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EST. 1902

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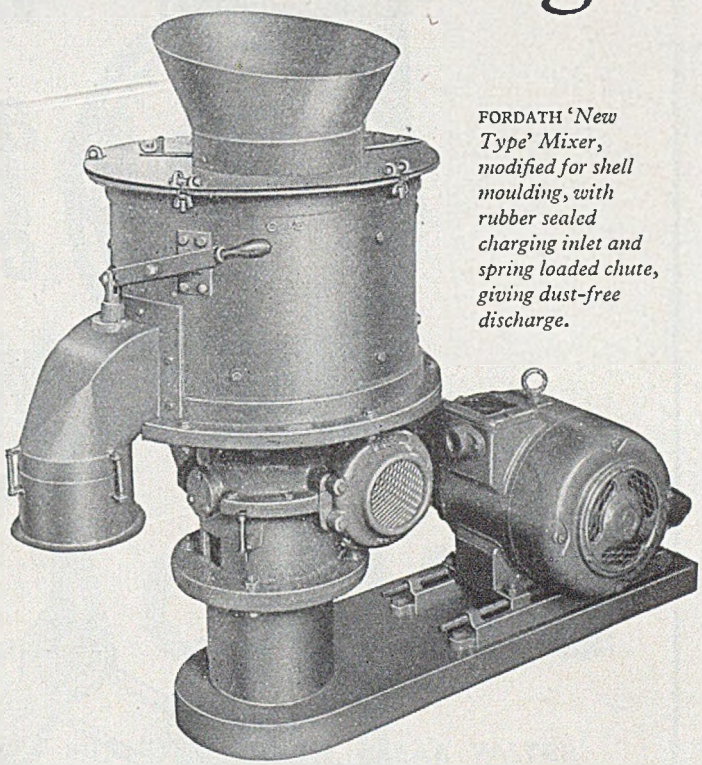
Fordath Mixers Aid Shell Moulding

PERFECT HOMOGENEITY OF THE SAND/RESIN MIX

EVERYONE in the foundry trade—and many in other industries—knows of the high efficiency of the Fordath 'New Type' Mixing Machine in mixing sands and powders of all kinds, with or without liquid bonding material.

Long proved in the core shop, the Fordath Mixer has now been adapted (and is rapidly being adopted) for work in the shell moulding process. Alongside technological advances in the foundry—and shell moulding is undoubtedly the most interesting technical development since the war—come associated problems and hazards.

Fine powders make fine dust—which is anything but fine for the operatives *unless* . . . unless by careful design the dust can be kept where it belongs: in the sand/resin mixture!



FORDATH *'New Type' Mixer, modified for shell moulding, with rubber sealed charging inlet and spring loaded chute, giving dust-free discharge.*

Modified by additional components providing perfect protection for operatives, the Fordath Mixer has all the advantages:

1. *Swift preparation of the batch by intensive mixing action with vigorous turbulence* **inside** *the machine.*
2. *The intensity of the mixing action ensures perfect distribution of any* WETTING AGENTS *which are to be embodied in the sand/resin mix.*
3. *Rubber sealed dust cover embodies butterfly valve charging inlet.*
4. *Spring loaded discharge chute giving dust-free attachment to dump-box.*
5. *Enclosed motor drives through V-ropes to vertical worm reduction gear, totally enclosed and sealed from mixing chamber.*
6. *Every batch of sand/resin mix is sealed and delivered* **quickly and dustlessly.**
7. *Units complete, mounted on bedplate, are available for 80lb, 150lb, 300lb, 550lb, 1000lb batch-sizes.*

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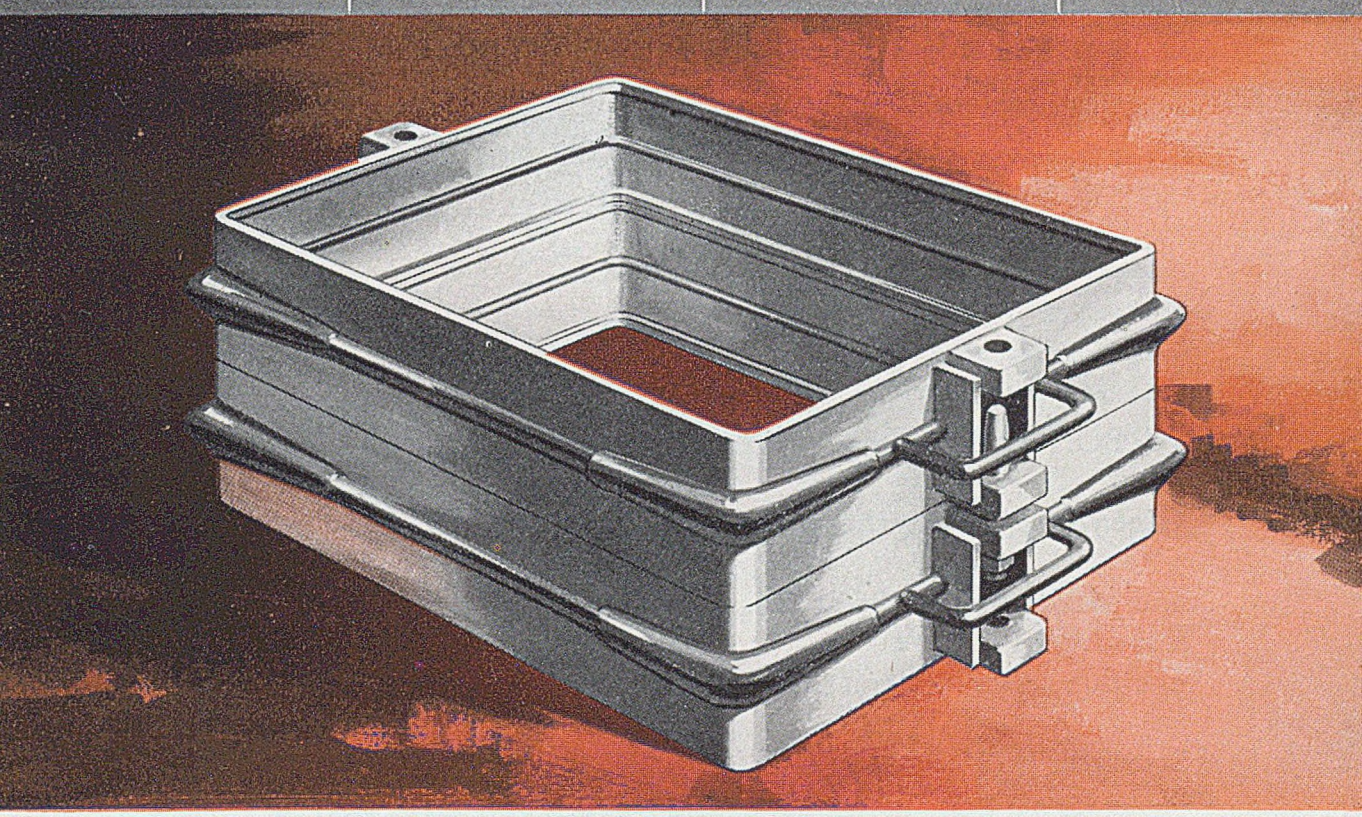

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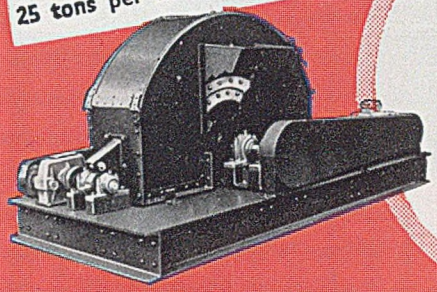
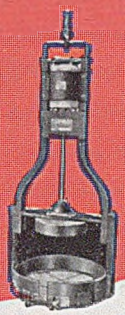
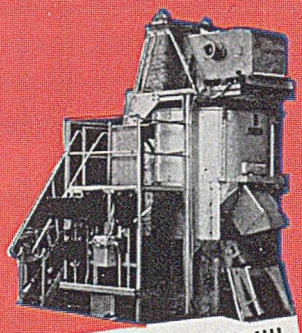


Continuous Disintegrator
25 tons per hr. capacity

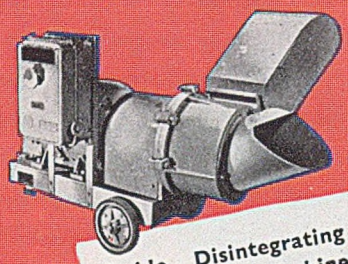


Vibratory
Sand Sifting Machine

SAND TREATMENT PLANT . . .

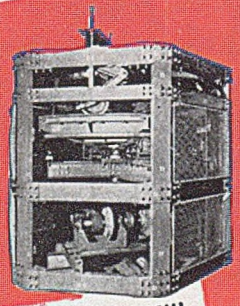


Batch Type Sand Mill
Various sizes



Oxide Disintegrating
and Aerating Machine

Prosama Disintegrating
and Aerating Machine



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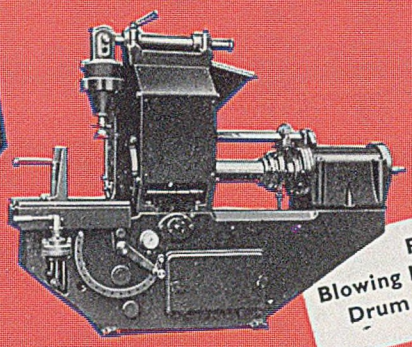
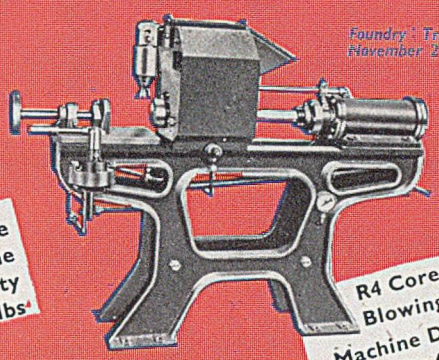
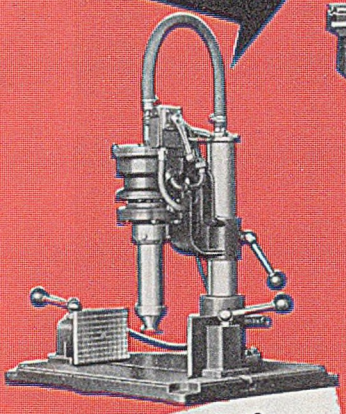
CORE BLOWERS



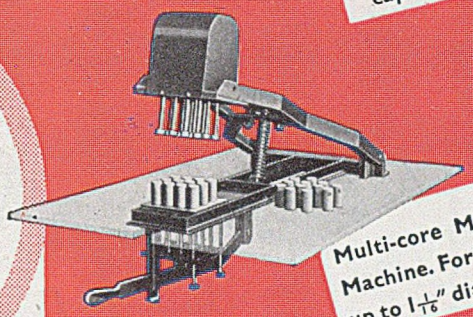
R2 Core Blowing Machine Drum capacity 400 lbs



R4 Core Blowing Machine Drum capacity 66 lbs

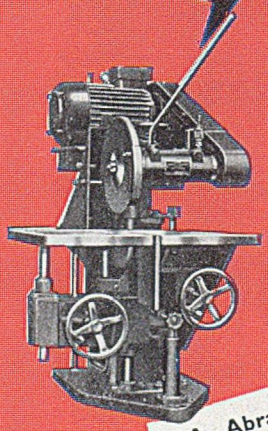


Bench Core Blower Cartridge capacity 1¼ lbs.

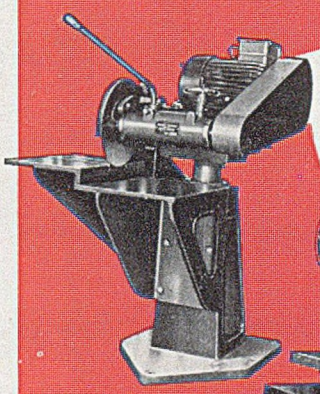


Multi-core Making Machine. For Cores up to 1 1/16" diameter

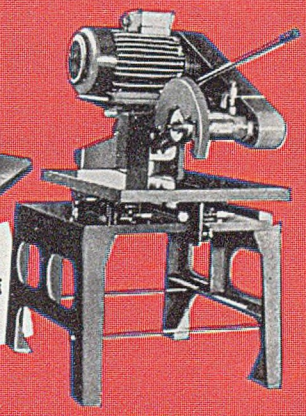
CUT-OFF MACHINES



C.A. Abrasive Wheel Cut off Machine



C.E.F. Abrasive Wheel Cut Off Machine



C.M.B.S. Abrasive Wheel Cut Off Machine

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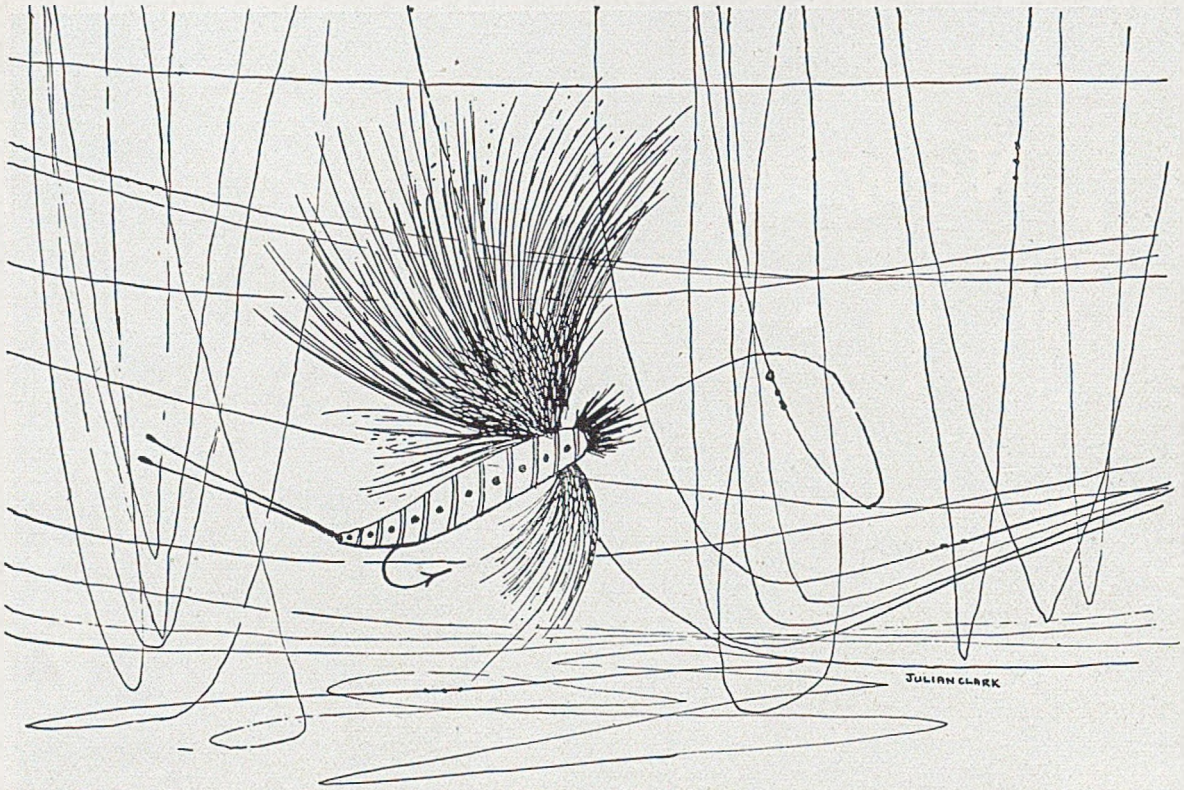

THE PHILOSOPHY OF CASTING—No. 2

Casting a Fly

"Opportunity is ever worth expecting; let your hook be ever hanging ready. The fish will be in the pool where you least imagine it to be." (*Ovid*)

IT IS, perhaps, a weakness in us all to blame our failures and our difficulties on opportunities which never came our way. But "A wise man will make more opportunities than he finds" said Francis Bacon. There is an answer to every problem which confronts us in the turmoil of our post-war industrial life. To find that answer, we may have to cast constantly around for new ideas, new markets, new techniques. Nothing is static. In foundry practice, to take an illustration near at home, the use of Cellobond resins has made an invaluable contribution to certain processes. For shell moulding, the quick cure, good flow and strong bond of Cellobond phenolic resins combine to produce a perfect shell. And for core binding, the low initial cost of the Cellobond phenolic and urea resins and the time they save in baking and in knock-out has made them first choice amongst resinous binders. Cellobond foundry resins may well be the answer to some problem on your desk at this very moment. Cast around for the solution no longer; just write for samples and full particulars.

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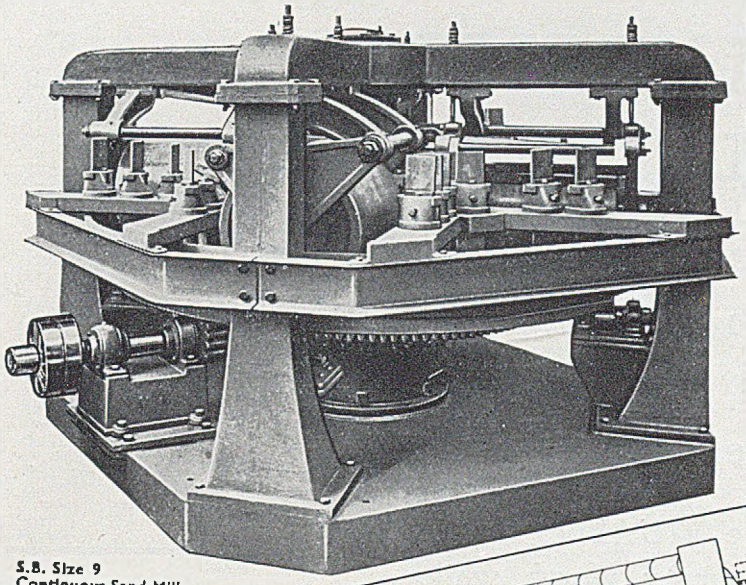

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Continuous Sand Mill.

