.E., F.C.G.I., at a Symposium on Underfeed Stokers as applied to Furnaces, held in London recently, under the auspices of the Institute of Fuel and the British Coal Utilisation Research Association, the author, discussing the application of the small underfeed stoker, said its use had been found to be extremely wide and opportunity for further progress in this direction would certainly occur. The ordinary simple firebox and heating chamber furnace was universal and could usually be converted to this form of mechanical firing. Obviously, the great fault of any coal-fired furnace was that nothing could be done with the heat leaving the furnace, and this applied equally whether stoker fired or by hand. The number of coal-fired furnaces in which preheating secondary air had been successful was infinitesimal. If the waste heat could be used for preheating or steam-raising, the method of firing the coal would not affect that end of the furnace.

Even such high-temperature work (continued the author) as that required for drop forging is being done with full satisfaction and considerable economy, although repair of the firebox refractories is very high. The use of the stoker in firing brick kilns at high temperature has been given more attention in the United States than here, but certainly offers possibilities. An apparently crude application, but nevertheless one which shows great economy, is for direct heating. There are quite a number of small furnaces used for heating bar ends or small pieces of metal, etc., in which the work, being small, has to be so constantly withdrawn from the fire that a door would be a drawback. The common practice is to build the furnace box shape over a bar grate on which the fire is built. Blast air is forced through the fire and so through the furnace, which, at the best, has a slot in the front through which the material is placed on the fire and withdrawn. Flames will be seen issuing from the furnace in all directions, through the slot, outlet in the roof, or other openings. A similar brick structure built directly over an underfeed stoker grate answers the same purpose with considerable economy, due to the coal being fed on the underfeed principle, with the resultant absence of wasteful long flames and smoke. Quite a small continuous feed will heat with economy much above the old method.

Limitations of Stokers

Nevertheless, there are cases where this type of stoker is not truly applicable. No system of fuel burning has ever been equally suitable to all forms of heating or fuel, and the underfeed stoker is no exception to this. So far the application to the heat-treatment furnace, which receives its heat from under the floor, cannot be considered a complete success. In this type of furnace the combustion from the fuel, starting in an ordinary firegrate, is completed in a combustion chamber or flue under the furnace. The hot gases pass up into the furnace through ports placed along both sides of the furnace floor. A longish flame is therefore of advantage. The furnace is built in a pit and the firing takes place below ground level. The change to mechanical underfeed firing has been tried. Draft from the fire cannot be very great since excess chimney pull would draw considerable quantities of air under the door to the detriment of material being heated under reducing conditions of atmosphere. The heat of the fire is therefore very much concentrated in the firebox, the roof of which is also usually low. Cases have occurred where the heat on the grate has been so excessive that the side door has had to be left open to reduce the firebox temperature. Secondary air may be one solution, extra cooling from outside may be another.

Automatic Control

Being mechanically operated through an electric motor, control of the motor, and hence feed, can readily be arranged to follow pyrometric conditions. This permits the furnaceman to watch a large number of furnaces or attend to other matters and, of course, ensures holding or keeping a furnace at the temperature desired. It does not have any real effect on combustion economy. Air-fuel ratio and its importance has been stressed. Automatic adjustment of the one to the other should be aimed at, and wherever tried it has shown that very great advantages are to be gained by it. An automatic control system recently put into practice attacks the matter from the best angle, *i.e.*, that of control of air supply in the first instance. The system demands that the air should be applied along a duct of sufficient length or so arranged that an orifice diaphragm can be inserted. Since the differential pressure across this diaphragm is proportional to the amount of air flowing, a swinging manometer can be used as the main control. Air supply is controlled thermostatically. The coal supply is arranged to follow the air. This arrangement avoids the mistake of the early designs in which the air follows coal irrespective of the resistance of the fire to the passage of the necessary air. Further ideas on this subject will come along as soon as the stoker manufacturers realise that they have a great opportunity of burning coal on the most economical lines and in accordance with theoretical considerations of correct combustion.

It is not intended to discuss here the qualities of fuel which can or should be placed in a mechanical stoker. At the same time, while stressing the need for a more powerful and robust design, the question of the use of coke might be considered. It is the confirmed opinion of the writer that coke ought never to be used on account of its great abrasiveness. The grinding action of coke is far greater than most people realise. Fuel efficiency engineers continue to make the mistake of advising the use of coke. They cannot have seen the result of their advice.

NEWS IN BRIEF

EMPLOYEES AT THE Vickers works of the English Steel Corporation, Limited, Sheffield, more than trebled their target in a recent "Salute-the-Soldier" savings week. They raised £160,000.

TWO HOSTELS to provide wartime rest breaks for industrial workers in the Midlands were opened at Shrewsbury on Saturday, July 22, one for men at Radbrook Hall and the other for women at Abbey House, Abbey Foregate.

IN THE DAGENHAM "Salute-the-Soldier" savings week, Ford workers subscribed over £50,000 and, in all, employees of the firm throughout the country have contributed £81,000. The total now saved by Ford workers is £1,700,000, and the company subscribed £200,000 in Dagenham's effort.

FOLLOWING AN INTIMATION from the Government that it was not intended to reopen idle shipyards at Howdon-on-Tyne and Jarrow-on-Tyne, a conference of local authorities, trade unions and M.P.s at Newcastle passed a resolution calling upon the Government to state its post-war shipbuilding policy.

WAGES OF IRONFOUNDRY WORKERS in Scotland have been increased by 4s. a week from July 24 as the result of a conference in Glasgow between the men's union and the employers' federation. Women and apprentices receive *pro-rata* increases. Similar workers in England and Wales are affected by the increases.

THE PROVISION of new strip mills is urged in a report to the Welsh Advisory Council for Post-war Reconstruction by Carmarthen County Development Committee. The Committee, asserting that there are more tinplate mills in Llanelly than in any other district in Wales, claim that the area should have priority consideration when the location of new strip mills are considered. The companies operating in the area should join together to establish such a mill, and, if necessary, the Government should give financial support.

THE ANNUAL PRESENTATION for long service with Ley's Malleable Castings Company, Limited, took place at Derby last week, when 11 men, who had this year completed 40 years' service, were presented with long service certificates and money. The presentation of clocks to 23 other employees who had completed 21 years' service has had to be postponed this year for the first time owing to the difficulty in obtaining clocks. Since the firm started making "Black Heart" malleable iron castings in 1873, certificates for completion of 40 years' service have been awarded to 110 employees, while 644 have received awards for 21 years' service.

IN THE U.S.A. there appears to be a general consensus of opinion that controls must be dispensed with as rapidly as possible and the fullest encouragement given to private initiative and enterprise. In his annual statement to the shareholders of William Baird & Company, Limited, Mr. Robert L. Angus (chairman) says it is to be hoped that in this country the same views will be taken, as the experience of Government controls during the war, however necessary as an emergency measure, must have convinced everyone with knowledge of their hampering effects on efficiency that the present restrictions must be removed as soon as ever practicable.

APPLICATIONS FOR LICENCES previously sent to the Export Licensing Department, Bank Buildings, Princes Street, London, E.C., should in future be sent to Stafford House, King William Street, London, E.C.4. In making this announcement the Board of Trade state that it will be of considerable assistance to the department if for the present applicants will restrict their applications to urgent cases. Arrangements have been made with the Customs under which any licences produced to them with a period of validity expiring in July and August, 1944, will be regarded as automatically extended until August, 1944. Application for the renewal of such licences is therefore unnecessary and should not be made.

MR. HARCOURT JOHNSTONE, Secretary of the Department of Overseas Trade, addressing the British Federation of Commodity and Allied Trade Associations, said that expansion of export trade was accepted as essential for the realisation of plans the Government were making to achieve a better way of life for our people after this war. As the world became more normal and adequate world supplies of commodities became available, he hoped that bulk purchasing by the Government would disappear. He believed the people of this country could obtain foreign produce more cheaply and in greater variety through the operation of the produce markets than by any system whatever of Government bulk purchase.

ESSENTIAL WORK ORDER AMENDMENT

The Minister of Labour has amended the Essential Work Order to improve the procedure in cases where workpeople are dismissed on the ground of serious misconduct. Hitherto the rule has been that, if the Local Appeal Board finds that dismissal was not justified on the ground of serious misconduct and the worker's reinstatement is "directed," the worker does not lose his right to the guaranteed wage for the intervening period. If for practical reasons reinstatement has not been directed, even though the Appeal Board has found that dismissal was not justified, the worker has been unable to claim the guaranteed wage.

The new Order makes it possible for the workers to be given a right to guaranteed wages for the period between the date of dismissal and the date on which the final decision is communicated to the parties concerned.

American production of steel castings declined somewhat in March last compared with the corresponding month of last year. Output totalled 174,000 short tons, against 176,000 tons in March, 1943. Order-books show a corresponding reduction.

COMPANY RESULTS

(Figures for previous year in brackets)

Mather & Platt—Interim ordinary dividend of 4% (same).

Davy & United Engineering—Dividend of 7½% (same).

Walkers Parker—Net profit, after tax, for 1943, £66,801.

Crossley Bros.—Net profit for year to April 30 last, £35,090 (£33,933); deferred ordinary dividend of 5% (same).

Scottish Machine Tool Corporation—Net profit for the year to March 31 last, £92,429 (£83,689); final dividend of 5%, making 8% (same).

Darlington & Simpson Rolling Mills—Net profit for the year to March 31, 1944, £61,138 (£62,277); dividend of 7½% (same); to general reserve, £23,500.

Vickers—Interim dividends on the preferred 5% stock and 5% preference stock, less tax, and on the cumulative preference stock free of tax up to 6s.

W. G. Allen & Sons (Tipton)—Net profit for the year ended March 31, after depreciation and taxation, £8,350 (£8,229); to general reserve, £2,000 (same); dividend of 10% (same); forward, £6,569 (£6,359).