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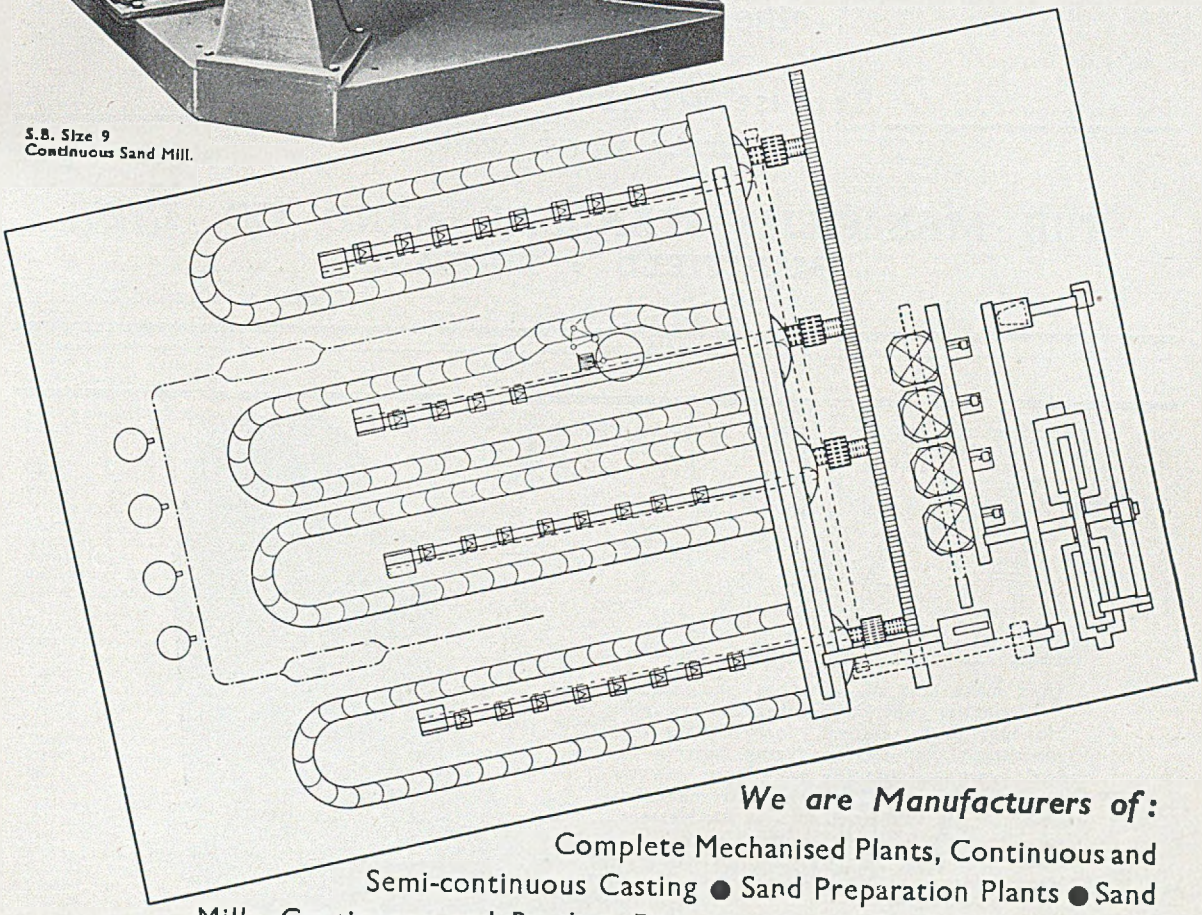
for a visit from one of our representatives



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Established 1902
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Industrial Accidents

Everybody deplores the occurrence of an industrial accident, especially in the shops under one's control. In the normal course of affairs, these unfortunate happenings so very often get divorced from a personal matter and on the one side they involve the insurance companies, solicitors, counsel and a court of law and on the other side the same string with the trade unions replacing the insurance companies. At this, or even later stages, the position reached is that both sides are reinforcing, at high cost, the law of the land. Because of this expense, many cases are settled out of Court. This can lead to miscarriage of justice, much in the same way as an individual may refrain from suing a monopolistic undertaking owing to the inequality of cash resources, unless a "cast-iron" case is obvious.

With the passage of time, the Courts are taking more notice of shop conditions—by this is meant the organization of the work. A proper delegation of responsibility all down the line in an orderly fashion has often been helpful to the Court, whereas the contrary is being viewed with disapprobation. This attention to detail proved an important factor in the Scottish Courts recently, where the production of an authentic record of an accident taken immediately after its occurrence was accepted and indeed appeared to be decisive. In some of the smaller concerns, this duty of recording an accident is often held over until, maybe, a second accident calls it to mind. The case cited shows how important it is to record, immediately and accurately, every type of accident, be it severe or minor. The greatest factor for the reduction of industrial accidents is the dual organization of an intelligent system of manufacturing and the inculcation into the minds of the whole of the staff a proper awareness of the accident risk inherent in factory life. This latter factor is highly developed in the United States, where it is deemed to be of equal importance to the installation of mechanical gadgets for rendering machinery foolproof. Maybe, the Americans have formed the opinion that over-insistence on mechanical devices for the prevention of accidents gives a sense of false security.

A feature of factory law, which is weak and unsatisfactory, is that certain personal protective equipment must be provided by the employer, but its use by the employees is usually optional. The introduction of a third-party risk is also a complication, for when one employee, through his carelessness, is responsible for an accident to a mate, the employer is jointly liable. He can, of course, in theory, take action against the man causing the accident, but practically never does, as the chance of the recovery of costs is virtually nil. The sum of money paid out each year in compensation is increasing and merits the attention of all employers. It would appear that all that can be done is to follow the precepts we have indicated for making the shops as "safe" as possible.

Sixth Foremen's Training Course

The continued success of the foundry foremen's training courses held at Ashorne Hill, near Leamington Spa, during the past five years has encouraged the Institute of British Foundrymen to organize a sixth course which will be held from Thursday, April 1, to Saturday, April 3, 1954. Ashorne Hill will again be the venue. A nominal registration fee of £1 for each participant will be charged.

Programme

The programme of the new course, which is designed to give practical guidance to foundrymen, is as follows:—

Thursday Evening, April 1.

Assembly of those participating (4 p.m. onwards); technical film display.

Friday, April 2.

Address by the president, Mr. E. Longden, M.I.MECH.E.; lectures on shell moulding; the influence of equipment on the productivity of the general foundry, and, in the afternoon, on a new approach to productivity. The evening session will comprise discussion groups.

Saturday, April 3.

(Morning): Lectures on the elimination of fettling-shop congestion and on methods of control for the production of large castings.

The limited sleeping accommodation available at Ashorne Hill controls the number of visitors who can participate. Vacancies will therefore be allocated strictly in order of receipt of applications. The charge for accommodation at Ashorne Hill is 37s. 6d. per day, which includes dinner, bed, breakfast, luncheon and tea (17s. 6d. per head per day to non-residents). No accommodation will be available at Ashorne Hill for the Saturday night.

Forms of application to attend the course may be obtained from the secretary, the Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester 3, to whom they should be returned not later than January 31, 1954; early application is desirable.

National Foundry Craft Training Centre

The National Foundry Craft Training Centre, which operates at West Bromwich in foundry premises lent by Rudge Littley, Limited, is unaffected by recent Press announcements of the winding up of a training committee in the Midlands announced in the JOURNAL, on November 5. The Centre, for a modest fee covering the bare cost of tuition plus accommodation at its residential hostel, trains apprentices sent voluntarily by their employers for a month at a time over a period of about three-and-a-half years. The standard of training given, and the effects of supplementing the normal work at the boys' "home" foundries, have been widely praised by employers who have sent students.

Opened in October, 1948, the N.F.C.T.C. remains in full and vigorous life. Its day-to-day work is conducted under the supervision of a management committee of the West Midlands Joint Foundry Advisory Committee (Recruitment and Training), representing the whole foundry industry, ferrous and non-ferrous. This committee meets at monthly intervals. The policy of the Centre is directed and its finances are controlled by a body of trustees. So far, the Centre has completed 52 terms covering the four courses into which the syllabus is divided. In 1954 there will be eleven terms (allowing for a four-week break in July and August). Of these terms, four each will be devoted to students taking first and second courses, two to those attending third courses, and one to fourth-course boys.

R.S.A. Bicentenary Competition

The Royal Society of Arts will reach its bicentenary in March, 1954, and with this in mind its Council is arranging, in addition to various customary forms of celebration which will commemorate the Society's past achievements, a competition which will focus attention upon the future. The first public announcement of the competition was made at the inaugural meeting of the 200th session on Wednesday of last week, when H.R.H. the Duke of Edinburgh, as president of the Society, was in the chair.

The Society accordingly offers prizes totalling £500, the largest being £250, for conceptions of life on this planet in the year 2000 A.D., and forecasts (in visual or written form) are invited of the future developments which may be looked for in some particular aspect of life related to arts, manufactures and commerce—the field of the Society as defined in its full and original title. For example, a competitor might give his ideas of what transport, housing, food or clothing may be like in 47 years hence. The chief criterion in assessing the entries will be originality.

Full terms and conditions relating to the competition, together with registration forms, may be obtained from the secretary, Royal Society of Arts, John Adam Street, London, W.C.2. Registration forms must be completed and returned together with an entry fee of 1s. by February 15, 1954, and the actual competitive material submitted by June 30, 1954.

Institute of General Managers

At the inaugural dinner of the Institute of General Managers held at the Savoy Hotel, London, last Friday, the guests of honour included Sir Rupert De la Bère, M.P., and Sir Patrick Hannon. The organization has been formed by a number of managing directors and general managers in order to give effect to a need for a powerful and representative professional institute of chief executives in the drive for greater productivity and management effectiveness in industry. All candidates must hold a *bona fide* general management appointment at the time of application. The education and training of younger men as potential general managers will be one of the main concerns of the Institute. Conferences, publications, information and advisory services, and a broad interchange among chief executives of management information and experiences, will also be provided through branch functions.

Dinner

FEDERATION OF LIGHT METAL SMELTERS

Mr. F. Farenden presided over the annual dinner, held at the Trocadero Restaurant last Thursday. At the high table were:—Mr. V. P. Harries; Dr. W. E. Berry; Mr. L. J. Chandler; Mr. H. E. Thatcher; Mr. E. Player; Mr. H. R. Murray Shaw; Mr. C. E. Keey; Mr. G. A. Woodruff; Mr. G. W. Booth and Mr. H. M. Angus, all of whom were accompanied by their ladies. The function was superbly organized by Mr. H. G. Ross, the secretary.

INDUSTRIALISTS in the north-east have been warned that load-shedding may have to take place in the event of severe weather or a breakdown in plant.

Patternmaking for the Repetition Foundry*

By Robert R. Shaw

[SLIGHTLY ABRIDGED]

Patternmaking is a craft so diversified in its various branches that no individual could claim to be an expert in all its ramifications. The contrast between light casting and heavy engineering, jobbing work and repetitive mechanical moulding calls in each case for a different technique, and it is in these differences that makes patternmaking such an interesting trade for the real craftsman to pursue.

Light iron casting has undergone quite a revolutionary change in many respects during the past 20 yrs. due to the advance in machine moulding, and patternmaking technique has in consequence been altered to meet this particular need. Machine moulding almost invariably calls for patternplate equipment where the pattern leaves the mould clean, where all core prints match up perfectly with the core and all runners are incorporated on the plate. This, very briefly, is the nucleus of all successful mechanical moulding.

Materials for Patternplates

Patternplates are made in cast iron, aluminium, or wood. The last, however, can almost be neglected, since wood is too soft a material to stand up to the punishing conditions of mechanical moulding and its use represents very bad practice for large-scale production. Aluminium is quite extensively used for patternplates; just why this is so extensively used is rather difficult to justify, because the metal has very little to commend it for such a purpose. It has a long freezing range between the liquidus and the solidus, giving a large liquid shrinkage which causes trouble in heavy sections, which must be "fed" to give a good plate. It is a soft malleable metal, very liable to be dented in use, and is liable to permanent distortion under pressure. Its lightness is no real advantage, since in mechanical moulding the plate is not man-handled except when taken off and on the machine. By far the most suitable metal for the manufacture of patternplates is a soft, grey cast iron preferably high in phosphorus. Phosphorus lowers the melting point of cast iron, and gives a late expansion on solidification which results in very sharply-defined edges on the casting. A cast-iron patternplate is absolutely rigid, cannot be deformed by rapping, parts easily from the sand and, given normal care, will not cause any damage through breakage. In this respect it is in a category on its own.

Types of Plates

The simplest type of pattern that can be put on a plate is one where the cope is quite flat, and the casting is entirely in the drag; in this case all one has to do is to mount the pattern or patterns, as the case may be, on a flat plate. Alternatively, if a cast plate is desirable, the patterns are laid on a flat board, and the drag half of the moulding box is rammed up. The box is then inverted, and the cope rammed up. The box is next parted and a frame the shape and thickness of the desired plate is laid on the drag half and sand is made up all around the frame to the extreme edge of the box. Risers are placed at the four corners of the box, the patterns are withdrawn, the box is closed and is then ready to cast.

The making of a plate where part of the casting is in the drag and part in the cope can be illustrated by a case where the parting is all in one plane, and the plate is of the mounted type. The first step is to make a master split pattern with two contractions, and from this master the requisite number of pattern castings are made. These are surfaced, dowelled and finished to the dimensional accuracy required. A flat plate is then prepared by machining it on both sides and is drilled with a round hole at one end and an elongated hole at the other to fit the pins of the moulding box. The inside dimensions of the box are next enscribed on the plate. The patterns are then arranged on the plate at a convenient distance apart to allow for a runner and the plate is next drilled vertically through the dowel

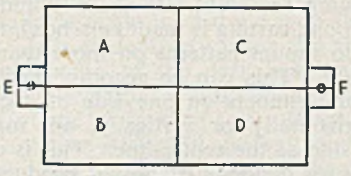


FIG1

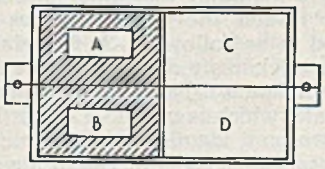


FIG2

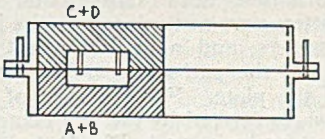


FIG3

FIGS. 1, 2 *and* 3.—*Stages in the Production of a Mounted Patternplate, where Both Halves of the Pattern are Identical.*

* A Paper read before the North-Eastern section of the Scottish branch of the Institute of British Foundrymen.

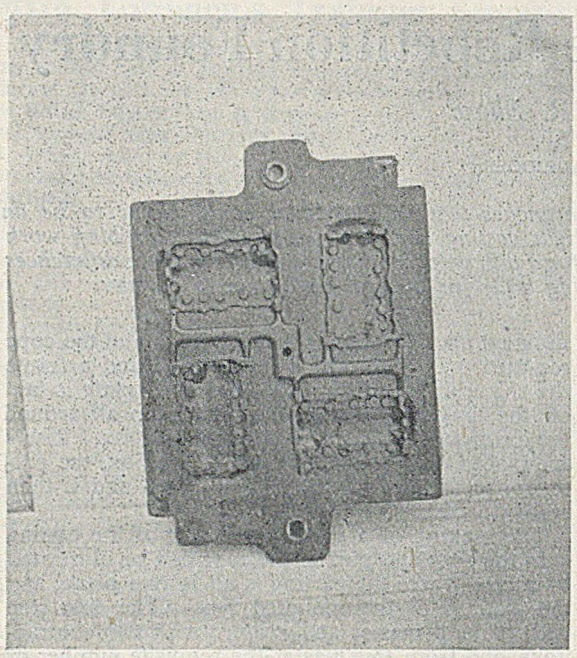


FIG. 4.—*Example of a Cast-iron Patternplate, the Four Patterns, Runners and Plate being cast in One Piece.*

holes, and dowel pins are inserted to line up the half patterns on each side. The patterns are finally screwed to the plate—the screws being located at the most convenient points—and the runners also are screwed in position.

In the case of a mounted plate where both halves of the casting are identical, *e.g.*, a cylinder (where more than one casting is made in a box), there is no necessity to mount patterns on more than one side of the plate. This can be accomplished if all the patterns and runners on one side of a centre-line, either horizontally or vertically, are matched on the other side of the centre-line. This is one of the fastest known methods of mould production when using a single moulding machine, since one has no necessity to reverse the plate for copes and drags. The method is as follows:—A flat plate of steel about $\frac{1}{8}$ in. thickness and of the same dimensions as the patternplate is drilled to fit the moulding box. This flat plate, which is used as a jig, is laid on the plate and two pins, identical with the moulding-box pins, are fixed into position. The inside dimensions of the moulding box are scribed on the jig, together with a centre-line, both vertical and horizontal. The half patterns are next placed on the jig together with the runners, and a drill is run through the dowel holes in the patterns, passing through both the jig and the plate. For the sake of simplicity, the four squares formed by the two centre-lines will be designated (as is shown in Fig. 1) A, B, C. and D. If AC has to reverse with BD the jig is merely turned over on the same pins, and squares BD drilled where there are holes in the jig. The patterns may then be screwed to the plate. If the work is done accurately enough, this is quite a satisfactory method. Considering a case where AB has to reverse on CD, here the pin hole at E is reversed on pin hole at F so that A becomes D and B becomes C. Thus, if the holes on the jig in squares A and B are drilled on C and D the patterns so mounted will match up if the moulding boxes are reversed on closing. In this method, one pin should be fixed in the box, the other in the plate of the machine.

This type of plate should not be dismissed without explaining another very accurate method of mounting the patterns without using a metal jig, which is as follows:—The machined flat plate is laid on the bench and a moulding box is placed on the top of it with the pins in position. Half of the patterns and runners are placed in position in squares A and B. No drilling or fixing of any kind need be done at this stage. Stucco is next poured over these patterns and runners, which are blanked off at the vertical centre-line (Fig. 2)—that is, no stucco need be poured over squares C and D. It is also not advisable to have the depth of stucco reaching quite to the dowel holes. When the stucco has firmly set, a drill is passed through each dowel hole, and bored through the plate to any convenient depth. The moulding box complete with stucco, patterns and runner is next lifted from the plate and inverted on the bench. The stucco surface (with patterns and runner still imbedded) is then given a coat of shellac varnish and finally smeared with grease. The corresponding half of each pattern and runner is next placed on each pattern incased in the stucco, and all dowel pins are inserted (Fig. 3). Another moulding box is then placed on the first box and it, too, is filled with stucco to the centre vertical line, at the same depth as in the

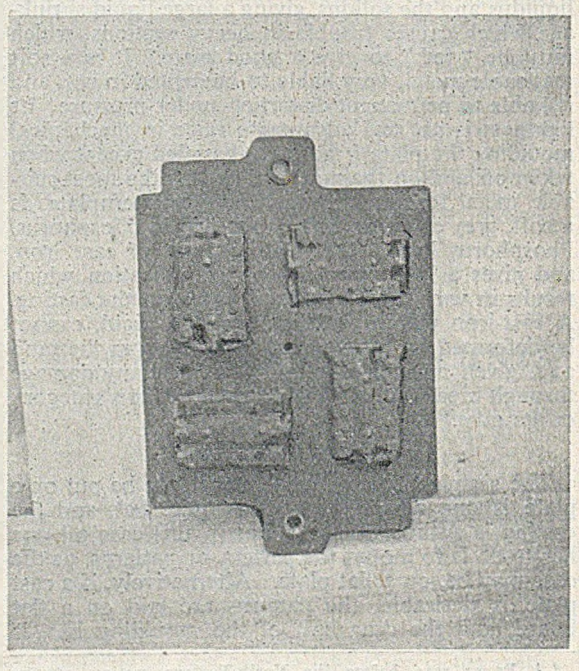


FIG. 5.—*Cope or Reverse Side of the Patternplate shown in Fig.* 4.

former instance. After the stucco has set, the two boxes are parted; the second box, of course, has patterns and runners imbedded in the stucco as in the former instance. Moulding box No. 2 is next placed on the plate in the reverse position as in the first instance, *i.e.*, the stucco part covering squares C and D. The plate is then drilled through the dowel holes on the pattern. If the moulding boxes fit each other accurately, this method gives a perfect alignment.