Christy Bros.—Net profit for the year ended March 31, after depreciation, £45,317 (£58,872); income-tax and E.P.T., £21,497 (£32,140); to general reserve, £5,000 (£10,000); preference dividend, £2,250 (same); directors' and employees' bonuses, £18,750 (£11,250); ordinary dividend of 17½% (12½%); forward, £21,473 (£19,312).

H. J. Baldwin & Company—Profit for the year to March 31, £22,136 (£33,873); taxation, £5,680 (£17,651); profit realised on sale of assets, £56,374 (nil); dividend on preference shares, £3,000 (same); to general reserve, £46,374 (nil); to contingencies reserve, £10,000 (nil); dividend of 10% on the ordinary shares, £10,000 (same); forward, £16,695 (£13,239).

Coghlan Steel & Iron—Profit for the year ended March 31, after providing for depreciation and taxation, £9,404 (£9,171); contributions payable under the War Damage Act, £125; fixed dividend on the preference shares, less tax, £1,375 (same); participating dividend on the preference shares of 1½%, less tax, £375 (same); ordinary dividend of 12½% (same); to reserve, £1,000; forward, £15,886 (£12,481).

Consett Iron Company—Profit to March 31 last, after charging debenture interest and providing for depreciation and taxation, £259,314 (£290,206); redemption of 4¼% debenture stock and purchases of stock, £35,858 (£34,134); to reserve for deferred repairs, £100,000 (nil); dividend on the 8% preference stock, less tax, £20,000 (same); dividend of 7½% (same) on the ordinary stock, less tax, £105,000; forward, £197,241 (£198,785).

James H. Lamont—Net profit for 1943, after depreciation. £26,617 (£52,083); fixed dividend on the 6% cumulative participating preference shares, less tax, £1,800; staff bonuses, £645; income-tax and taxation reserve, £9,936 (£35,265); written off goodwill, patents and trade marks, £2,000; general reserve, £3,000; ordinary dividend of 25%; participating dividend of 2% on the cumulative participating preference shares; forward, £2,011 (£1,975).

S. P. Austin—Trading profit to April 30 last, £25,382 (£54,418); income from investments, £2,959 (£4,241); depreciation, £2,347 (£1,922); debenture interest, £2,800 (same); tax, £18,000 (£44,250); net profit, £5,194 (£9,687); surplus on sale of investments, £3,768 (nil); 5% preference dividend, £1,750 (same); ordinary dividend of 10%, £3,250 (same); written off goodwill, £2,000 (same); to reserve, nil (£1,500); forward, £1,518 (£1,055).

Briton Ferry Steel Company—Profit for the year to April 1, after debiting charges in respect of 4% first mortgage debenture stocks, staff and other pensions, etc., £259,651 (£211,432); to officials and staff bonus, £10,001 (£5,471); depreciation, £50,000 (same); taxation, £80,000 (£70,000); to special reserve for additions, improvements and renewals, £38,160 (£30,764); to general reserve, £30,000; final dividend on the ordinary stock of 7½%, making 10% (same); forward, £50,370 (£51,228).

Harland & Wolff—Trading profit for 1943, £1,235,110 (£990,329); dividends and interest on investments, £15,706 (£15,697); balance of profit on settlement of certain contracts completed in 1941 and 1942, £380,062 (nil); disposable total, £1,630,878; taxation on profits to date and interest credited to pension trustees, £709,654 (£381,346); depreciation, £400,000 (same); net profit, £521,224 (£224,680); excess cost of wartime capital expenditure, £200,000 (nil); staff pensions, £100,000 (nil); dividend of 6% on the "A" ordinary shares, less tax (same), £156,000; 6% on the "B" ordinary, less tax (same), £53,883; fees, £4,250 (£2,000); forward, £94,157 (£87,066).

OBITUARY

MR. SIMON FRASER, for many years export manager for the foundries department of the Carron Company, has died in Johannesburg. Mr. Fraser became associated with the Carron Company nearly 40 years ago. In turn he held positions as assistant foundries commercial manager and supervisor of outside staffs. As export manager he made extensive tours, including visits to several of the European capitals, South America, Canada, West Indies, Australia, New Zealand and South Africa.

MAJOR LESLIE JACKSON COOMBE, managing director of Spear & Jackson, Limited, steel and tool manufacturers, Aetna Works, Savile Street, Sheffield, has died at the age of 60. He began his association with Spear & Jackson about the beginning of the century as assistant to Mr. Fred Jackson, a partner in the firm. He had long service as a Territorial officer. Major Coombe was a pioneer in industrial air-raid precautions. He did excellent work as chairman of the Sheffield Chamber of Commerce A.R.P. Advisory Committee and as chairman of the Sheffield Trades Liaison Committee, a co-ordinating body for precautions in the works and shops of the city. Major Coombe was a J.P. for Derbyshire.

Raw Material Markets

IRON AND STEEL

The call for pig-iron is on a diminished scale and production of late has followed a downward curve. Least active is the trade in high-phosphorus iron, but the tonnages of engineering and special castings on order are also reduced, and this trend is reflected in the shrinkage of demand for low- and medium-phosphorus grades. Possibly the lull in this branch of the trade may be ended after the holidays, but no revival in the light-castings branch is expected until the rigid restrictions on building operations are removed. Scarcity of suitable ores is the reason for the severe limitation of hematite licences, but cover for all other classes of pig-iron is readily available. For the operation of the blast furnaces, full supplies of fuel, ore and limestone are coming regularly to hand.

There is a strong demand from the foundries for cast-iron and steel scrap, and supplies are rather stringent. Heavy machinery metal in sizes suitable for foundry work meets with strong pressure, as users have not been able to cover their requirements of this material. Only limited tonnages of short heavy steel are available, and the call for wrought-iron scrap in the heavier grades is maintained.

From the general condition of decline in other branches of the steel trade, the re-rolling industry seems to be wholly exempt. So heavy is the demand for small bars, rounds, squares and flats, etc., that it is doubtful if any more orders could be placed for delivery during the third period. In these circumstances the maintenance of full supplies of steel semis has become imperative and commands the close attention of the Control. Substantial tonnages are coming to hand, and re-rollers are as keen as ever to acquire other classes of material such as defective billets, crops, etc.

Some reduction in the specifications for plates, angles, etc., is attributable to the approach of the holiday period for shipyard workers. This, of course, will only be a temporary recession, but there has also been a shrinkage of demand from other sources, and plate rollers are now in a position to book additional tonnages for prompt delivery. There is little interest in heavy joists, but light and medium sections are well specified, and sheet mills also have healthy order-books, particularly for the lighter gauges. Collieries are taking up their full permitted quotas of arches, roofing bars, props and rails, and there is a steady demand for wire and ferro-concrete rods.

NON-FERROUS METALS

The non-ferrous metal markets are relatively quiet. Consumption is still large, but generally it is below the level of the wartime peak. This decline has been most marked in the case of copper; it has been estimated that during this year there will be a reduction of 100,000 tons in world consumption as compared with 1943. While a considerable amount of metal is being absorbed, manufacturers are finding themselves running short of war orders. Unless there is an increase in the scale of munitions production or more freedom allowed in the execution of civilian orders, it is probable that consumption will register a further falling-off. Copper shipments to this country have been arriving fairly regularly and there is certainly no fear of any scarcity of supplies with the position as it is at the moment.

Production of tin in the Belgian Congo and other African sources of supply has been steadily expanding. The tonnage held in this country is believed to be quite satisfactory. Until recent months the tin situation was very difficult, and for a long time there was an acute shortage of supplies, but the position has now been reached when all essential needs can be covered without undue straining of resources. The United States continue to depend on Bolivia as their main tin supplier. Conditions in that country seem to have quietened down after the recent change of Government, and shipments of tin are proceeding regularly.

A fairly large amount of lead is still being taken in by the war industries, but all needs are fully covered. In America the supply situation is rather more difficult. The War Production Board expects a continuation of the decline in production, and forecasts an increased dependence on stocks. In May, refined lead output was 45,903 short tons, compared with 50,154 tons in April.

MR. MAURICE TOLLIT, who has been associated with the management of Guest Keen & Nettlefolds, Limited, in Birmingham for many years, has been appointed a director of the company.

CURRENT PRICES OF IRON, STEEL AND NON-FERROUS METALS

(Delivered, unless otherwise stated)

Wednesday, August 2, 1944

PIG-IRON

Foundry Iron.—CLEVELAND No. 3: Middlesbrough, 128s.; Birmingham, 130s.; Falkirk, 128s.; Glasgow, 131s.; Manchester, 133s. DERBYSHIRE No. 3: Birmingham, 130s.; Manchester, 133s.; Sheffield, 127s. 6d. NORTHANTS No. 3: Birmingham, 127s. 6d.; Manchester, 131s. 6d. STAFFS No. 3: Birmingham, 130s.; Manchester, 133s. LINCOLNSHIRE No. 3: Sheffield, 127s. 6d.; Birmingham, 130s.

(*No. 1 foundry 3s. above No. 3. No. 4 forge 1s. below No. 3 for foundries, 3s. below for ironworks.*)

Hematite.—Si up to 2.25 per cent., S & P 0.03 to 0.05 per cent.; Scotland, N.-E.Coast and West Coast of England, 138s. 6d.; Sheffield, 144s.; Birmingham, 150s.; Wales (Welsh iron), 134s. East Coast No. 3 at Birmingham, 149s.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, 140s. 6d., delivered Birmingham.

Scotch Iron.—No. 3 foundry, 124s. 9d.; No. 1 foundry, 127s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, 174s.; South Zone, 176s. 6d.

Refined Malleable.—North Zone, 184s.; South Zone 186s. 6d.

Cold Blast.—South Staffs, 227s. 6d.