Irregular Parting Line

In most instances in the making of a plate where the parting line is irregular, it is not practicable to make a split pattern. A saddle is therefore made for the pattern to sit on a board which follows the contour of the parting line, and all that part of the pattern which is to be located in the cope, above the box parting line, must be cut out of the board. The drag half is next rammed up on this board. The box and board are then inverted and the board withdrawn. The mould at this stage is carefully made up by the moulder, and all vertical parting faces are given the maximum taper to the edge of the moulding box. The cope half is then rammed in the usual manner and parted off. It will be evident at this stage that the more nearly vertical the parting face the thinner will be the plate on this face, since the thickness of the plate is only regular on a perfectly horizontal face. It is therefore necessary, in order that the plate should be of reasonably uniform thickness, for all steep vertical parting faces to be cut away by the moulder almost up to the line of the pattern. If this procedure is not carefully followed, the thick and thin sections of the plate would cause distortion and, maybe, cracking when the plate is in use.

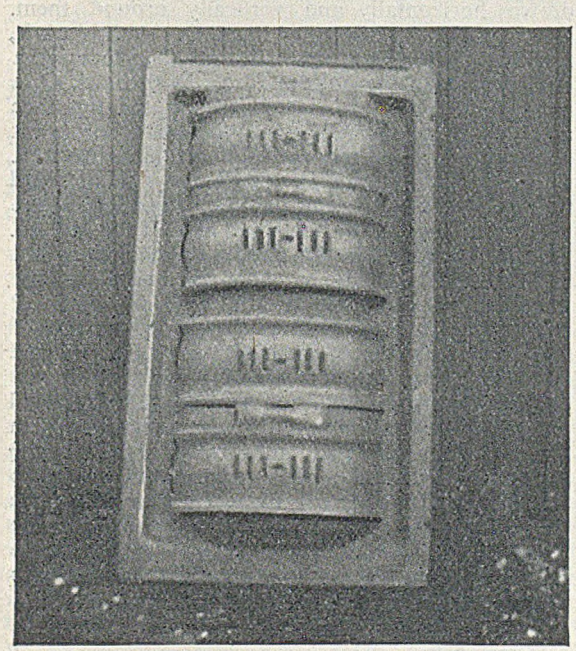


FIG. 6.—*Cast-iron Patternplate, size* 36 *by* 20 *in., incorporating Four Fire Fronts.*

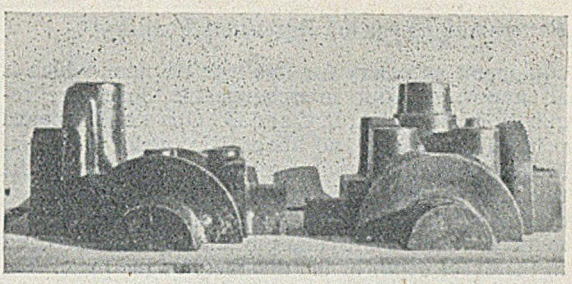


FIG. 7.—*Examples of Patterns Suitable for Embossing as* $\frac{1}{8}$*-in. thick Shells and mounting on a Plate*

Another type of plate well worth mentioning is a double-sided plate, where the cope part of the pattern is screwed on. This type is always employed when the pattern would in itself represent too solid and heavy a block of metal to be cast integral with the plate. (It may be added that this is not a very practical proposition except that the parting is all in one plane.) The procedure is as follows:—A split pattern is essential in this instance. The drag half is laid on a flat board and the box rammed and inverted; except when the pattern itself be a shell type, the pattern is withdrawn from the sand. The cope is then rammed on the drag, minus the pattern, and parted off. There now is as the cope a negative impression of the drag. Next the drag is knocked out and re-rammed with the pattern and box on exactly the same position as on the former occasion. Having completed the drag half for the second time, the operator is in a position to tackle the final stage on the cope half, which amounts to cutting off a thickness from all vertical faces of only about $\frac{3}{8}$ in. Having done this, the plate frame is laid on the drag and the sand is made up around it to the required thickness. It is evident on casting this that there is a shell impression of the drag half only of, say, a regular $\frac{1}{8}$-in. section. It still remains to mount the cope half of the pattern on this. If the top of the plate has not been sleeked in any way (and it is essential to avoid this), a clear outline of the pattern will be seen on the top surface of the plate, and this acts as a perfect guide on which to mount the cope patterns. These are also cast as shells $\frac{1}{8}$ in. thick, in a similar way as that in which the bottom half-plate was made. When the cope patterns are screwed into position, there is formed as a complete plate a uniform shell patternplate $\frac{3}{8}$ in. thick, which would be quite impracticable as a solid block on account of its weight. Furthermore, such a plate would be impossible to make solid because such a heavy block of metal in the pattern would remain molten long after the plate part had solidified, and the whole would be sure to crack in cooling. By this method, many engineering jobs which are made from block patterns and coreboxes can be satisfactorily put on a production-moulding basis.

Cast Matchplates

With cast matchplates there are usually two machines working in conjunction, one making copes and one making drags. Dealing first of all with the

Patternmaking for the Repetition Foundry

equipment necessary for this type of plate, which is all important, four interchangeable boxes are required, numbered A, B, C and D. One wooden board perfectly surfaced, and about 2 in. wider and 4 in. longer than the moulding box, is necessary. Its thickness should be about 1½ in. A centre-line is then drawn on the board on which the pin centres are marked. On the left-hand pin centre, a hole is bored to the exact depth of the thickness of the plate. On the right-hand pin centre a rectangle is cut, the breadth of which is the diameter of the pin and the length about double that, with the depth equal to the thickness of the plate. These two holes can be designated X and Y. The internal dimensions of the moulding box are scribed on the board and inside this line a strip of wood about ¼ in. thick by ½ in. wide is sprigged so that the moulding box can be placed on the board in an exact position. It will be observed that holes X and Y are placed exactly below the pinholes on the box. The patterns are next laid on the board in their required position. Any part of the patterns protruding above the joint of the box must be sunk into the board, and all partings below the joint of the box must be made up to follow the contour of the parting line. Having got the four boxes and the board ready, box A is laid on the board and is filled with ordinary floor sand, rammed as hard as possible. The box is then inverted, the board removed, and box B is placed on A and rammed with floor sand, again as hard as possible. Box B is then parted from box A; the two boxes are laid side by side, and the patterns withdrawn. A dusting of parting powder is applied to both moulds and then box C is placed on box A and box D on box B. All is now ready to ram a negative impression of both cope and drag, i.e., boxes

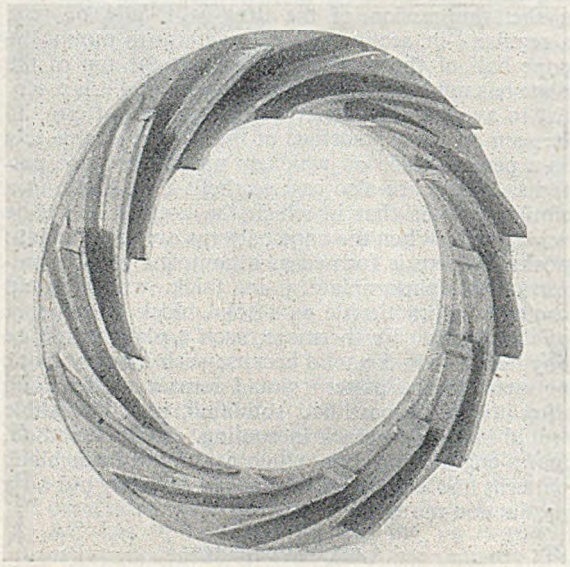


FIG. 8.—*Cast-iron Pattern for an Impellor Casting, approximately 20 in. dia.*

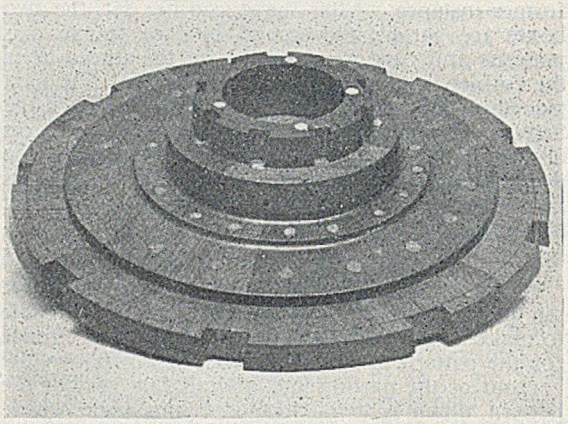


FIG. 9.—*Typical Example of a First-quality Wooden Pattern of Segmental Construction.*

A and B. The ingates are placed in position in both boxes, that is, at the edge of the frame of the plate. Facing sand is applied to these moulds in the usual way, then they are very carefully rammed and parted, C on the left of A and D on the right of B.

Boxes A and B are now emptied and box A is placed back on the board with the patterns in position as in stage one.

Method of Location

Leaving the moulding, the making of the pin and socket for locating the two plates in identical positions relative to the patterns will be described, as this is all-important. First, two blocks of wood approximately 5 by 4 by 1¼ in. are made and centre-lines drawn horizontally and vertically around them. These blocks can be termed P and Q. With block P, a square 1¼ in. side is marked on the top face and a 1-in. square on the bottom face. With block Q, a rectangle 1¼ by 2 in. is marked on the top face and 1 by 1¼ in. on the bottom face, and a hole is cut out on these respective pieces of wood as marked. These two blocks are then dowelled to a small board the size of the block, and the exact thickness of the plate to be made, with the small hole at the bottom. On the board and in the middle of the square and rectangle respectively, a hole is bored to the diameter of the pin in the case of block P and in the case of Q a rectangle is cut out of the board the width of the diameter of the pin, and of length twice the diameter of the pin. Into the board of block P is inserted a piece of bright steel rod the diameter of the pin of the box with which the plate will be used, and into the board for block Q is placed a rectangular piece of cast iron finished to dimensions, *viz.*, of length twice the diameter of the pin, breadth the diameter of the pin, and depth the thickness of the combined block and board. These blocks are next filled with stucco and, in fact, two stucco castings are made from each block.

Final Casting and Finishing

Returning to the moulding process, it will be remembered that the board has been prepared with

patterns in position and moulding box A in position. Next the stucco piece from block P with the steel pin protruding the thickness of the plate into the hole in the board is inserted. Also the stucco piece from block Q with the rectangular cast-iron piece, protruding the thickness of the plate, is placed in the hole in the board. Box A is now rammed up in the normal manner, inverted, box B is placed on it, and the second stucco piece is placed on the protruding parts, *i.e.*, the steel pin and the rectangular piece of cast iron respectively. Great care must be taken with these moulds to see that a faultless finish is obtained, as both these moulds in boxes A and B act as drags in the final assembly. A and B boxes are next parted and laid side by side with C and D. Turning next to moulds C and D, there need be no special finish on these moulds, since the inside face of the plate is of no importance. All vertical faces in these moulds are cut away so that the section of the plate at any part will be the same throughout. Moulds C and D are finally finished off.

Continuing the sequence of operations, a plate frame is made to the dimensions of the required plate, which is laid on moulds A and B respectively, and a thickness of sand is made all around, extending to the edge of the box. The plate frame is withdrawn and then the patterns. Iron risers, the thickness of the frame, are placed at the four corners of boxes A and B. Box C is closed on the top of box A and box D is closed on the top of box B, and they are finally cast.

Although quite a variety of different ways of making patternplates for hand and machine moulding have been covered, the Author has not touched on methods designed for machines where the pins are outside the plate dimensions, or where the mould is made in substances other than green-sand, such as pressure-cast plates in gypsum moulds or moulds made in silicon ester. It would take a book to do justice to the whole subject, but it is hoped this short description has provided a basic introduction to the problems of patternmaking for high-production moulding. A number of miscellaneous patterns produced by the Author on the general lines described are shown in Figs. 4 to 9.

(*Continued from col.* 2)

former technique, it was claimed, slightly outweighed those for the latter at the present time, but the use of interferometry in metallurgy was still in its infancy and much may be developed during the next few years. Already an instrument giving a stereoscopic picture has been designed. Among the many capabilities of the phase-contrast microscope is its ability to reveal sub-microscopic structures, and the possibility of making a topographical survey to reveal etching pits, segregations, various compounds, precipitates, *e.g.*, nitrides in steel. It is interesting to note that in the latter example, the phase contrast technique shows clearly that the nitride precipitate is in the form of flakes rather than rods. In general, better resolution is also possible.

Microscopy in Metallurgy

Institution of Metallurgists Refresher Course

The microscopy of metals formed the theme of a refresher course arranged by the Institution of Metallurgists at Harrogate from October 30 to November 2. The subject was introduced by Dr. G. K. T. Conn, the University of Sheffield, who indicated the basic principles of the optical systems used. This was followed by four lectures on various special techniques which are used in the metallographic examination of metals. Techniques using the ordinary microscope were considered by H. Evans (Research and Development Department, Mond Nickel Company, Limited) who illustrated how these methods are still satisfactory in solving problems often studied at present by many metallurgists by more complex methods. He showed, for example, how the compounds of chromium carbide can be differentiated by the careful selection of etching reagents. Cathodic vacuum etching and thermal etching were described briefly, the latter method being associated with hot-stage microscopy.

This later technique was the subject of a lecture by P. J. E. Forsyth of the R.A.E., Ministry of Supply, Farnborough, who indicated its potentialities. He showed examples of his own work in the study of light alloys and zinc-base alloys, and the ingenious device by which the structural changes of an alloy may be observed at temperature under the influence of strain. The specimens, in the form of ribbon, must be held in a controlled atmosphere or in vacuum. The furnace container had been designed to rest on the stage of an ordinary bench microscope. Such investigations had increased the popularity of using 35-mm. microfilm in order to be able to observe the slow changes in structure.

Use of Polarized Light

The metallurgical applications of the polarized-light microscope were explained by B. W. Mott (A.E.R.E., Ministry of Supply, Harwell), who briefly described the principles of the optics of polarized light, and gave a large number of examples of its use. So sensitive is this technique to topographical variations that mechanical polishing in the preparation of specimens can only be relied upon for the harder steel alloys, and electrolytic polishing is almost essential. Among the many phenomena which may be studied are isotropic inclusions, degree of preferred orientation such as caused by deformation, colour differences with the aid of the tint screen, and optical characteristics of the phases. He enumerated the various possible anomalies which might occur, and it was suggested that this method of microscopic examination of metal structures should be used with discretion and preferably not without the assistance of an ordinary metallurgical microscope.

The course of lectures closed with a treatise by D. McLean (National Physical Laboratory, Teddington) on the uses of the phase contrast and interferometric examination of metal surfaces. The applications and potentialities of the use of the

(*Continued at foot of col.* 1)

Fuel-efficiency Exhibition

When Alderman A. Moss, Lord Mayor of Manchester, spoke at the opening of the "Fuel Efficiency in Industry and Home" exhibition being held at the City Hall, Manchester, from November 18 to 28, he referred to the stimulation which the exhibition would give to those people seriously interested in the scheme of "smokeless zones." Alderman Moss said that he welcomed the exhibition because it would appeal not only to those technically involved, but would be of educational value to all those interested in the smoke-abatement project, particularly, and any other schemes that will help the public in general.

The Right Hon. Earl of Derby, M.C., Lord Lieutenant of Lancashire, opened the exhibition and spoke first on the "rightness" of the exhibition being held in Manchester. He understood that the district had the highest coal consumption in the country and was one of its greatest industrial centres. Before the war, he said, coal was in good supply but the demand was rather small; now the position was somewhat reversed, and it seemed inevitable that the price of coal should have increased in comparison. Due to the large home demand we were unable to export large quantities of coal. Oil, the alternative to coal, was imported, and here, as with coal, it was essential that it should be used with the maximum effectiveness and efficiency.

Typical Exhibits

There is much in the exhibition which will repay a visit by the foundryman. For instance, Associated Settings & Chimneys, Limited, of Kingswinford, Staffs, have a wide variety of equipment on show, including siliceous and aluminous monolithic refractories now being used for rammed lining refractories for rotary-type furnaces for steel works and for malleable iron melting, and in the latest system of power station boiler casings. James Hodgkinson (Salford), Limited, engineers and ironfounders, have had some 60 years' experience in the production of units for promoting fuel efficiency and the abolition of smoke by mechanical firing. Their exhibits include a range of mechanical stokers and small coal-handling plants. For mechanical fuel handling, a typical example of a bucket elevator was exhibited. Dust collectors were seen among other exhibits at the stand of James Howden & Company, Limited, of Glasgow and London.

Crosthwaite Furnaces & Scriven Machine Tools, Limited, of Leeds, 9; Danks & Company (Oldbury), Limited, and Mirrlees Watson & Company, Limited, all include mechanical stoking exhibits on their stands. The Morgan Crucible Company, Limited, of London, are featuring two of their range of low-heat-storage insulating refractories. In all, seventy-nine of the leading organizations in the field of fuel efficiency are represented, though devices for the domestic user are not extensively shown. One cannot but be impressed by the strides which instrumentation has made in fuel-control generally, and also by the emphasis which is undoubtedly to be "sensed" in the exhibition, of more efficient firing and, as a result, smoke-abatement activities. The exhibition is sponsored by the Combustion Engineering Association, an organization representing manufacturers and users. A few other notable stands of interest to foundrymen are reviewed in the following paragraphs:—

ELECTROFLO METERS COMPANY, LIMITED, London, have an exhibit demonstrating the company's activity in the field of complete instrumentation and automatic control of industrial plant. An associated company, Solway Flowrators, Limited, exhibit a range of variable-area flow-meters for the measurement of corrosive fluids and gases.

DANFOSS MANUFACTURING COMPANY, London, are showing a range of heating and oil-burner controls and motor starters.