(NOTE.—*Prices of hematite pig-iron, and of foundry and forge iron with a phosphoric content of not less than 0.75 per cent., are subject to a rebate of 5s. per ton.*)

FERRO-ALLOYS

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

Ferro-silicon (5-ton lots).—25 per cent., £21 5s.; 45/50 per cent., £27 10s.; 75/80 per cent., £43. Briquettes, £30 per ton.

Ferro-vanadium.—35/50 per cent., 15s. 6d. per lb. of V.

Ferro-molybdenum.—70/75 per cent., carbon-free, 6s. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, 1s. 3½d. lb.

Ferro-tungsten.—80/85 per cent., 9s. 8d. lb.

Tungsten Metal Powder.—98/99 per cent., 9s. 9½d. lb.

Ferro-chrome.—4/6 per cent. C, £59; max. 2 per cent. C, 1s. 6d. lb.; max. 1 per cent. C, 1s. 6½d. lb.; max. 0.5 per cent. C, 1s. 6¾d. lb.

Cobalt.—98/99 per cent., 8s. 9d. lb.

Metallic Chromium.—96/98 per cent., 4s. 9d. lb.

Ferro-manganese.—78/98 per cent., £18 10s.

Metallic Manganese.—94/96 per cent., carb.-free, 1s. 9d. lb.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms and Slabs.—BASIC: Soft, u.t., 100-ton lots, £12 5s.; tested, up to 0.25 per cent. C, £12 10s.; hard (0.42 to 0.60 per cent. C), £13 17s. 6d.; silico-manganese, £17 5s.; free-cutting, £14 10s. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £15 15s.; case-hardening, £16 12s. 6d.; silico-manganese, £17 5s.

Billets, Blooms and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £13 17s. 6d.; basic hard, 0.42 to 0.60 per cent. C, £14 10s.; acid, up to 0.25 per cent. C, £16 5s.

Sheet and Tinplate Bars.—£12 2s. 6d., 6-ton lots.

FINISHED STEEL

[*A rebate of 15s. per ton for steel bars, sections, plates, joists and hoops is obtainable in the home trade under certain conditions.*]

Plates and Sections.—Plates, ship (N.-E. Coast), £16 3s.; boiler plates (N.-E. Coast), £17 0s. 6d.; chequer plates (N.-E. Coast), £17 13s.; angles, over 4 un. ins., £15 8s.; tees, over 4 un. ins., £16 8s.; joists, 3 in. × 3 in. and up, £15 8s.

Bars, Sheets, etc.—Rounds and squares, 3 in. to 5½ in., £16 18s.; rounds, under 3 in. to ⅝ in. (untested), £17 12s.; flats, over 5 in. wide, £15 13s.; flats, 5 in. wide and under, £17 12s.; rails, heavy, f.o.t., £14 10s. 6d.; hoops, £18 7s.; black sheets, 24 g. (4-ton lots), £22 15s.; galvanised corrugated sheets (4-ton lots), £26 2s. 6d.; galvanised fencing wire, 8 g. plain, £26 17s. 6d.

Tinplates.—I.C. cokes, 20 × 14 per box, 29s. 9d. f.o.t. makers' works, 30s. 9d., f.o.b.; C.W., 20×14, 27s. 9d., f.o.t., 28s. 6d., f.o.b.

NON-FERROUS METALS

Copper.—Electrolytic, £62; high-grade fire-refined, £61 10s.; fire-refined of not less than 99.7 per cent., £61; ditto, 99.2 per cent., £60 10s.; black hot-rolled wire rods, £65 15s.

Tin.—99 to under 99.75 per cent., £300; 99.75 to under 99.9 per cent., £301 10s.; min. 99.9 per cent., £303 10s.

Spelter.—G.O.B. (foreign) (duty paid), £25 15s.; ditto (domestic), £26 10s.; "Prime Western," £26 10s.; refined and electrolytic, £27 5s.; not less than 99.99 per cent., £28 15s.

Lead.—Good soft pig-lead (foreign) (duty paid), £25; ditto (Empire and domestic), £25; English, £26 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, ex works, £37 12s. 6d.; rolled zinc (boiler plates), ex works, £35 12s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £30 10s.

Other Metals.—Aluminium, ingots, £110; antimony, English, 99 per cent., £120; quicksilver, ex warehouse, £68 10s. to £69 15s.; nickel, £190 to £195.

Brass.—Solid-drawn tubes, 14d. per lb.; brazed tubes, 16s.; rods, drawn, 11⅝d.; rods, extruded or rolled, 9d.; sheets to 10 w.g., 11¼d.; wire, 10⅞d.; rolled metal, 10½d.; yellow metal rods, 9d.

Copper Tubes, etc.—Solid-drawn tubes, 15¼d. per lb.; brazed tubes, 15¼d.; wire, 10d.

Phosphor Bronze.—Strip, 14¼d. per lb.; sheets to 10 w.g.: 15¼d.; wire, 16½d.; rods, 16½d.; tubes, 21½d.; castings, 20d., delivery 3 cwt. free. 10 per cent. phos. cop. £35 above B.S.; 15 per cent. phos. cop. £43 above B.S.; phosphor tin (5 per cent.) £40 above price of English ingots. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 10d. to 1s. 4d. per lb.; rolled to 9 in. wide, 1s. 4d. to 1s. 10d.; to 12 in. wide, 1s. 4½d. to 1s. 10½d.; to 15 in. wide, 1s. 4½d. to 1s. 10½d.; to 18 in. wide, 1s. 5d. to 1s. 11d.; to 21 in. wide, 1s. 5½d. to 1s. 11½d.; to 25 in. wide, 1s. 6d. to 2s. Ingots for spoons and forks, 10d. to 1s. 6½d. Ingots rolled to spoon size. 1s. 1d. to 1s. 9½d. Wire, round, to 10g., 1s. 7½d. to 2s. 2½d., with extras according to gauge. Special 5ths quality turning rods in straight lengths, 1s. 6½d. upwards.

NON-FERROUS SCRAP

Controlled Maximum Prices.—Bright untinned copper wire, in crucible form or in hanks, £57 10s. ; No. 1 copper wire, £57 ; No. 2 copper wire, £55 10s. ; copper firebox plates, cut up, £57 10s. ; clean untinned copper, cut up, £56 10s. ; braziery copper, £53 10s. ; Q.F. process and shell-case brass, 70/30 quality, free from primers, £49 ; clean fired 303 S.A. cartridge cases, £47 ; 70/30 turnings, clean and baled, £43 ; brass swarf, clean, free from iron and commercially dry, £34 10s. ; new brass rod ends, 60/40 quality, £38 10s. ; hot stampings and fuse metal, 60/40 quality, £38 10s. ; Admiralty gunmetal, 88-10-2, containing not more than ½ per cent. lead or 3 per cent. zinc, or less than 9½ per cent. tin, £77, all per ton, ex works.

Returned Process Scrap.—(Issued by the N.F.M.C. as the basis of settlement for returned process scrap, week ended July 29, where buyer and seller have not mutually agreed a price ; net, per ton, ex-sellers' works, suitably packed) :—

Brass.—S.A.A. webbing, £48 10s. ; S.A.A. defective cups and cases, £47 10s. ; S.A.A. cut-offs and trimmings, £42 10s. ; S.A.A. turnings (loose), £37; S.A.A. turnings (baled),£42 10s. ; S.A.A. turnings (masticated), £42 ; Q.F. webbing, £49 ; defective Q.F. cups and cases, £49 ; Q.F. cut-offs, £47 10s. ; Q.F. turnings, £38 ; other 70/30 process and manufacturing scrap, £46 10s. ; process and manufacturing scrap containing over 62 per cent. and up to 68 per cent. Cu, £43 10s. ; ditto, over 58 per cent. to 62 per cent. Cu, £38 10s. ; 85/15 gilding metal webbing, £52 10s. ; 85/15 gilding defective cups and envelopes before filling, £50 10s. ; cap metal webbing, £54 10s. ; 90/10 gilding webbing, £53 10s. ; 90/10 gilding defective cups and envelopes before filling, £51 10s.

Cupro Nickel.—80/20 cupro-nickel webbing, £75 10s. ; 80/20 defective cups and envelopes before filling, £70 10s.

Nickel Silver.—Process and manufacturing scrap, 10 per cent. nickel, £50 ; 15 per cent. nickel, £56 ; 18 per cent. nickel, £60 ; 20 per cent. nickel, £63.

Copper.—Sheet cuttings and webbing, untinned, £54; shell-band plate scrap, £56 10s. ; copper turnings, £48.

IRON AND STEEL SCRAP

(*Delivered free to consumers' works. Plus* 3¾ *per cent. dealers' remuneration.* 50 *tons and upwards over three months,* 2*s.* 6*d. extra.*)

South Wales.—Short heavy steel, not ex. 24-in. lengths, 82s. to 84s. 6d. ; heavy machinery cast iron, 87s. ; ordinary heavy cast iron, 82s. ; cast-iron railway chairs, 87s. ; medium cast iron, 78s. 3d. ; light cast iron, 73s. 6d.

Middlesbrough.—Short heavy steel, 79s. 9d. to 82s. 3d. ; heavy machinery cast iron, 91s. 9d. ; ordinary heavy cast iron, 89s. 3d. ; cast-iron railway chairs, 89s. 3d. ; medium cast iron, 79s. 6d. ; light cast iron, 74s. 6d.

Birmingham District.—Short heavy steel, 74s. 9d. to 77s. 3d. ; heavy machinery cast iron, 92s. 3d. ; ordinary heavy cast iron, 87s. 6d. ; cast-iron railway chairs, 87s. 6d. ; medium cast iron, 80s. 3d. ; light cast iron, 75s. 3d.

Scotland.—Short heavy steel, 79s. 6d. to 82s. ; heavy machinery cast iron, 94s. 3d. ; ordinary heavy cast iron, 89s. 3d. ; cast-iron railway chairs, 94s. 3d. ; medium cast iron, 77s. 3d. ; light cast iron, 72s. 3d.