A working model of a cast-iron vertical tube economizer which clearly demonstrates the function of the economizer in using the waste heat from the boiler flue gases to preheat the boiler feed water is shown by E. GREEN & SON, LIMITED. Also on view is a full size model of the firm's premier diamond cast-iron gilled tube economizer type 25. This has been prepared to demonstrate the all-round availability of the tubes and to show the clear diagonal and vertical gas passages.

PRAT-DANIEL (STANMORE), LIMITED, are showing induced-draught and forced-draught fans, dust collectors, etc

NU-WAY HEATING PLANTS, LIMITED, Droitwich, exhibit three new products—the Nu-way model 50 heater, the home-fire burner, an oil burner designed for domestic use with the small independent boiler, and the fully automatic "Rotavac" burner, with gas/electric ignition.

FERRANTI, LIMITED, Hollinwood, display a range of radiant electric fires, including floor, panel, and wall types of contemporary design, thermal-storage water heaters, meters, and a three-phase maximum-demand alarm.

A selection of products specifically related to the theme of the exhibition is displayed by DAVIDSON & COMPANY, LIMITED, Belfast. Included are a model "Sirocco" cellular dust-collector complete with six secondary collectors and induced-draught and booster fans. A working model of a single-cell collector is also featured, as well as a complete standard cell. Another working model comprises small-scale examples of various designs of fans manufactured by the company.

BRITISH OIL BURNERS, LIMITED, London, show the "Emulsor" domestic oil-fuel burner, thermostatically controlled and electrically ignited.

E. & F. BEATTIE, LIMITED, Manchester, exhibit modern domestic heating appliances, including models of slow-combustion stoves, domestic boilers, all-night grates, and, in particular, a demonstration model of the "Watts" automatic-feed anthracite boiler, for use with central-heating systems.

On a double-deck stand, HOPKINSONS, LIMITED, Huddersfield, show numerous valves, including a 9-in. bore Hopkinson-Ferranti valve, suitable for 1,600 lb. per sq. in. steam pressure, with electric controls operated from a control station. Soot blowers, an automatic pump leak-off unit, an electrically assisted torsion-bar safety valve and pressure switch, gauges, and water-level indicators are also shown.

KELVIN & HUGHES (INDUSTRIAL), LIMITED, London, exhibit four sections of a typical industrial undertaking showing instrumentation used at the various stages.

Netherlands Steel Production

The Netherlands Statistical Bureau announces that for the first six months of this year, iron and steel production was higher than in the same period of 1952. Pig-iron production rose from 247,700 tons to 314,600 tons, crude steel from 289,800 to 417,600 tons, and hot-rolled steel products from 210,500 to 322,600 tons.

Dust Control from Pedestal Grinders

I.B.F. Blackpool Conference Discussion

At the closing session of the annual conference of the Institute of British Foundrymen, held in the Baronial Hall, Winter Garden, Blackpool, Dr. C. J. Dadswell presided. Matters for consideration were two films showing different systems developed for the suppression arising from the use of pedestal grinders, the first prepared by the British Steel Castings Research Association and the second by the British Cast Iron Research Association, and a Paper, "Application of External Dust Control to a 24-in. Pedestal Grinder,"† by W. H. White, F.R.S.A., and W. B. Lawrie, M.Sc., F.R.M.S., A.I.M., which described the development of the second system. At the meeting, Mr. Armitage, of the B.S.C.R.A., introduced the modifications incorporated by his Association and demonstrated a model of the apparatus.*

Opening the meeting, the Chairman, DR. C. J. DADSWELL, said he was most willing to preside, as in the matter of dust control from grinders he had a seat in both camps, being on the Council of both the British Steel Castings Research Association and the British Cast Iron Research Association. The paper was then presented, the Chairman next introducing the films by saying that the importance of all aspects of industrial health was, of course, well recognized, and the films to be shown gave the results of investigations conducted over the last two years simultaneously by the two Associations.

Following the showing of the B.C.I.R.A. film, MR. D. H. ARMITAGE, at the Chairman's request, made the following introduction to the showing of the second (B.S.C.R.A.) film:—

The diagram (Fig. A) summarizes the design modifications to stand grinder exhaust equipment as recommended by the British Steel Castings Research Association. These provide satisfactory dust control when grinding steel and iron castings and are now incorporated in new machines and conversion sets manufactured by members of the Foundry Trades' Equipment and Supplies Association. The modified machines are equipped with extractors as normally supplied for conventional machines. For example, with a grinding wheel 24-in. dia., 3-in. face, an exhaust rate of 500 cub. ft. per min. at 3-in. water gauge is adequate.

The film outlines the course that the work at the B.S.C.R.A. dust-research station has followed, as a result of which there has been evolved an answer to the problem of dust suppression when grinding steel and iron castings. In finding this answer, it has been possible to decide upon relatively simple modifications that can be incorporated in new grinding machines or added to old ones, with a minimum of cost and difficulty. Further, this has been done without exceeding the normal fan capacity; in other words, fans of normal size and horse-power are required. Also, there was on show a small-scale model of a stand grinder showing the B.S.C.R.A. modifications.

* See also "Dust Control on Floor Grinders." JOURNAL, July 23, 1953, p. 123.

† Paper printed in the JOURNAL, October 15, 1953, p. 481.

DISCUSSION

THE CHAIRMAN, opening the discussion, and referring to the second modification of the hood on the 14-in. wheel, in which there were two nozzles at the top of the hood, asked Mr. White if these for practical purposes could be combined into a nozzle extending all round.

MR. WHITE replied that economic extraction must first be considered, and the question had been asked many times as to whether the vertical arms were in the way of side grinding. The arms, both on the 14-in. dia. and 24-in. dia. wheel, would have to swivel in order to get the best results from the extraction system at the point of dust generation. For the 14-in. model, they swivelled on a vertical axis, and for the 24-in. model they swung on their central axes. A further development had been made, doing away with the arms, and extending the

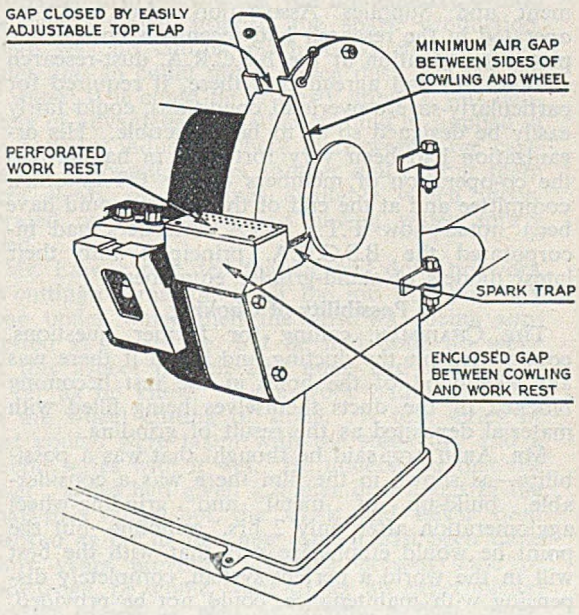


FIG. A.—*Diagrammatic Representation of Modifications to Stand Grinder Exhaust Equipment as developed by the British Steel Castings Research Association in conjunction with the Foundry Trades Equipment and Supplies Association.*

deflector plate (that was the framing around the top nozzle) down to the rest on either side of the wheel as a complete and permanent piece of the hood, with a top and two side openings for air extraction curtains. (Mr. White here amplified his explanation with a drawing on the blackboard.)

MR. A. R. PARKES thought it might interest members to know that there was at least one installation of the pattern of extraction apparatus introduced by the British Cast Iron Research Association in use in a Midland foundry, using a 24-in. dia. wheel. This machine had now been in use for two or three months, and the foundry manager had expressed great satisfaction with it, announcing his intention to have about a dozen more stand grinders with dust extraction on the same pattern.

MR. J. G. BAILES said he was interested more in grinding steel than cast iron, but his firm had altered their machines in the B.S.C.R.A. manner. The method was highly efficient, extremely simple and a great credit to the steel research organisation for the simple way in which they had overcome the difficulties. It took his firm exactly 40 min. to convert their machines and make them efficient.

THE CHAIRMAN asked, for the B.S.C.R.A. design, how the side plates were adjusted to allow for wear on the wheel.

MR. ARMITAGE replied that the side plates were a fairly recent additional refinement which had been shown unnecessary when grinding ordinary iron or steel castings. Members of the pedestal-grinder committee of the Foundry Trades Equipment and Supplies Association who had co-operated in the research had recently seen the side plates in operation at the B.S.C.R.A. dust-research station, and had agreed that these, if required for particularly-severe overload conditions, could fairly easily be designed so as to be retractible. His organization had been very fortunate in having had the co-operation of members of the F.T.E. & S.A. committee and at the end of the film it would have been noted how F.T.E. & S.A. members had incorporated the B.S.C.R.A. principles into their latest models of stand-grinder equipment.

Possibility of Choking

THE CHAIRMAN, calling for further questions, commented on the ducting and asked if there was any likelihood of the holes in the rest becoming blocked or the ducts themselves being filled with material deposited as the result of grinding.

MR. ARMITAGE said he thought that was a possibility—as shown in the film there was a considerable build-up of metal and grinding-wheel agglomeration after only 2 hrs.' grinding—but the point he would emphasize was that with the best will in the world a perfect system, completely dispensing with maintenance, could not be provided. Unless the extraction system were efficiently maintained, the research associations and the grinder manufacturers were just wasting their time.

MR. F. E. ROWLAND said he disagreed with Mr. Armitage. There was, he thought, not the slightest risk of dust choking up the series of holes provided in the work rest—a viewpoint based on experience. As regards the build-up of swarf in the guard below the work rest when grinding steel, this was due to the fact that the particles were flung off at high speed and at a very high temperature and impinged on the inside of the guard. This resulted in a welding process, as the material had not time to cool down before it became attached to particles previously deposited, which were still hot. In due course, this resulted in a build-up of a pinnacle as shown on the film. It was a quite usual phenomenon when grinding steel, but the deposit was easily removed.

A MEMBER asked Mr. Armitage whether during the period of the trials any blocking of the holes in the work rest had in fact been observed.

MR. ARMITAGE said over a period of 4 hrs. there was no blocking of the holes. During an extended period there was perhaps a danger of that happening, but he was glad to know that one member thought it unlikely.

ANOTHER MEMBER said operators at his foundry had put pieces of sacking over the top of the wheel, allowing them to hang down on each side. The sacking became worn away by the wheel and yet formed a fairly tightly fitting curtain. Their practice was very much on the lines of the British Steel Castings Research Association's solution and was of interest because it showed how operators were improving conditions for themselves.

MR. BIRKITT congratulated those responsible for producing such very efficient systems. With the increased amount of dust passing through the ducting, was there any chance of greater wear of the ducts taking place, due to a shot-blasting effect on the inside ?

THE CHAIRMAN said he did not think that the change in "service life" would be very great.

MR. J. G. BAILES said he had had experience of nine months' working of their machines following conversion to the B.S.C.R.A. system and the holes in the work rest definitely did not fill up. Operators had told him that they did not have to worry about the build-up and, further, they had experienced greater comfort generally in operating the machine.

Subsequent Disposal of Dust

MR. RILEY said it was perfectly obvious that the B.S.C.R.A. modification made to that stand grinder was most beneficial in removing the dust from that particular point, but a snag with all extraction systems was the disposal of the dust afterwards. The problem was not so acute with the "wet" collection systems which were very efficient, but he thought it was now time for the associations to carry out work on filters and the disposal of the dust.

MR. ARMITAGE replied that a project in hand at the moment was concerned with this question and a survey was being made of the effectiveness of various types of extractor unit. It was realized to be a very important part of the problem. So far as his association was concerned, work had started at the grinder and the questions of dust extraction and disposal were logical developments from this beginning.

Application to Cutting-off Wheels

A MEMBER asked if the Authors had any comments to make on dust extraction from cutting-off wheels. In his foundry, a large number of small castings were tested on cutting-off wheels, and the production of dust there was enormous and its collection presented a very big problem.

MR. ARMITAGE stated that his association had not dealt with this specific problem, and he could only suggest that the B.S.C.R.A. attachment might serve for that process in a similar manner to that demonstrated on stand grinders.

MR. WHITE, speaking of the B.C.I.R.A. external extraction system, said it would appear to be quite easily adaptable to cutting-off. These wheels were only $\frac{1}{16}$ to $\frac{1}{4}$ in. wide, and the majority of the air movement developed was down the sides of the wheels. It had been found that if the cowling of 14-in. and 24 in. dia. wheels was totally enclosed, the wheel itself would develop approximately one-half its peripheral speed in air velocity. Thus, a 24 in. dia. wheel, running at a peripheral speed of 9,000 ft. per min., would develop an air movement of somewhere about 4,000 ft. per min. close to the wheel and at the point of contact of grinding. That air stream carried the dust with it, and it was believed that the external system was the only system which could possibly gather that dust stream or cloud since it had been diverted outside the zone of the internal extraction system. The same principles would apply to cut-off wheels, though the majority of air movemnt developed would be from the sides of the wheel.

MR. LAWRIE commented on the idea of the wheel itself producing sufficient air velocity for dust removal and said he had had no experience of cutting-off wheels, but it seemed that they now knew enough to approach the problem on something approaching a scientific basis.

Value of Water as a Suppressant

A MEMBER recounted that they had had a 14-in. dia. cutting-off wheel in his works which produced a lot of dust, but it was found that if a powerful jet of water was directed on to the wheel or the job, the dust was cut down considerably.

MR. LAWRIE said some grinding-wheel manufacturers seemed to be against the use of water with certain wheels. Dust collection by the use of water was very difficult to accomplish for the respirable-size ranges. He had not so far seen any successful application of water for dust control in this manner.

A GRINDING-WHEEL MAKER who was present said he saw no reason at all why water should not be used on a cutting-off wheel. He thought other wheel manufacturers would agree.

ANOTHER MEMBER said there was no danger at all in using resin-bonded wheels with water, except that if one performed a quick cut on steel, there was sufficient heat generated to give a considerable degree of quench hardening of the surface. That might seem strange, but it was true.

Further speakers mentioned that they used not water but a coolant which acted as a mild lubricant. Another commentator said he was surprised to hear Mr. Lawrie's remarks on the use of water as a dust suppressor. He knew of several large foundries in America where extensive use was made of water in this way, where it was applied in conjunction with a wetting agent.

MR. LAWRIE, dealing with the points raised, thought members should be clear as to what was meant when they referred to "dust." At that moment he meant particles of matter of respirable size which floated in the air. Ordinary water did not easily wet them and even particles which were wet carried a water film which was so thin that it quickly evaporated. He had never seen a method of spraying water on to an air-borne dust cloud which gave satisfactory dust control. If there *was* one working which was satisfactory he would be glad to know where, so that he might see it.

Of course, in certain cases dust could be suppressed by other wet methods. The material could be wet at the start and kept wet throughout a process, then there would be no dust, but his immediate concern was with the suppression of air-borne dust after it had been formed.

Another point was that if water was sprayed in a foundry the humidity would be altered and one might thereby reduce the rate at which sand dried and so prevent some dust. However, this, of course, would not control dust which was already airborne.

Suppression at the Source

MR. SMITH said there was a cutting-off machine on the market which used a water spray on the point of contact between the wheel and the work, and it had also got a water veil immediately behind the work, which stopped the spark production. There was no cutting machine which cut under water and so could not produce dust, but the use of water, if it could be properly applied, was definitely of advantage. Whether it could be applied in the foundry industry, where there were large castings to be handled, was another matter, but there were plenty of machines available which incorporated moving heads and having water sprays fitted.

Mr. Lawrie repeated that he had done no work on cutting-off machines. If the job was generally done under water then the dust was being suppressed at its source, but he had done no work on this aspect himself and none had been done as far as he knew. Some work had been done on the wheel cutting of stone. A first series of dust counts were taken with the stone dry and a second series with it wet. He understood that the "wet" series had given a higher dust count in the small-size range but the work had never been checked as far as he knew, and it had been done many years previous. In the present state of knowledge, he would want to see an experimental process filmed as well as having a dust count. Without that, the way the dust arose could not be observed.

THE CHAIRMAN said his foundry had tried to use a cutting-off machine to cut off fireclay runner pots to the right length. The procured a machine

but forgot to buy a dust extractor, and, of course, it was impossible to use the machine until one was provided.

A problem with the cutting-off wheel was created where one had to pass through the article. It was not just a matter of creating dust at the periphery. One wanted a system which would give freedom to move the wheel through, and if one could pick up the dust from the cutting point that would be a step in the right direction.

Types of Dust

During the showing of the film he had asked Mr. Lawrie if there was any difference in the dust from an iron casting or from a steel casting. Much dust was shown coming from pig-iron, rather more than from an iron casting. Mr. Lawrie had said there might be some reason why the dust was different from the two metals.

MR. LAWRIE said he thought there might be more dust from grey iron. A lot of it, he thought, came from the graphite. While the work illustrated was done on pig-iron, founders should not forget that the rust, if the pig-iron was rusty, to commence was very quickly penetrated, and after the rust was gone the rest of the work was done on grey iron.

Referring to the dust produced when grinding steel castings, MR. J. F. B. JACKSON said that the B.S.C.R.A. had examined this and had found that it consisted of about equal parts of grinding wheel dust and iron oxide. The dust was shown to contain less than 1 per cent. of free silica.

A question was asked as to whether there was any ideal work rest. In the picture there were several designs shown and, replying to this, MR. WHITE said both associations had agreed that any kind of slotted or perforated rest was far better from a dust-control point of view than a solid rest. There were some prejudices against opening the surface of the rest, but he thought these might arise from experience of bad designs.

When the same questioner remarked that it seemed no effort had been made to standardize the work rest, for some had slots and some holes, MR. ARMITAGE said their first work involved drilled holes in the work-rest. Preliminary films were shown to the various committees interested, and it was found that some liked drilled holes and others preferred slots. Personally, he did not think there was any basic advantage either way; it was a question of individual preference.

MR. WHITE agreed adjustment of rest movement was the machine maker's job to incorporate, and the position of grinding would not materially alter the efficiency of the external extraction system.

MR. ARMITAGE said that they had not actually ground very large castings on the stand grinder, but, as previously mentioned, the design of the work rest incorporated in the machines shown in the film allowed for movement both up and down.

Wet Collection

MR. JONES referred to the suppression of dust by wet methods, and said Mr. Lawrie had reported he had not seen a method which was effective in the foundry. Did that remark still hold good for the collection system, properly referred to as "dealing with dust"?

MR. LAWRIE said he was not talking about filtering systems or wet processes. He had been speaking of the control of air-borne dust.

The CHAIRMAN recalled that Mr. Armitage had mentioned that his organization would shortly be investigating dust-collection systems, and thought there would be many criticisms of present apparatus. Collection systems would have to be much more elaborate than some had been in the past.