(Note.—*For deliveries of cast-iron scrap free to consumers' works in Scotland, the above prices less* 3*s. per ton, but plus actual cost of transport or* 6*s. per ton, whichever is the less.*)

SMALL ADVERTISEMENTS

SITUATIONS

FOUNDRY MANAGER, age 39, M.I.Brit.F.; ex-Serviceman; practical, technical, commercial training; metallurgist; expert repetition production; hand and power GREY and MALLEABLE light castings; take entire charge all depts., patternshop, annealing; guarantee results; excellent record; free short notice to join Midland Foundry immediate; salary secondary; prospects; keen, energetic, loyal.—Box 588, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

FOUNDRY EXECUTIVE desires change (free to accept). Many years' experience of Architectural and Art founding and engineering in cast and wrought metals, iron, bronze, lead and aluminium; highly decorative interior and exterior work. Willing to lay-out and commence new foundry for this class of work.—Box 600, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

FOUNDRY MANAGER required; preferably with experience in steel and bronze founding; degree or higher national certificate essential; age not over 35 years; managerial abilities and sound practical knowledge a condition; applicants to supply full particulars as regard education, positions occupied, and salary required.—Box 576, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

YOUNG METALLURGIST (B.Sc.), with research aptitude and 10 years' experience, seeks position on research or development.—Box 586, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

THE IRON AND STEEL INSTITUTE requires an Editorial Assistant. Applications, stating age, experience, salary required, etc., should be addressed to 4, Grosvenor Gardens, London, S.W.1.

FOUNDRY SUPERINTENDENT required for Jobbing and Mechanised Foundries; high grade alloy steels. Must be good disciplinarian, accustomed to strict technical control and up-to-date methods of progress and planning. Only really first-class men of proved ability and drive need apply.—Full details of experience to Box 610, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe

HEAD FOREMAN required for Steel Foundry Arc Furnace in North Midlands. Experience of Arc Furnace Melting and good knowledge of Steel Foundry Metallurgy essential.—Write, giving full details of age, previous experience, technical training, and salary required to Box 608, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

WELL-KNOWN MANUFACTURERS of Core Oils and Binders open appoint experienced practical man to work the Foundry Trade in North and Midlands with existing Representatives. Essential that applicant has up to date knowledge Foundry practice and personal connection.—Send fullest details past experience, salary, etc., in confidence, F.D. Box 612, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

REPRESENTATIVES for South West England, parts of Midland and Scotland, on commission basis, required by well-known manufacturers of foundry supplies; good connections with foundries essential.—Offers with details to Box 604, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

AGENCY

GENTLEMAN desires Agencies, part time during war with view developing full time post-war connection in Scotland. Thorough practical knowledge Engineering Tool Trade and all Fire Appliances.—Box 602, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

PATENTS

THE Proprietor of the Patent No. 531,953, for "Improvements in or relating to Odometers for Skates and similar means of Locomotion," is desirous of entering into arrangements, by way of licence and otherwise, on reasonable terms, for the purpose of exploiting the same and ensuring its full development and practical working in this country.—All communications should be addressed in the first instance to HASELTINE, LAKE & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

THE Proprietors of the Patent No. 543,017, for "Improvements in or relating to Swaging Tools," are desirous of entering into arrangements by way of licence and otherwise, on reasonable terms, for the purpose of exploiting the same and ensuring its full development and practical working in this country.—All communications should be addressed in the first instance to HASELTINE, LAKE & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

MACHINERY

SKLENAR Patent Melting Furnaces; coke- or oil-fired; capacity 2 tons, 1 ton, ½ ton, 500 lbs.—SKLENAR PATENT MELTING FURNACES, LTD., East Moors Road,

THOS. W. WARD LTD.
SOLE AGENTS FOR
"POLFORD" CORE SAND MIXERS, TILTING and CRUCIBLE FURNACES, MOULD DRYER, RIDDLE, SCREEN, etc. WRITE FOR PRICES AND PARTICULARS.
ALBION WORKS, SHEFFIELD.
'Grams: "Forward." 'Phone: 26311 (15 lines).

HAND MOULDING MACHINES.
Farwell Type Plain Hand Squeezers.
Pickles Universal, turnover table 18 in. by 16 in.
Hand Squeeze Pin Lift, table 22½ in. by 14½ in.
Jackman Osborn Type 601 rollover Jolt Ram, table 30 in. long.
Samuelson Hand Ram, turnover table 24 in. by 19 in.
Berkshire Hand Ram Pattern Draw.
Pridmore Hand, to admit 15½ in. by 16½ in.
Sandblasting Plant; 50 Air Compressors; 500 Electric Motors, Dynamos, etc.
S. C. BILSBY,
CROSSWELLS ROAD, LANGLEY,
NR. BIRMINGHAM.