Extraction of Warmed Air

MR. WILLIAMS said in winter one of the problems attendant upon dust extraction was the loss of warmed air from the foundry. If large volumes of air were used, did Mr. Lawrie think it might be permissible for that air to be returned to the foundry after it had been passed through a filter?

MR. LAWRIE doubted whether large air volumes were necessarily more efficient than small volumes, and said the question of the advisability of recirculation was of course a medical one.

To a questioner who asked if at any time in the near future there might be developed an efficient dust exhaust for a portable grinding machine, MR. LAWRIE replied that research work was in hand on a portable grinding head.

Work Rests

MR. STURROCK asked if Mr. White and Mr. Armitage had experimented with work rests at different heights. It appeared as if the work rests were always at a fixed height.

MR. ARMITAGE said that, in the film, tests were shown in which the work itself had been moved vertically in relation to the wheel, in order to give extremes of operating conditions. In practice, clearly there would be an optimum adjustment of work-rest height dependent on the size and nature of the work being ground. Most grinding machines were designed to allow for such adjustment of the work rest, an operation that did not interfere with the principles of dust control put forward as a result of their investigations.

MR. WHITE pointed out that if the work rest was moved either up or down, the best position for grinding was just below the centre-line of the wheel, and the dust would be controlled by the external extraction system.

MR. STURROCK said his point was that the position of the work rest did depend on the size of the casting being ground. If they were grinding a small piece, then the work rest should be high, while if it was a large piece, the work rest should be much below the centre line.

Doubtful Value of Dust Counts

THE CHAIRMAN said there was no statistical information in the B.S.C.R.A. film showing the

efficiency of the dust extraction and asked Mr. Armitage if there was any information available on that.

MR. ARMITAGE referred in the first instance to the view expressed by Mr. Lawrie in the Paper that had just been presented to the meeting, that attempts to determine airborne-dust concentrations quantitatively had shown inconsistencies. Throughout the work performed in the B.S.C.R.A. dust-research station, clearly the question of determining the degree of dustiness had been continuously to the forefront, but as far as findings based on dust counts as such were concerned the Association had come across the very same inconsistencies referred to by Mr. Lawrie. Due to these inconsistencies, for which no satisfactory explanation had yet been forthcoming, reliance was placed more upon the illumination technique developed by Mr. Lawrie for the purpose of observing *improvements* in dust concentrations.

It would be realized that with any grinding machine of orthodox or of improved design which was extracting air from the working atmosphere at a rate of the order of 500 cub. ft. per. min. this extraction alone would clearly have a bearing upon the build-up of dust concentration in a shop atmosphere under varying conditions of dust control in the unit itself. Assessment of the efficiency of a dust-control unit by dust-sampling methods was thus shown to be complex, and while figures relating to dust counts were available, if anyone was particularly interested in having them, it was his Association's view that a greater validity was to be attached to the interpretation of observations made by Mr. Lawrie's illumination technique than by thermal precipitator "spot" checks, however ingenious the sampling plan might be.

Work was being continued by his Association to remove, if this were practicable, the inconsistencies arising from dust sampling, in an attempt to make this technique a more useful and reliable tool to be used alongside other methods of assessment, such as had been described.

Interpretation of Figures

THE CHAIRMAN asked if there were any figures which the B.S.C.R.A. would be prepared to make available on dust counts?

MR. ARMITAGE said that while no doubt figures could be given along the lines suggested, he, personally, would prefer, until the inconsistencies had been given explanation, to speak in terms of trends rather than in terms of so many particles per ml. In fact, he would prefer to believe the visual observations recorded in the film.

MR. LAWRIE added to Mr. Armitage's remarks a very general statement, in which he said that he himself had first thrown doubt on dust-count results in 1948, because he had felt that the standard dust count did not by any means tell the whole story. This was why he had developed the photographic methods which had been used on the recent work. There had been very wide variations in the dust count and he was sure that unless research workers could see the source from which the dust was coming they were in no position to interpret the wide fluctuations obtained. As Mr. Armitage had shown there were dust counts between 200,000 and 1,000 in the dust from the wheel. Nevertheless, he himself had used the thermal precipitator (which was the standard instrument) in conjunction with his film, because he though it at least helpful to record what was happening. This work, in general, confirmed the observation that in places where dust could not be seen little could be counted.

MR. COLIN CRESTY asked several questions relating to dust counts:—(*a*) Were the workers yet in a position to set a "dust standard"; (*b*) if so, what maximum figure would the Authors propose; (*c*) were the two types of apparatus shown in the films aiming at, and could they hope to attain, the same standard; (*d*) what steps would have to be taken to show that observed dust was, in fact, dangerous dust; and (*e*) had dust counts been taken on the B.S.C.R.A. modified apparatus? He understood that some sort of standard had been adopted in the mining industry.

Validity of Smoke Tests

There was one point about which he did not feel too happy, namely, as to the extent to which founders could rely on demonstrations using titanium tetrachloride fumes or wood smoke when they were actually concerned with sand—the "smokes" from these materials seemed to be so different physically from sandy dust.

MR. ARMITAGE said permissible standards of dustiness were a matter more for Mr. Lawrie to comment upon than himself, but with regard to dust counts when grinding steel castings, these could certainly be made available. He emphasized, however, that contamination in the operator's breathing zone when grinding steel castings normally bore direct relationship to the general atmosphere of the shop. The amount of build-up of dust in the general atmosphere was of course dependent on the efficiency of the extraction system on the grinding machine, and from the film that had just been shown it would be appreciated that with the B.S.C.R.A. system, this build-up was considerably reduced. Mr. Michie who had been working continuously on the problems associated with dust-sampling methods, was present and could perhaps better express the B.S.C.R.A. views.

Use of Indicators

On the question of the use of smoke or fume, whether generated from grinding wood or with titanium tetrachloride, this was relied upon essentially as an indication of air movement. It had, for instance, been used to show that the air movement was away from the operator and towards the machine. Mr. White had used it for the same purpose in the B.C.I.R.A. work.

As a matter of interest, the use of smoke from the grinding of wood was a technique for which they had to thank the Chairman's company, the English Steel Corporation, who had done a lot of valuable work in this field, and had proposed that the smoke pattern from wood grinding was similar to that of the fine dust stream arising from the grinding of steel castings. The value of smoke, as an indicator of air flow and in preliminary work

upon dust-suppression problems in general, was accepted both by the B.S.C.R.A., and, indeed, by Mr. Lawrie. The Association would continue to use smoke for this purpose, although of course relying in all cases upon the grinding of actual castings under production conditions for the ultimate assessment of dust-control efficiency.

MR. LAWRIE agreed that he was not very happy at the thought of using smoke as a substitute for dust. The smoke of wood grinding had been used as a rough indication, but final tests had all been done on the material for which the system had been designed. Until they knew more about dust and its behaviour that was the only safe thing to do, even though it became increasingly difficult to photograph dust as the experimental system became more and more efficient.

As far as standards were concerned, research workers in the mining industry had established rough standards. It was known that dust-sampling instruments differed in efficiency of collection. The mining standard he thought was not so much a scientific standard as a statement that workers in this field had in general found it within the realms of practicability to bring the dust count in a mine to that certain level.

What he had tried to do in the present work was to determine the differences which were caused in the dust cloud by the grinding process, and they had found, so far as the dust counts were concerned, that there was no increase in dust concentration whether the man was grinding or not. On one day it could be 2,000 and the next 200. What he would be interested in would be information which told him how much dust the machine was making and what percentage was leaking into the atmosphere.

Radioactive Tracer Dust

A MEMBER then asked if it would be possible to make the dust radioactive and check it in that way, and the chairman called upon MR. G. M. MICHIE to reply.

Commenting on this suggestion, MR. MICHIE said that there was little doubt that it would be possible to make the dust radioactive and consideration had in fact been given to this possibility. There were, however, major difficulties in the way of applying the technique, particularly in relation to the precautions which would have to be taken to prevent the inhalation of radioactive material by personnel.

Mr. Michie then went on to amplify Mr. Armitage's remarks concerning the dust-count figures which had been obtained when grinding steel castings using the B.S.C.R.A. system. Mr. Armitage had referred to the fact that in the operator's breathing zone, thermal-precipitator dust counts gave figures which were more or less of the same order as those obtained when sampling the general atmosphere of the enclosure or room in which the tests were being carried out. On the basis of the results illustrated in the film, that was in fact only what was to be expected, since the lighting technique had clearly indicated that the air streams in the operator's breathing zones were such that air was being drawn from behind his head, downwards and towards the machine. In other words, the dust level in the operator's breathing zone was controlled by the level built up in the enclosure in which the tests were being conducted, and what this might be at any particular time would depend (*a*), upon the rate at which the extraction system was effective in changing the air of the enclosure (*b*) upon the length of time during which the tests had been in progress, and (*c*) upon the efficiency of the system in preventing the emission of dust from any part which might give rise to contamination of the general atmosphere. During the course of any particular experiment, there was almost certain to be some build-up in the dust level in the general atmosphere of the enclosure, and this was naturally not to be confused with any fall-off in the local efficiency of the exhaust system. For this reason, dust-count figures had not been quoted with their film, and further work was necessary before it would be possible to assess quantitatively the efficiency of the dust control in terms of dust-count figures.

Vote of Thanks

DR. DADSWELL, closing the discussion, thanked the directors of both research associations and the Authors of the papers for attending and explaining the solutions which they had put forward. The solutions proposed were very interesting and personally he could see advantages and disadvantages in both from the practical angle. Perhaps, the solutions were not far removed one from the other, one needed an external agency and the other strove to use the power of the entrained air of the wheel. As Mr. Lawrie had suggested, the latter system might be worth considering in all fields of dust extraction from rotating parts.

He was sure he was expressing the views of the meetings when he said they admired the original approach that had been made to the problem by both associations. Problems could only be solved by thinking out the causes and then taking steps, one at a time, to remove them.

T.U.C. Chairman's Warning

A prophecy that "we are all going to be in a hell of a mess" unless there was increased productivity in the engineering industry was made last week by Mr. Jack Tanner, chairman of the Trades Union Congress and president of the Amalgamated Engineering Union, speaking at the annual meeting of the T.U.C.s North Western Advisory Council.

Mr. Tanner was dealing with a question on the outcome of the present negotiations for a 15 per cent. wage increase in the industry. "We have got to increase productivity whether we get anything out of these negotiations or not," he said.

It was a matter which affected all workers, as the country depended on exports, and these came directly or indirectly from the engineering industry. Germany, America, and Japan were all competing for our markets. The employers, he went on, had already given one instance where an order for 200 locomotives had been lost as their prices had been too high.

Yorkshire Founders' New Premises

Re-building of F. W. Birkett's Non-ferrous Shops

A new factory recently built by F. W. Birkett & Sons Limited, power transmission engineers, comprises a single-storey brick and steel building erected on a 3-acre site and is entirely self-contained. Finished products are constructed from basic raw materials entirely within the factory. The new foundry, which is partly mechanized, has a floor space of approximately 7,000 sq. ft., and has also been equipped with a mechanized sand-conditioning plant, with the sand being delivered to the moulding machines by conveyor belts. Present production is 2 to 2½ tons per day.

The foundry is divided into two sections, one having approximately 14 hand moulders, engaged on loose-pattern work for non-ferrous castings up to 10 cwts. A general view is shown in Fig. 1. Moulders for the smaller work operate at bench level and larger moulds are made on the floor, but after completion all moulds are placed on the appropriate casting runway where they are poured from travelling ladles. Each moulder has available a supply of compressed air for blowing out his moulds and for the application of parting media or driers.

Mechanized Section

The other half of the foundry consists of five pneumatic moulding machines, both straight-lift and turnover types, with sand being supplied by overhead belt conveyor to hoppers over each machine. After closing, the moulds are put on to the casting conveyor, and cast in turn from the travelling ladles. After casting, the boxes are then transferred to the vibratory knock-out. After knocking out, the sand is automatically reconditioned by means of two mixers, and then passed on to the conveyor belt for re-distribution to the machine moulders and hand moulders. Empty boxes are placed on a gravity conveyor for return to the moulding machines. The castings are then cleaned and dressed in the fettling shops, where a variety of machines are installed for separating the casting from runners and risers. All castings are then cleaned in a shot-blast plant prior to being taken into the casting store ready for machining.

Melting is carried out by means of four oil-fired furnaces, and careful pyrometric control is maintained of melting temperatures. As extensive use

FIG. 1.—*View of the New Foundry of F. W. Birkett & Sons, Limited, showing the Roller Conveyor Circuit and Pneumatic Moulding Machines. In the Foreground is the Hand-moulding Section.*

Yorkshire Founders' New Premises

of cores is made, especially with machine moulded jobs, a modern coreshop has been built. Here, large quantities of cores are made both by hand and by extrusion-type core machines and modern coreblowers. The drying of cores is done in two gas-fired ovens.

Machine Shop and other Processing

Two machine shops are equipped with precision automatic, semi-automatic and turret lathes, together with the usual milling, drilling, shaping machines, etc. Highly-finished products made to accurate limits are thereby ensured, and this, coupled with a high output rate, ensures low costs which can be directly passed on to customers. From the machine shop, the finished products are inspected before being taken to the despatch department.

The welfare of employees was carefully considered when the new factory was designed, and adequate washing and canteen facilities have been made available. Also, the whole factory was designed to give the maximum natural light and airiness, which is so essential for pleasant and efficient working. Another point, so far as employee welfare is concerned, is that they all, from the lowest grade of unskilled labourer to the highest skilled man, share a monthly output bonus scheme. This, it is claimed, ensures that materials are produced in the minimum time without the snag that often appertains with piece-rate schemes, *i.e.*, where men working against the clock are inclined to turn out inferior products.

Atomic Energy for Industry

Confidence that nuclear energy would replace coal as the main source of Britain's industrial power was expressed by Sir John Cockroft, director of the atomic energy research establishment at Harwell, when he opened new physics laboratories at the University College of North Staffordshire at Keele last week.

If the development of our industrial life was to go on as it had been doing for the past 30 years we should shortly be in serious difficulties over obtaining sufficient coal to meet increasing needs, said Sir John. However, it now looked as if nuclear fission through reactors was likely to fulfil our future industrial needs.

IT IS ANNOUNCED THAT the trading profits of T. M. Birkett & Sons, Limited, were £143,054 for the year to July 31, compared with £139,825 for the previous year. Net profit is £51,436 (£48,420) after tax of £66,392 (£66,944). The final dividend of 20 per cent. maintains the year's total at 25 per cent.

DAMAGES OF £65 WERE AWARDED to a former crane slinger employed by Davy & United Engineering Company, Limited, Sheffield, at Sheffield County Court last week when he claimed £150 for injuries caused, he alleged, through the firm's negligence. The pursuer, Robert Bagshaw, claimed that he had sustained a permanent injury to a ligament in his back through falling over a bolt projecting 5 in. above the floor in the machine shop.

Publications Received

"Releasil" Silicone Release Agents and their use in Metal Casting Processes. Issued as Technical Data Sheet E3-3 by Midland Silicones, Limited, 19, Upper Brook Street, London, W.1.

This brochure describes the application of a proprietary branch of silicone release agents to the shell moulding and allied processes. It is available to readers on writing to the above address.

Statistical Year Book, covering Aluminium, Lead, Copper, Zinc, Tin, Cadmium, Mercury and Silver. [In German.] Published by Metallgesellschaft A.G., 4 Reuterweg, Frankfurt am Main, Germany.

This important publication describes in some 250 pages the global and national output of the metals set out in the table. A slip announces that an English edition is to appear in a few weeks time, when a fuller review will be printed.

Spheroidal Cast Iron. Published by the Mond Nickel Company, Sunderland House, Curzon Street, London, W.1.

Whilst our readers are familiar with the tensile properties of spheroidal-graphite cast iron, they are probably not so well aware of its attributes in the direction of other engineering properties. It is here where the book is of major value as it deals with such features as its magnetic, heat and corrosion resistance, machinability, castability, and many other properties. There are included some excellent pictures of examples of this type of cast iron taken from European foundries. The brochure is available to our readers on writing to Sunderland House.

Materials Handling Equipment and Methods in the U.S.A. Published by the Organization for European Economic Co-operation and obtainable through H.M. Stationery Office, Kingsway, London, W.C.2. Price 9s.

This is the report of a mission consisting of representatives of Austria, Belgium, France, Germany, Greece, Italy, Netherlands, Portugal, Sweden and the United Kingdom to the United States. To the reviewer it is a complete mystery how such diverse nationalities could combine to produce a report of this character and the credit for its undoubted usefulness must go to the hosts. Because of this, it loses much of the interest to be associated with the Anglo-American reports, where comparisons were possible between the methods and many other aspects existing in the two countries. As a result, this is a plain account of the methods practised in the States. There are ten chapters and six appendices contained in the publication's 170 pages and the special attention of readers is recommended to a Zipper conveyor in Chapter II, as a novelty. A close study of the balance, especially the sections on roller conveyors, and monorails will be useful, but Chapter X "Conclusions and Recommendations" presents nothing new to readers. Such matters as a national and international co-operation, have works visits, film shows and the like, been effectively undertaken by the foundry industry for decades, and requires no additional organization. As a text book on mechanical handling in all its aspects, the book is very good value for money.

STEEL INGOT PRODUCTION in Canada amounted to 321,332 tons in September, compared with 331,678 tons in August.

I.B.F. Australian Members

Following the amalgamation of the Institute of Australian Foundrymen Victorian Division with the Institute of British Foundrymen, a number of members of the former body now become members of the Institute of British Foundrymen. Their individual integration with the Institute membership was ratified at a recent meeting of the Council. The list of I.B.F. members thus becomes augmented as follows:—

As Honorary Members.

F. Moss, the Steel Company of Australia; A. M. Tennant, chief metallurgist, Vickers-Ruwolt Pty., Limited, Dr. S. Crawcour, Armadale, Melbourne; G. D. Thompson, head of the foundry school, Melbourne Technical College.

As Subscribing-firm Members.