MISCELLANEOUS

ADVERTISER wishes to purchase or invest in Small or Medium-Sized Foundry; London area.—Box 590, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

REFRACTORY MATERIALS.—Moulding Sand, Ganister, Limestone, Core-Gum; competitive prices quoted.—HENSALL SAND Co., LTD., Silver Street, Halifax, Yorks.

NON-FERROUS FOUNDRY, capacity available, including sand blasting; competitive prices quoted.—ALBUTT, SON & JACKSON, Valve Makers and Brass Founders, Greenmount Works, Halifax.

GLASGOW IRONFOUNDERS, with continuous casting plant, capable of 600 to 800 boxes daily, would welcome enquiries for repetition grey iron castings; box sizes 21 in. by 15 in. by 7 in.—Box 568, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

IMMEDIATE capacity available for Castings in Iron, Brass, Gunmetal, Phosphor Bronze, Aluminium Bronze, Manganese Bronze, Aluminium and Alloys; weights from 1 lb. to 10 cwts.; quantities from 1 to 50,000; specialities, heavy and pressure castings, castings shot blasted; delivered any distance; own patternshop; sound castings guaranteed; prompt attention to all enquiries.—Write, in first instance, to Box 566, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

METALLURGICAL CONSULTANTS offer their services on all Metallurgical Work covering Founding, Forging, Extrusions, Heat Treatment, Welding and Protective Treatment Processes, Chemical Analysis, Metallurgical Investigations, etc.—51, Russell Road, Horsell, Woking.

PATTERN MAKERS (ENG.) CO., LTD. [Est. 1912
SHREWSBURY ROAD, WILLESDEN, LONDON, N.W.10
HIGH-CLASS PATTERNS and MODELS
NON-FERROUS CASTINGS
WIL. 4371/2. (On Government Lists)

'Phone: 22877 SLOUGH
NEW SHOT BLAST CABINET PLANTS
with motor driven Exhaust Fans, complete, all sizes; air compressors to suit in stock, also motors if required.
Britannia large size plain jolt and pattern draw moulding machine, 8 in. dia. cylinder, table 4 ft. x 3 ft. reconditioned.
Genuine Morgan lip axis 600 lbs. capacity furnace.
Pneulec swing frame Grinder, motorised, as new.
Magnetic Separator, drum type, practically new, £45, with Generator.
Several good Foundry Ladles 1 ton to 10 tons capacity.
Alex. Hammond, Foundry Machinery Merchant.
14 AUSTRALIA Rd. SLOUGH
BUY FROM ME AND SAVE MONEY

ILFORD PRODUCTS
FOR INDUSTRIAL RADIOGRAPHY

THE progress of Industrial Radiography has made apparent the need for a range of sensitized materials varying in their particular characteristics according to work to be done. Such a range of materials providing for every known requirement of the Industrial radiographer has now been made available by Ilford Limited and comprises three distinct types of films, intensifying screens and x-ray papers. These materials are described briefly below.

ILFORD X-RAY FILMS

Industrial X-ray Film A—a general purpose film for use with or without screens.

Industrial X-ray Film B—a high contrast, non-screen film for direct exposures (or with metal screens) for maximum flaw-discrimination.

Industrial X-ray Film C—a slow fine grain non-screen film for high resolution in crystallography or in the radiography of light alloys.

ILFORD X-RAY PAPERS

Ilford (Staudard) X-ray Paper—for use with or without an intensifying screen.

Kryptoscreen X-ray Paper—for use with or without Brytex Intensifying Leaves—an exceptionally fast high resolution paper.

ILFORD INTENSIFYING SCREENS

Tungstate Screens (for cassette mounting)—for use with Industrial X-ray Film A.
- (a) Normal pairs—consisting of thin front and thick back screen, for use at relatively low kilovoltages.
- (b) Industrial pairs—consisting of two thick screens, for use at kilovoltages greater than 100-120 kV or with gamma rays.

Flexible Tungstate Screens (Normal or Industrial pairs)—coated on thin card base or on celluloid.

High Definition Tungstate Screens (for cassette mounting)—giving greatly improved definition, but having only halt the speed of the normal Tungstate Screens.

Brytex Intensifying Leaves—specifically intended for use with Kryptoscreen Papers; usable also with Industrial X-ray Film A with moderate intensification factor.

The following Ilford booklets contain full information of all Ilford Industrial X-ray materials and will prove useful to Industrial Radiographers.

"Ilford Products for Industrial Applications of X-rays and Gamma Rays."

"Photography as an Aid to Scientific Work."

ILFORD LIMITED · ILFORD · LONDON

Published by the Proprietors, Industrial Newspapers, Limited, 49, Wellington Street, Strand, London, W.C.2 and Printed in Great Britain by Harrison & Sons, Ltd., 44/47, St. Martin's Lane, London, W.C.2.

FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. 73. No. 1459.

AUGUST 3, 1944

Single Copy 6d. By Post 8d. Annual S
scription, Home and Overseas, 21/- (Prep

Registered at the G.P.O. as a Newspaper

Offices: 49, Wellington Street, Strand, London, W.C.2