Holden & Lewis, ironfounders, Yarraville, W.13, Melbourne (representative, A. L. Flew); W. O. & B. Adams, Carlton, N.3, Melbourne (representative, W. Adams); Broken Hill Proprietary Company, Melbourne, C.1; Grimwade Castings, Port Melbourne, S.C.7 (representative, R. Cox); Graham Campbell Ferrum Pty. Limited, West Footscray, W.12, Melbourne (representative, G. S. Graham); General Motors-Holden's, Limited, Melbourne, C.1 (representative, E. S. Davies); Horwood Bagshaw, Limited, Victoria Street, Mile End, South Australia (representative, A. E. Smith); International Harvester Company of Australia, Limited, P.O. Box 223, Geelong, Victoria (representative T. J. Ingram); Jaques Bros., engineers and ironfounders, Richmond, E.1, Melbourne; Kelly & Lewis, Limited, Springvale, Victoria (representative, R. MacFarlane); Metters K.F.B., Footscray,W.11, Melbourne; Owens Bros., ironfounders, Warrnambool, Victoria; Parkinson Stove Company, ironfounders, Footscray, W.11, Melbourne; Payne & Sons, ironfounders, Carlton, N.3, Melbourne; May & Millar Pty., Limited, ironfounders and engineers, Horsham, Victoria; McPherson's, Limited, Melbourne, C.1 (representative, A. G. Palmer); Vickers-Ruwolt Pty., Limited, Richmond, E.1, Melbourne (representative, A. Tennant); Russell Manufacturing Company, Richmond, E.1, Melbourne (representative, W. Sylvester); Steel Castings (Pty.), Limited, Port Melbourne, S.C.7 (representative, N. Hosking); Thompson's (Castlemaine), Limited, engineers and founders, Melbourne, C.1; Walkers, Limited, engineers and founders, Maryborough, Queensland; Zinc Corporation Limited, founders, Melbourne, C.1; Goninan & Company, Broadmeadow, Newcastle, N.S.W.

As Members.

K. H. Andrews, metallurgist, South Caulfield, S.E.8, Melbourne; W. L. Allen, A.R.S.M., managing director, Allen Foundry Company, Footscray, W.11, Melbourne; H. Blakeley, proprietor, Bronzite Foundry, Glen Iris, S.E.6, Melbourne; E. R. Bartlett, foundry proprietor, North Fitzroy, N.7, Melbourne: W. R. Brown, foreman moulder, Camberwell, E.6, Melbourne; C. E. Burnell, foundry proprietor, West Melbourne, C.3; L. A. Barrow, foundry manager, East Malvern, S.E.5, Melbourne; L. Cumings, foundry manager, Richardson Foundries, Yarraville, W.13, Melbourne; R. L. Cox, managing director, Mason & Cox, Yarraville, W.13, Melbourne; K. G. Chaplin, foundry manager, Sunshine, W.20, Melbourne; R. M. Campbell, foundry foreman, Moonee Ponds. W.4, Melbourne; R. A. Cheers, foundry director, Coburg, N.10, Melbourne; A. Campbell, foundry director, Canterbury, E.7, Melbourne; H. Clements, foundry director, Brighton East, S.6, Melbourne; L. M. Davies, foundry foreman, Warrandyte, Victoria; David Duncan, foundry proprietor, South Melbourne, S.C.5; N. Duncan, foundry manager, South Melbourne, S.C.5; A. F. Dunbar, A.I.M., B.SC., head of metallurgy school, Melbourne Technical College; C. R. Day, foundry manager, Sunshine, W.20, Melbourne; R. T. W. Dawson, director and foundry supervisor, West Brunswick, N.12, Melbourne; E. S. Davies, foundry manager, North Balwyn, E.9, Melbourne; A. M. Dawson, foreman patternmaker, Parkville, N.2, Melbourne; J. L. Doeg, works manager, East Malvern, S.E.5, Melbourne; R. C. Davidson, foundry foreman, Middle Park, S.C.6, Melbourne; J. D. Ebeling, A.M.I.E. (AUST.), director, C. Ebeling & Sons, Yarraville, W.13, Melbourne; C. H. Fraser, works manager, Preston, N.18, Melbourne; L. J. Forbes, works manager, Essendon, W.5, Melbourne; S. E. Firman, foundry director, Brydon & Nichols, Carlton, N.3, Melbourne; R. Grant, foundry director, Hawthorn, E.2, Melbourne; H. G. Harvey, foundry director, Box Hill, E.11, Melbourne; L. B. Hanneysee, foundry foreman, Rosanna, Victoria; J. J. Harcourt, foundry manager, Melbourne, C.1; W. Hanks, foundry director, Coburg, N.13, Melbourne; J. T. John, managing director, M. B. John Pty., Limited, Ballarat, Victoria; P. M. Jurss, foundry director, Moonee Ponds, W.4, Melbourne; W. Kneen, foundry manager, Yarraville, W.13, Melbourne; H. G. Lacey, foundry director, Sale, Victoria; R. T. Leslie, foundry manager, Gatic Engineering Company, Brunswick, N.10, Melbourne; W. Moulding, foundry manager, Hawthorn, E.2, Melbourne; A. R. Mungard, foundry foreman, East Brunswick, N.11, Melbourne; F. R. Morgan, foundry manager, Mason & Cox, Yarraville, W.13, Melbourne; J. A. Preston, foundry metallurgist, Heildeberg, N.22, Melbourne; A. H. Penhall, master patternmaker, Port Melbourne, S.C.8, Melbourne; A. G. Palmer, foundry manager, North Essendon, W.6, Melbourne; J. P. Mullins, foundry manager, Yarraville, W.13, Melbourne; R. McDermott, foundry manager, Coburg, N.13, Melbourne; G. D. Nash (Chartered Engineer), manager, Box Hill, E.12, Melbourne; K. R. Oakes, foundry chemist, Brighton, S.5, Melbourne; K. Priestley, foundry manager, South Yarra, S.E.1, Melbourne; N. F. Stevenson, design engineer, Sandringham, S.8, Melbourne; A. Strudwicke, foreman die-caster, East Brighton, S.6, Melbourne; P. D. Sinclair, foundry manager, Nixon's Foundry, North Melbourne, N.1; J. Sands Hill, director, South Melbourne, S.C.5; W. H. Seales, foundry manager, Footscray, W.11, Melbourne; H. F. Stokes, managing director, Stokes Foundries, Brunswick, N.10, Melbourne; A. W. Silvestor, chief metallurgist, Kew, E.4, Melbourne; E. J. Tippett, managing director, Ronaldson Bros. & Tippett, Ballarat, Victoria; G. F. Tucker, managing director, United Engineering Company, Footscray, W.11, Melbourne; A. H. Taylor, foundry supervisor, Pascoe Vale Road, Broadmeadows, Victoria; Professor H. K. Worner, Professor of Metallurgy, Melbourne University; F. C. Wilson, chief metallurgist, Herne Hill, Geelong, Victoria.

As Associate Members.

R. L. Ashton, assistant foundry foreman, Coburg, N.13, Melbourne; K. M. Armstrong, foundry metallurgist, Middle Brighton, S.5, Melbourne; L. Allison, foundry metallurgist, East Preston, N.18, Melbourne; K. Alexander, foundry metallurgist, West Footscray, W.12, Melbourne; G. Adams, assistant supervisor,

I.B.F. Australian Members

W.O. & B. Adams, Carlton, N.3, Melbourne; A. A. Bourchier, foundry foreman, Pascoe Vale, W.8, Melbourne, A. W. Bell, foreman patternmaker, East Oakleigh, S.E.12, Melbourne; J. Biles, furnace attendant, Reservoir, N.19, Melbourne; R. G. Button, foreman moulder, Brunswick, N.10, Melbourne; R. I. Belt, moulder, Sunshine, W.20, Melbourne; J. E. Bartils, foreman moulder, North Essendon, W.6, Melbourne; W. J. Black, foreman moulder, West Geelong, Victoria; J. S. Blake, moulder, Springvale, Victoria; H. F. Cother, foundry engineer, East Malvern, S.E.5, Melbourne: A. E. Clark, director, D. Duncan Foundries, South Melbourne, S.C.5; W. L. Crofts, foundry metallurgist, Altona, Melbourne; R. H. Dyke, B.SC., foundry research officer, Balwyn, E.8, Melbourne; H. L. Davies, foundry engineer, West Footscray, W.12, Melbourne; J. D. Dickinson, patternmaker, Fairfield, N.20, Melbourne; N. A. Donald, assistant foreman moulder, Middle Brighton, S.5, Melbourne; J. B.Dawson, foundry manager, West Brunswick, N.12, Melbourne; L. F. Dawson, foundry manager, C.B.D. Piston Company, North Melbourne, N.1; K. E. Deans, foundry chemist, Newtown, Geelong, Victoria; I. W. Duncan, moulder, Kew, E.4, Melbourne; A. E. Essex, patternmaker, Footscray, W.11, Melbourne; F. C. Eager, foundry metallurgist, McPherson's Limited, Test & Research Dept., Melbourne, C.1; S. W. Edis, foreman moulder, West Footscray, W.12, Melbourne; E. J. Eldridge, moulder, Clifton Hill, N.8, Melbourne; R. I. George, foundry metallurgist, East Kew, E.5, Melbourne; G. Jacobs, assistant foundry foreman, Abbotsford, N.9, Melbourne; N. E. Jones, director, B.H.P., C.1, Melbourne; H. S. James, foreman coremaker, Geelong, Victoria; J. C. Kellett, foundry foreman, Ajax Pump Foundry, Kyneton, Victoria; W. C. Kempson, moulder foreman, Horsham, Victoria; H. J. Kerrison, foundry metallurgist, South Yarra, S.E.1, Melbourne; A. R. Knight, foundry engineer, Camberwell, E.6, Melbourne; G. D. Kay, foundry chemist, East Kew, E.5, Melbourne; W. Leslie, moulder, East Coburg, N.13, Melbourne; J. Morley, foundry foreman, Coburg, N.18, Melbourne; C. Mann, foundry foreman, Kew, E.4, Melbourne; J. B. O'Hair, design engineer, Mentone, S.11, Melbourne; H. Parkin, foreman patternmaker, Hawthorn, E.2, Melbourne; A. C. Parkin, foreman patternmaker, Yarraville, W.13, Melbourne; G. McDonald, foundry foreman, North Box Hill, E.12, Melbourne; A. McMahon, foundry foreman, Ascot Vale, W.2, Melbourne; T. MacKinlay, moulder, Pascoe Vale South, Melbourne; I. W. Parfett, moulder, Albert Park, S.C.6, Melbourne; J. Pearce, foundry metallurgist, Balwyn, E.8, Melbourne; S. T. Quass, foundry metallurgist, Aeronautical Research Laboratories, Department of Supply, C.1, Melbourne; I. A. Robinson, foreman moulder, Surrey Hills, E.10, Melbourne; J. G. Ritchie, B.MET.E., foundry metallurgist, East St. Kilda, S.2, Melbourne; A. J. Renouf, foreman moulder, Sunshine, W.20, Melbourne; J. S. Russell, engineer and patternmaker, East Preston, N.18, Melbourne; E. J. Smith, moulder, Brunswick, N.10, Melbourne; H. Spring, foreman foundryman, Westmead, Newcastle, N.S.W.; A. Stevenson, moulder, Kew, E.4, Melbourne; C. J. Smith, foundry instructor, Yarraville, W.13, Melbourne; W. Stanway, foreman moulder, Burnley, E.1, Melbourne; T. Stevenson, moulder, St. Kilda, S.2, Melbourne; V. A. Saveneh, foundry engineer, Mont Albert, Melbourne; A. Stewart, foreman moulder, East Geelong, Victoria; John T. Smith, foreman furnaceman, East Malvern, S.E.5, Melbourne; L. W. Stewart, moulder and assistant foreman, Footscray, W.11, Melbourne; J. A. Taylor, foundry instructor, Yarraville, W.13, Melbourne; P. Triggs, Assistant foundry foreman, Clifton Hill, N.8, Melbourne; N. Tranter, foundry foreman, Brunswick West, N.12, Melbourne; A. W. Ulmer, foundry consultant, Kingsville, W.13, Melbourne; C. C. Vorrath, foundry supervisor, Polson Motor Parts, Braybrook, W.19, Melbourne; W. Walsh, manager, Meehanite, Australia, Limited, West Brunswick, N.12, Melbourne; R. B. Whitelaw, assistant metallurgist, Moonee Ponds, W.4, Melbourne; O. L. White, foundry metallurgist, Melbourne, C.1; L. B. White, foundry foreman, Yarraville, W.13, Melbourne; A. P. Yallop, foreman brassfounder, Parkville, N.2, Melbourne.

As Associates

E. F. Fitzgerald, trainee metallurigst, Kew, E.4, Melbourne; R. S. Hopkins, assistant sand chemist, Malvern, S.E.4, Melbourne; B. J. Millett, patternmaker, West Footscray, W.12, Melbourne; A. F. McKenzie, moulder, East Kew, E.4, Melbourne.

The following members of the Institute of Australian Foundrymen were already members of the Institute of British Foundrymen:—

Honorary members: V. C. Faulkner (already honorary member I.B.F.) and G. D. Thompson; *as subscribing-firm member:* T. Main & Sons (representative, W. T. Main); *as members:* G. P. Benson; P. N. Davies; W. A. Gibson; I. R. John; H. A. Stephens, B.SC., and *as associate:* M. G. Hazelwood.

I.B.F. Student's Grant

During the past four years, the Institute of British Foundrymen as part of a scheme to widen its educational work has, with the generous co-operation of the Joint Iron Council, made an award which enabled a deserving young foundryman, whose aspirations would otherwise have failed to materialize, to bear the cost of a course at the National Foundry College. The Joint Iron Council has now kindly decided to accept direct responsibility for granting this award which will, however, continue to be made through the medium of the Institute of British Foundrymen, who will judge the applications.

The Institute is, therefore, prepared to receive applications for the 1954 award from young foundrymen or students preparing for work within the foundry industry. In general, the award will be confined to applicants under 30 years of age, and it is primarily intended for those who wish to take a course at the National Foundry College, though in very exceptional circumstances consideration will be given to rendering assistance for some other form of study. Applicants should be of the educational standard necessary to secure admission to the College and applications from candidates should contain the following information:—

(*a*) Name, address and age.

(*b*) Name and address of present employer.

(*c*) A chronological account of previous experience.

(*d*) A chronological account of educational qualifications and technical studies.

(*e*) Full particulars of any investigational work carried out.

It will be the endeavour of the Institute to secure the co-operation of the selected candidate's employers in ensuring his continuity of employment. Applications should be addressed to the secretary of the Institute, Mr. T. Makemson, M.B.E., St. John Street Chambers, Deansgate, Manchester 3, and submitted not later than March 31, 1954.

Simplified Moulding

By "Jacques"

Discussion on design between drawing office and foundry is often to mutual advantage. In many of the large combines such liaison has developed into a full-time job, with excellent results in the direction of smoothing out difficulties and simplifying moulding and coremaking problems. With the smaller, semi-jobbing firms, close executive contact is not always easy, and beyond the occasional call round and inspection of results, established procedure is usually taken for granted.

Many of the smaller engineering concerns who buy castings, leave foundry routine to the respective departments. Their designs, in the main, follow a traditional practice, though not always contributing to a simplified method of moulding, probably because of small quantities required or uncertain total requirements. Loose, split, or solid patterns are delivered to the moulding shop in a style that usually requires skilled and experienced moulding routine—often a slow process—and in many cases following a design causing more than the average number of rejects. Usually, a high rate of foundry wasters gets an on-the-job inquest, with advantages all round, for sometimes a modification to the pattern or design will take out a major snag and speed up the job to an economic standard and reduce the wasters to a reasonable figure.

Examples of Co-operation

Two examples, from many, are chosen to illustrate the advantage of co-operation between the design department and the moulding shop. The descriptive matter is brief, sketches being largely self-explanatory, but it is thought the report may stimulate ideas in regard to other lines of foundry and engineering products.

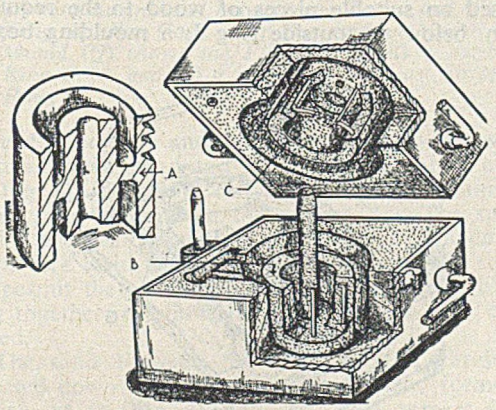


FIG. 1.—*(A) V-belt Pulley of Orthodox Design and the Method of Green-sand Moulding Employed. The Ring "Cod" (B) and Upper Ring (C) both need reinforcement.*

Fig. 1, at A, shows one of several sizes of pulley castings, of traditional pulley-handbook design, for providing a machined groove, V-belt drive. The job was hand moulded and poured "green"—a slow job with the attendant hazards, as shown, in the moulding. The bottom inner ring "cod" B, had to be suitably reinforced to withstand metal pressure when run on the outside; close venting was also necessary to ensure quiet filling; burst "cods" were not uncommon, although top direct inlets to rim and boss minimized this risk, the top-half inner ring C had also to be suitably gaggered to ensure

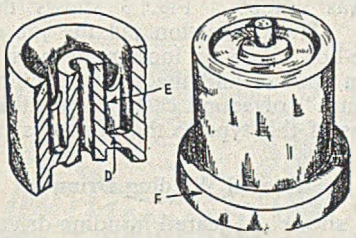


FIG. 2.—*New Design of V-belt Pulley, with the Web (D) located towards One End and Brackets (E) arranged for support purposes.*

a clean lift. With the standard of moulding skill then available, the job was not exactly a "flyer" and results left much to be desired.

An enquiry directed to the draughtsman as to why this range of pulleys were designed in this way, prompted the reply that no objection would be raised to any new design, providing the pulley had a suitable boss and rim section to do the work intended. Fig. 2 shows the alteration made, the section D previously in the centre of the pulley and which divided the "cods" in the mould half-

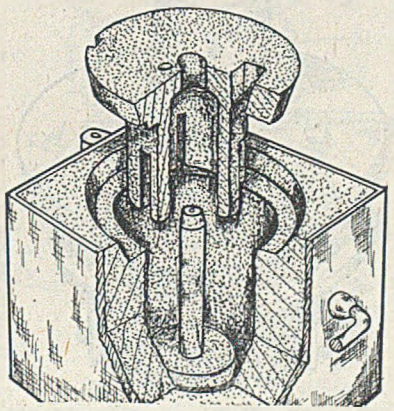


FIG. 3.—*Mould Assembly for the Simplified V-belt Pulley shown in Fig. 2.*

Simplified Moulding

top and half-bottom, was moved to the base (as moulded), and four supporting brackets E were incorporated to ensure rigidity, etc. A suitable cover-core print and cover-core corebox (not shown) was made. Fig. 3 shows the mould assembly. The conversion put the job on a flat-back, one-box, plate or loose-pattern, semi-skilled production routine and the saving in time, plus a high "return" of sound castings, justified altering all patterns of this type to the same design.

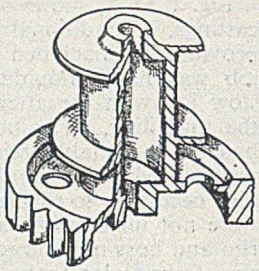


FIG. 4.—*Geared Winding-drum Casting, ordered from the Foundry in Small Quantities.*

Geared Winding Drum

Fig. 4 shows a geared winding-drum casting, ordered in small quantities at intervals. The need for economic manufacture and sales competition necessitated an enquiry as to how to produce this main unit at lower cost. Machine-cut gears were considered well above the requirement for such a slow-moving item, and it was held that moulded teeth would be satisfactory, if these were made to uniform shape and quality. No other significant alteration could be permitted, or the machine would have to be re-designed.

Consultation with the foundry about the job was welcomed, because moulding this three-part loose-pattern was a skilled job and production was slow and inherently expensive. A new pattern and core-boxes were deemed essential and then moulded teeth on the casting were offered with confidence, together with an assurance of parallelism and uniformity. Moreover, a bit more clearance on the pitch line was allowed. The new pattern was so arranged so as to mould the job, dowelled "loose," on a patternplate, using a two-part moulding box, and made as an item for the "semi-skilled" production section.

Making the Stripping Ring

Fig. 5 shows the re-designed pattern, with the units separated. The sketches show the method of making the hand stripping plate, which ensures that the toothed section of the pattern can be drawn cleanly from the mould, requiring no mending of the teeth. Fig. 6 shows a section of the flat-back gear-wheel, made $\frac{1}{8}$ in. deeper than the finished casting, note the "dimple" F.1, necessary for the method. A complete ring is made (a section of which is shown at F), the inner rim fits close to the pattern teeth and has a $\frac{1}{8}$-in. parallel section, shown at G in Fig. 7. The flat-back gear-wheel pattern is placed on a level plate or board and raised on suitable pieces of wood to the required $\frac{1}{8}$ in. below the outside ring J; a moulding box is

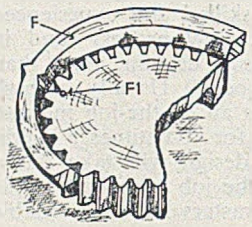


FIG. 6.—*Flat-back Gear-wheel Pattern Component, made $\frac{1}{8}$ in. deeper than the Finished Castings.*

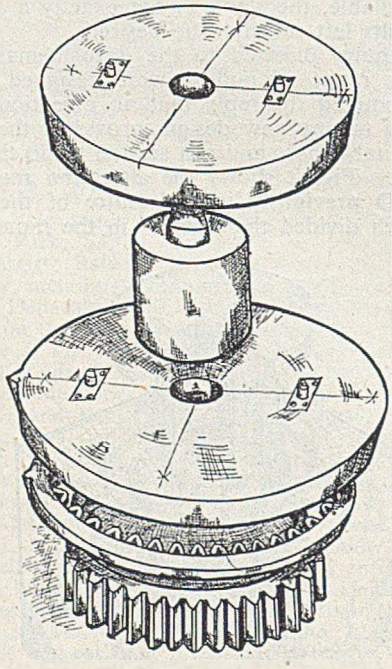


FIG. 5.—"*Exploded*" *View of the Re-designed, Winding-drum Pattern, a Stripping Plate forming the Teeth.*

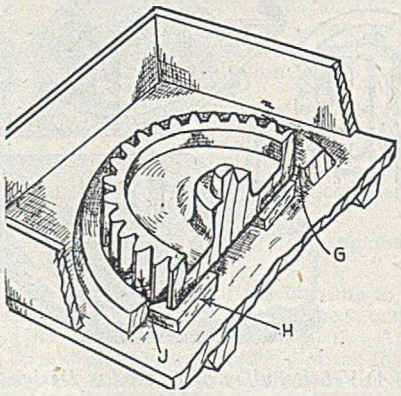


FIG. 7.—*Moulding Set-up for the Gear-wheel Component on a "Flat-back" Board.*

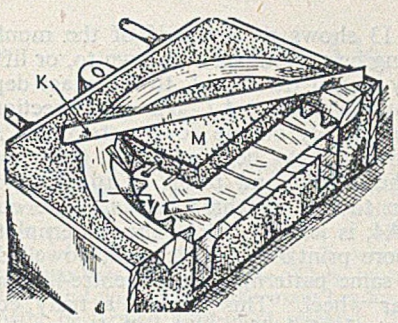


FIG. 8.—*Part Mould for the Gear Wheel after Rolling Over; Core-sand is packed and reinforced in the Top Recess at (M).*

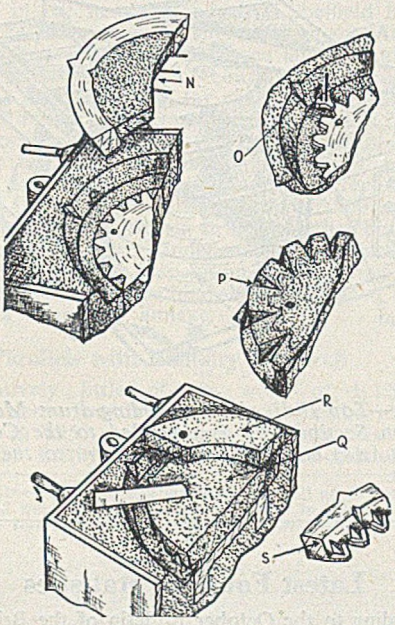


FIG. 9.—*(N) Strip Ring separation from the Gear-wheel Part Mould; (O) shows the Former used for pressing down Sand between the Teeth; and (P) the filing of the Core. In the re-assembly of the Mould (Q) shows the Filed Core; (R) a flat-back Ring Core, and (S) a section of the Cast Stripping Ring.*

placed in position and the job rammed up in a well-bonded facing sand and rolled over (as shown at K in Fig. 8). The sand between the teeth is rammed level with the face on the pattern, L. The space inside the gear wheel and strip ring is rammed up with core sand M and reinforced with rods, so as to permit the strip ring and level core to be lifted out together, as shown at N, Fig. 9, and the core dried.

The sand between the teeth is next carefully pressed down in the mould with a $\frac{3}{8}$-in. "former," shown at O (Fig. 9), and the dried core is filed between the teeth to the shape shown at P. The filed inner-ring core is replaced in the mould as shown at Q, noting the dimple position for correct register. A flat-back mould, or ring-core R, is then used to cover the stripping-ring space and the mould is poured in non-shrink pattern metal—a section of the cast stripping ring being shown at S (Fig. 9).

Pattern Assembly and Moulding

The metal stripping ring is then dowelled to its counterpart of cover-core print T (Fig. 10). The gear-wheel pattern is raised to requisite position on fixed battens (shown at X1, Fig. 11). Then the pattern and stripping ring are substantially dowelled and placed in a predetermined position on the centre-lines U on the patternplate V.

In producing moulds from this new set-up, the half-mould is rammed up in the usual manner and rolled over, Fig. 11; the top-half of the cover-core print is taken out, W, and the gear-wheel pattern X is drawn out through the stripping ring Y, leaving behind perfectly moulded teeth. The stripping ring is then taken out. Fig. 12 shows the complete

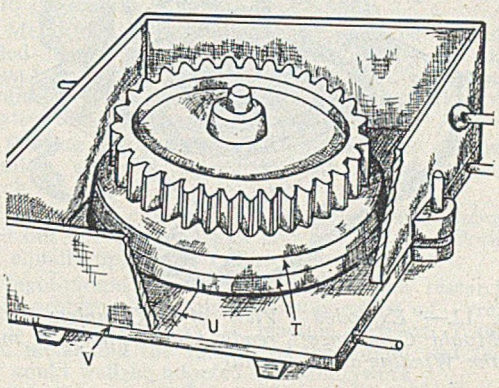


FIG. 10.—*Re-assembly of the Pattern for Moulding, incorporating the Stripping Ring and its Print at (T).*

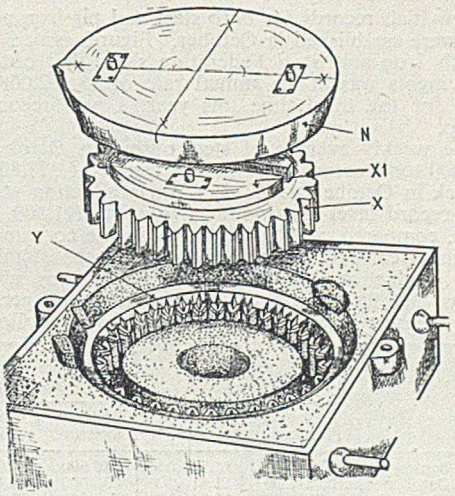


FIG. 11.—*First Half-mould after Rolling Over, showing the sequence of Pattern and Stripping-plate removal.*

Simplified Moulding

assembly of both half-moulds; the drum-flange, Z1, is bedded in the cover-core Z, being fixed true to position in the usual batten-and-dowels manner, the core-box is not shown.

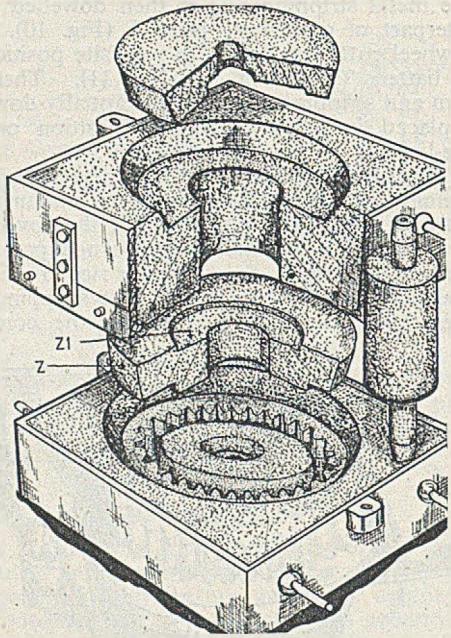


FIG. 12.—*"Exploded" View of a Complete Set of Mould Components ready for assembly to make the Winding-drum Casting.*

Fig. 13 shows the top-half of the mould. The moulding box for this is cut down to, or lifted by, a suitably-lugged frame, A1, to the exact depth indicated by the strickle, A2. The drum section, A3, is spigoted loosely on the cover-core print, A4, thus permitting this to be drawn out (after ramming) level the mould and prior to rolling the mould over on to logs or three bricks. The cover-core print, A4, is left behind on the patternplate. This cover-core print A4 is, of course, dowelled loosely on the same patternplate and centre-line setting as the gear wheel. This ensures a truly concentric register to both half-moulds. Reference to Fig. 12 shows the complete mould and core assembly.

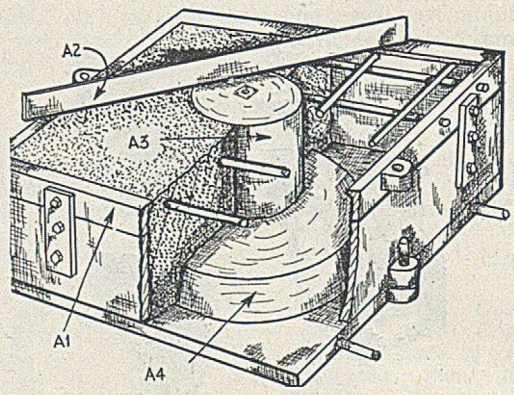


FIG. 13.—*Top Half of the Winding-drum Mould; the Drum Section (A3) is dowelled to the Cover-core Print (A4) and this latter, in turn, to the Pattern-plate.*

Steel and Pig-iron Output

New high records for both steel and pig-iron production were established in October. Figures issued by the British Iron and Steel Federation show that output of steel ingots was at an annual rate of 18,462,000 tons; thus, for the third time this year, a new record was set up.

The weekly average of steel output in October was 355,000 tons, compared with an average of 327,800 tons a week in October, 1952. Pig-iron production was also at a record level last month, averaging 221,500 tons a week, compared with 204,200 tons in the corresponding month a year ago. For the first 10 months of this year steel production has averaged 336,300 tons a week, against 306,100 tons over the corresponding period of 1952. Latest output figures (in tons) are as follows:—

	Pig-Iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1953—September ..	213,900	11,123,000	346,500	18,019,000
October ..	221,500	11,519,000	355,000	18,462,000
10 months ..	212,400	11,045,000	336,300	17,489,000
1952—September ..	208,600	10,845,000	329,800	17,149,000
October ..	204,200	10,616,000	327,800	17,044,000
10 months ..	201,600	10,482,000	306,100	15,917,000

Latest Foundry Statistics

According to the October Bulletin of the British Iron and Steel Federation, employment in iron foundries for the first time for several months improved during August for the statistics were taken on September 5. The total was then 140,799, showing an increase of 165 over the August figure, but a decrease of 2,529 compared with September, 1952. There was a still more remarkable gain in employment in steel founding, where at 20,466, the gain was 370, this being 20 more than a year ago. The average weekly output during September of liquid metal for the making of steel castings was 11,300 tons, as against only 8,800 tons in August, but 11,500 in September, 1952.

C. & G. Examinations

Applications for permission to become external candidates for the City and Guilds of London Institute Examinations in foundry practice and patternmaking should be made to the secretary of the Institute of British Foundrymen no later than the following dates: For overseas candidates December 31, 1953, and for candidates resident in Great Britain February 1, 1954. In future it will be impossible to extend these dates for late applicants.

B.I.S.R.A's. New Laboratories

Research Programme as it affects Foundrywork

On Thursday last, the new laboratories of the British Iron and Steel Research Association at Hoyle Street, Sheffield, were officially opened by the Duke of Edinburgh. These premises, an external view of which is shown in Fig. 1 and a plan in Fig. 2, were also inspected by members of the Press. They have cost about £500,000 and will provide the main headquarters for what might be termed pilot-plant research, that is, the translation of purely laboratory experiment into the realms of practical reality and works trials, in consultation with the personnel of local steelworks. Indeed, herein lies the *raison d'être* of locating the new shops in the heart of industrial Sheffield instead of on a more pleasant virgin site. The existing laboratories of the Association at Battersea and a number of extra-mural activities, will of course be retained, but some of the major projects, for example, work on continuous casting, will be transferred to Sheffield.

The laboratories consist of a number of new and some older buildings, the former comprising a main laboratory and administrative block of three storeys (30,000 sq. ft.), a metal-working shop (10,000 sq. ft.), and a melting shop (4,000 sq. ft.). The other buildings are a cutlery laboratory (independently conducted by the Cutlery Research Association, but sharing some common services), the machine-shop, a furnace model room and a temporary annexe.

Parallels with Foundry Research

Comparatively little of the work of B.I.S.R.A. directly concerns foundrymen.* for it will be remembered that in 1950 steel-castings research was transferred to the British Steel Founders' Association and is now independently conducted by the British Steel Castings Research Association. It is of interest, however, to record a few of the items which are currently being investigated at B.I.S.R.A. which could have parallel value in foundry and vitreous-enamelling research. Amongst these are:—

(1) Factors influencing slag/metal reactions—which could be related to iron desulphurizing techniques, steelfoundry melting and, possibly, non-ferrous quality control.

(2) Strains in rolled sheet and research on the effect of carbon and nitrogen on sheet metal—this particularly concerns sheet and presswork handled by enamellers.

(3) Continuous casting of steel—quite a number of problems in this field are applicable to continuous casting of grey-iron and non-ferrous metals and, in fact, to die-casting.

(4) Metal melting in vacuum—here, the type of plant installed is the same as described recently in this JOURNAL† and, of course, much of the work envisaged, particularly on gas evolution, could equally well serve iron, steel and non-ferrous foundry interests.

(5) Plotting the movement of blast-furnace charges—parallels exist in this field with cupola-melting research.

(6) Protective clothing—considerable work being carried out on visors, goggles and heat-resisting clothing is equally applicable to the foundry industry.

(7) Ingot-mould coatings—as part of the research on this problem, a mould having one side of Pyrex glass is used to study the reaction between rising molten metal and the surface of the mould and this device could well be adopted to foundrywork.

* Full details of the whole laboratories as well as the projects envisaged and work in progress are contained in the November, 1953, issue of our sister Journal *Metal Treatment*.

† See JOURNAL September 17, 1953, page 365.

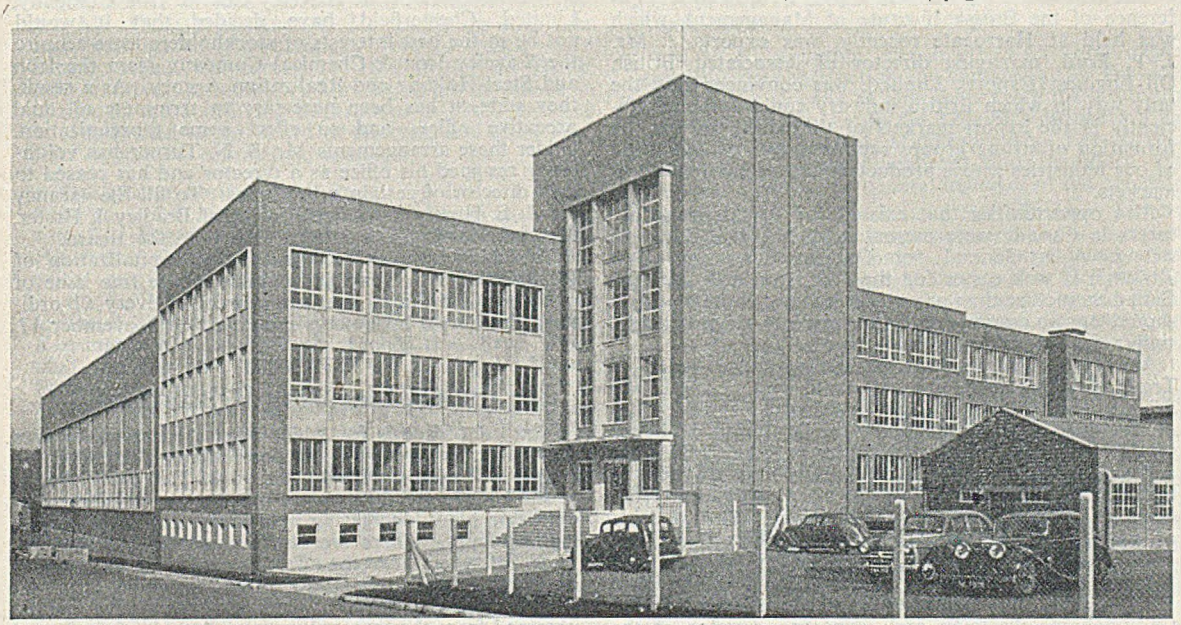


FIG. 1.—*The Main Building and Metal Working Shop.*

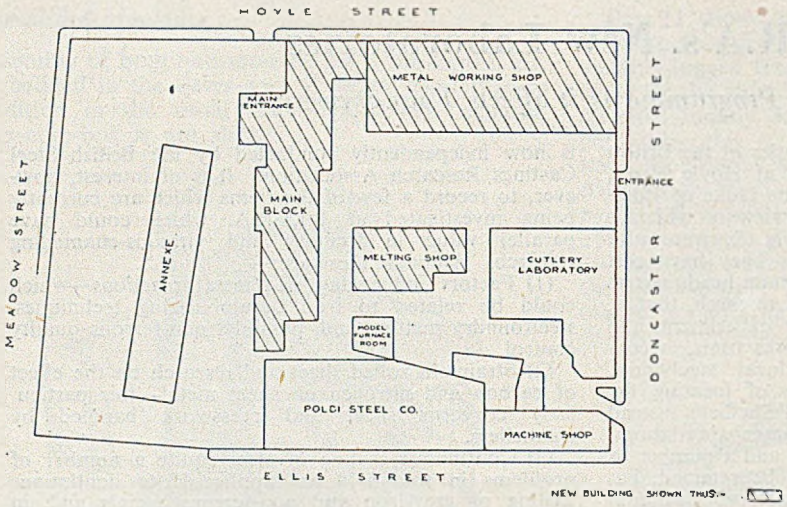


FIG. 2.—*Plan of the Hoyle Street Laboratories.*

(8) Furnace observation telescope—here, a water-cooled optical device makes possible the scanning of the inside of a hot steel melting furnace for quite long periods, a development having obvious potential uses for foundry observations.

Comparative Data

Of special interest to foundry research authorities are financial statistics for the work envisaged. It was disclosed last week by Sir Charles Goodeve, director of the Association, that of a total of about £500,000 available to them annually for research purposes, £350,000 accrues from a levy imposed on ingot tonnage, £75,000 (representing about 15 per cent. now as against double that amount previously) comes from a D.S.I.R. grant and the remainder from miscellaneous other sources. Of the countrywide position, including private research undertaken by individual firms, he estimated that perhaps £2,000,000 annually was devoted to steel research. As regards manpower, he understood that the American steel industry has about 1,000 men employed on direct research, whereas in this country we have 1,500 thus employed. These figures, however, are not strictly comparable, as in America much government-sponsored work is independently commissioned.

The statistics indicate a very healthy position and one which augers well for maintaining this country's lead in steel technology, despite our more complex problems. Indeed, the whole B.I.S.R.A. project well embodies that prime necessity to interpret the results of original research in terms of practical working measures. The steel industry has good reason to be proud of its new research facilities and their staff of investigators are now adequately provided with the tools of their profession.

B.I.M. Conference

One of the most prominent topics at the annual conference of the British Institute of Management, which was held at Harrogate recently, was exports. Mr. J. P. Ford, managing director of Associated British Oil Engines (Export), Limited, was convinced that the only way in which British industry could compete efficiently in the export markets of the world was by the formation of strong groups representative of every one of our industries whose products had a demand in world markets.

The opportunities that existed for British manufacturers in Canada were presented by Mr. J. S. P. Armstrong, Agent-General for Ontario, who said that although it was easier for the U.K. to enter into the Canadian picture than any other country in the world, it should not be assumed that the way into Canada was a simple set formula applicable to all.

Mr. Peter Thorneycroft, President of the Board of Trade, said that every industry could lend a hand in the drive to increase exports, and he called for the adoption of the most efficient methods, the provision of better services such as transport facilities to other industries, and for an all-round cut in costs. He drew attention to the fierce competition now being experienced from Germany, Japan, and the United States. The question of whether machinery for collective bargaining and joint consultation should be integrated was debated by Sir Charles Renold, chairman of the Renold & Coventry Chain Company, Limited, and Sir Graham Cunningham, chairman and managing director of the Triplex Safety Glass Company, Limited.

Staveley Coal & Iron Company

The directors of the Staveley Coal & Iron Company, Limited, Chesterfield, have decided that it would not be in the best interests of stockholders to re-acquire the Staveley Iron & Chemical Company from the Iron and Steel Holding and Realization Agency. As a result, they state, it has been necessary to terminate all dual executive offices and to effect some reorganization. Under these arrangements Mr. S. N. Turner has voluntarily resigned his office as a director and has ceased to be a director of certain subsidiaries. To fill the vacancy Dr. J. E. Hurst, managing director of Bradley & Foster, Limited, Darlaston, has been elected to the Board.

The directors also recommend the capitalization of £3,385,356, part of capital reserves, by the free issue of one new £1 ordinary share in respect of every £1 ordinary share held by holders registered on November 17.

Import Licensing Relaxations

The list of goods for which separate import licences are no longer required is considerably extended by Board of Trade Notice to Importers No. 593. Added to the list are several items of machinery, including dust extractor plant, degreasing machinery, and wheel grinding machines. There are also amendments to the previous list which have the effect of extending the number of metal manufactures now permitted to be imported without separate licence. Copies of the notice can be obtained from the Import Licensing Branch of the Board of Trade, 43, Marsham Street, London, S.W.1.

Obituary

MR. JAMES WILSON, retired brassfounder, who has died at Elgin within a few days of his 95th birthday, was a native of the town and began business on his own account in South Street, retiring 13 years ago.

MR. HARRY DEANE, of B.I.S.C. (Ore), Limited, died recently. He was for many years with Sir R. Ropner & Company, Limited, representing that company on the Baltic Exchange from 1922, when he came to London from West Hartlepool, until the end of the war. Mr. Deane was Mayor of Chiswick during 1952-53.

MR. WILLIAM CHARLES HUGHES, chief analyst of Imperial Chemical Industries, Limited, Billingham-on-Tees, until his retirement last year, has died at the age of 65. He started his career in 1905 with Brunner Mond, Limited, and later joined Synthetic Ammonia & Nitrates, Limited, which subsequently became part of the I.C.I. organization.

The death is announced of Mr. Harold Grimshaw, manager of the Contracts Department in the Trafford Park Works of Lancashire Dynamo & Crypto Limited, on November 12. He was 60 years of age. Mr. Grimshaw joined L.D.C. 42 years ago on leaving the Manchester College of Technology and served continuously in various appointments in the contracts office before becoming manager in 1947.

MR. JAMES NAPIER, who has died at his home, Aikenshaw, Rahane, Dumbartonshire, was a director of several firms apart from controlling the company of Napier & McIntyre, iron merchants, Blythswood Square, Glasgow, which he took over on the death of his father. He was a descendant of Robert Napier, who was associated with the building of the early Cunarders. He was a keen and active yachtsman on the Clyde.

KEITH BLACKMAN LIMITED announce the death on November 17 of their director and commercial manager, MR. DONALD M. BROWN. He was in his 70th year and had served the company for 54 years. Mr. Brown began his career in 1899 with the Blackman Ventilating Company, Limited, and was placed in charge of the ventilating department in 1909. In 1938 he was elected to the Board of directors and three years later appointed commercial manager.

THE DEATH occured last Friday of Mr. L. St. L. Pendred, C.B.E., who for 50 years had been associated with *The Engineer* and was its Editor for many years. His father, the late Vaughan Pendred, had also been editor and now his son occupies this position. Mr. L. St. L. Pendred was born in 1870 and received his technical education at the Central Institution, South Kensington and the Finsbury Technical College. Practical training was received in the works of Davey, Paxman & Company, Limited, of Colchester, and in Belgium and France. In 1905 he was appointed Editor-in-chief of *The Engineer*. He was for a long time a prominent member of the Institution of Mechanical Engineers, serving on its Council from 1920 and was president in 1930, becoming an honorary member in 1934. He was also a past-president of the Newcomen Society and the Institution of Engineers-in-Charge.

IN THE 53-WEEK PERIOD to June 30 last, production of zinc by the Electrolytic Zinc Company of Australasia, at 87,356 tons, was the highest yet achieved, and compares with 83,501 tons in the previous year.

Personal

MR. GRAHAM A. RAYDEN has resigned his post with Ruston & Hornsby, Limited, to join the staff of Doughty Engineers, Limited, of Cheltenham.

MR. G. R. WHITEHEAD, manager of the Sprotborough Foundry of John Fowler & Company (Leeds), Limited, has been appointed a director of the company.

MR. T. W. HAND has accepted the position of consultant to Stein & Atkinson, Limited, combustion engineers and furnace constructors, of London, S.W.1. Mr. Hand is an executive director of Colvilles, Limited, Glasgow.

MR. L. W. SMITH, treasurer of the Ford Motor Company, Limited, spoke on the duties and responsibilities of a treasurer in industry, at the meeting recently of the newly-formed Cambridge Forum of Financial Executives.

MR. CHARLES H. CRABTREE, chairman of R. W. Crabtree & Sons, Limited, printing-machine manufacturers and engineers, of Leeds, has been elected president of the Printers' Pension Corporation. He will preside at the Festival dinner next year.

MR. M. W. HUNT is resigning from the board of Edge Tool Industries, Limited, and the Boards of its subsidiaries, the Chillington Tool Company, Limited, John Yates and Company, Limited, and A. W. Wills and Son Limited, at the end of this year.

MR. O. HALL, special director and financial controller of Metropolitan-Cammell Carriage & Wagon Company, has reached normal retiring age and will relinquish his appointment on December 31. Mr. W. Scott, as chief accountant, will take over Mr. Hall's duties and responsibilities.

MR. DAVID BARCLAY has been appointed manager of the Newport works of Mountstuart Dry Docks, Limited, in place of the late Mr. H. P. Whitley. He was appointed assistant manager at Avonmouth in 1929, took over from Mr. Whitley as manager in 1945, and is in turn succeeded at Avonmouth by MR. J. NOEL EVANS, assistant manager at Newport.

MR. F. S. FLETCHER, who has had 65 years' experience of bridge construction and engineering on Tees-side, is to retire at the end of December from his position as consultant and adviser to the Tees Side Bridge & Engineering Works, Limited, Middlesbrough. For 50 years he has been executive manager and for more than 30 years a director and general manager of the company.

MR I. LEES HALL, of Lees Hall & Sons, Limited, metal melting furnace manufacturers, consulting foundry engineers and founders, of Lewes Road, Newhaven, Sussex, is to visit Australia, New Zealand, and the Middle East, sailing on December 9 on the Himalaya. He is making a business trip to visit agents and customers, and with a view to creating a department of supply and production in Australia.

THE PRINCIPAL of Wrexham's new technical college, which was opened by the Duchess of Gloucester recently, is MR. D. CECIL MORGAN, who has occupied the position for the last six years. He was apprenticed in the South Wales steel industry as a metallurgical chemist and then studied as a part-time student at Swansea Technical College, graduating subsequently from the University of Wales, Aberystwyth. The College provides full and part-time education in all technical subjects and embodies a secondary technical school providing pupils between 13 and 14 with a three-year course of secondary education, with a bias towards engineering and building.

News in Brief

NO FURTHER OFFERS of papers for presentation at the Glasgow conference (1954) of the Institute of British Foundrymen can be considered.

HENRY WALLWORK & COMPANY, LIMITED have produced more castings during each of the last three weeks than in any week since the foundation of the Company 100 years ago.

W. EDWARDS & CO. (LONDON), LIMITED, have removed from Worsley Bridge Road, Lower Sydenham, to Manor Royal, Crawley, Sussex, England, telephone: Crawley 1500.

PRESENTATIONS were made on November 14 by the director of F. H. Lloyd and Company, Limited, Wednesbury, to 30 workmen whose service to the firm totals 930 years.

IT IS NOW CONFIRMED that Alexander Stephen & Sons, Limited, Glasgow, have been given an order by Ellerman Lines for a cargo steamer of 5,300 tons d.w. for their Mediterranean trade.

WITH IMMEDIATE EFFECT Borax and Chemicals, Limited, have decided to reduce their prices for "Three Elephants" brand borax and boric acid, all grades and qualities, by £1 0s. 0d. per ton.

AT ITS MEETING in Birmingham on November 16, the Purchasing Officers' Association decided to form a Birmingham Students' Society. Mr. M. K. Dawkes (Birlec), Limited, was elected hon. secretary.

MR. A. STEPHENS, chairman of the Midland Council of the National Union of Manufacturers, was the principal guest at the first dinner dance on November 13 of the Dudley area of the Council, of which Mr. Gilbert Salter is local chairman.

THE GLASGOW SHIPBUILDING FIRM of Barclay, Curle & Company, Limited, has received an order for two cargo steamers each of 10,000 tons dw., from the British India Steam Navigation Company, Limited, with whom they had an association extending over half a century.

LARGE QUANTITIES of aluminium and magnesium swarf on the premises of T. J. Priestman, Limited, Birmingham, burst into flame on November 12. The fire, which lasted only a relatively short time, was nevertheless one of the most spectacular seen in Birmingham in recent years.

AT A MEETING of the Council of the Institute of British Foundrymen held last month it was decided to award diplomas to Mr. E. H. Beech and Mr. J. Hoyes for the paper "Core Assembly as a Production Aid to the Jobbing Founder" presented to the Lancashire branch last season.

A RECENT ADDITION to the range of low-temperature ovens made by the General Electric Company, Limited, is an easily transportable unit intended for laboratory work. It incorporates all the features required to permit checking and controlling movement of components during tests involving long periods of heat-treatment.

THE STANDARD MOTOR COMPANY, LIMITED, announces that from November 16, Mr. W. J. R. Warren, previously director of sales, will be director of export sales. He will remain a special director. Mr. F. E. Higham, who has been in charge of personnel matters, is to become a special director with the title of director of home sales.

FORMED by the principal French steel and ore-mining companies in 1946 to help finance investment in the steel industry, Groupement de l'Industrie Sidérurgique (G.I.S.) have just floated a 20-year 6 per cent. loan of 8,000 million francs (£8,000,000) for the second modernization and equipment plan. Further loans are expected to follow.

TUBE INVESTMENTS, LIMITED, has made an enquiry into the effects of National Service, and during the past three years has made an assessment of each youth leaving for service, and again on his return. So far, 150 youths have returned, and the following assessment has been made:—"No apparent deterioration except possibly in two cases; no evidence of improvement in nearly two thirds."

PROJECTILE & ENGINEERING COMPANY, LIMITED announce that a new sales office has been established at 28, Victoria Street, London, S.W.1 (telephone: ABBEY 1793/4/5). Here all information will be available and enquiries dealt with relating to injection moulding machines, plastic extrusion machines and die-casting machines in both the existing range and in machinery development in the future.

OVER SIXTY INDUSTRIAL FIRMS in Dundee have agreed to support a productivity committee for the city, which was set up at a meeting in the City Chambers on November 18. Representatives from more than 50 firms attended the inaugural meeting, in addition to delegates appointed by the Scottish T.U.C. The committee is the tenth to be set up in Scotland to work under the British Productivity Council.

STEWARTS AND LLOYDS, LIMITED, have received an order for several hundred miles of line pipe for the Haines-Fairbanks pipe project in British Columbia and Alaska. The value of the order is approximately £1,000,000 and will be paid for in dollars. It has been secured in face of international competition. The manufacture of the pipe will be undertaken in the company's works at Glasgow, South Wales and the Midlands.

TWO OLD-ESTABLISHED COMPANIES—Alex. Shanks & Sons, Limited, Arbroath, and Charles H. Pugh, Limited, Birmingham—both lawnmower manufacturers,, have amalgamated. They have joined forces for the manufacture and marketing of their wide range, from small hand mowers to the large power-driven models, gang mowers, motor scythes, etc. This will widen the scope of their service at home and abroad.

THIS YEAR, the well-known firm of Howard & Bullough, Limited, celebrates its centenary. The work of the foundry department of the Group was described by Mr. B. Gale in a Paper presented to the Blackpool Conference of the Institute of British Foundrymen. This Paper was also presented at a meeting recently of the Lancashire branch of the Institute, when Mr. Gale and his colleagues were received by the president, Mr. F. Harper.

COST was the most significant word in industry to-day, said Mr. W. E. Harrison, president designate of the Institute of Cost and Works Accountants, at the Institute's Midland regional conference at Leamington. Cost accounting, he said, was as important to the small firm as to the large concern, and small firms, which were by their nature more flexible, could give immediate effect to changes which would bear on cost reduction.

A GAS-TURBINE ENGINE for industrial use is to be developed by the Rover Company, which firm has already demonstrated a gas-turbine-driven car. This fact is revealed in a statement accompanying their

(*Continued on page* 670)

News in Brief

(*Continued from page* 668)

annual accounts. The statement stresses that the development of the gas-turbine car has not yet reached a stage at which production on a commercial scale is practicable. A subsidiary company has been formed to handle production of the new engine.

THE SECOND PHASE in a long-term proposal to build Armstrong Whitworth & Company (Pneumatic Tools) into the largest firm of power-tool manufacturers in Europe was completed recently when Mr. D. Heathcoat Amory, Minister of State, Board of Trade, officially opened the firm's factory at West Chirton trading estate, North Shields. The first phase was the linking of Armstrong Whitworth and the Thor Power Tool Company of America some three years ago.

THAT THE ZINC-ALLOY PRESSURE-DIE-CASTING foundry of the Wolverhampton Die Casting Company, Limited, is now recognized to be the largest in Europe was a statement made by Mr. Robert Whitehead, the chairman, at the recent annual meeting. A total area of 63,000 sq. ft. is required for that aspect of the firm's activities, he said. The range of equipment installed includes some of the largest American die-casting machines down to small automatics. The firm now employs approximately 1,600 people.

THE WEST BROMWICH firm of George Salter & Company, which is to become a public company, has a long and interesting history. The firm devised and made the springs for Stephenson's Rocket, and to-day its springs are used in the Comet air liner. During the American Civil War it supplied bayonets. The first Salter (Mr. Richard) entered business in Bilston in 1760. He forged a file into a spring and from that idea he founded the spring-balance industry. At present the firm employs some 1,400 people.

ONE HUNDRED YEARS AGO—on November 8, 1853—45 Sunderland shipbuilders formed themselves into an association. The centenary of the Wear Shipbuilders' Association was being celebrated recently at a dinner at which the principal speaker was Mr. K. S. D. Wingfield Digby, Civil Lord of the Admiralty. Early on, the 45 shipbuilders were joined by another two dozen with building yards upstream, but since then the number of builders has dwindled and now there are only eight, although the output has, of course, grown.

TURNER MANUFACTURING COMPANY, LIMITED, Wolverhampton, announce that they are to produce a Diesel engine, suitable for passenger cars, one of a range of two-stroke supercharged engines that the company is to make to a design of a German consulting engineer, Professor H. List. The firm will produce a range of three engines to the List design, the 2-cylinder engine, and 3-cylinder in-line engine, and a V4, the two latter for heavy duties. The 2-cylinder engine has been fitted into a standard Vauxhall saloon and has been tested for over 12,000 miles.

BIRMINGHAM UNIVERSITY has launched an appeal, mainly directed to industry, for additional income of £75,000 a year for the next seven years, to meet its commitments in research. Sir Arthur Smout, chairman of the appeal committee, said that, as an industrialist himself, he looked to the industry of Britain to continue to support the University, not as a charity but as a sound business investment. British industry needed leadership; it wanted new ideas, new inventions, and above all it wanted inspiration. These needs the University could supply, said Sir Arthur.

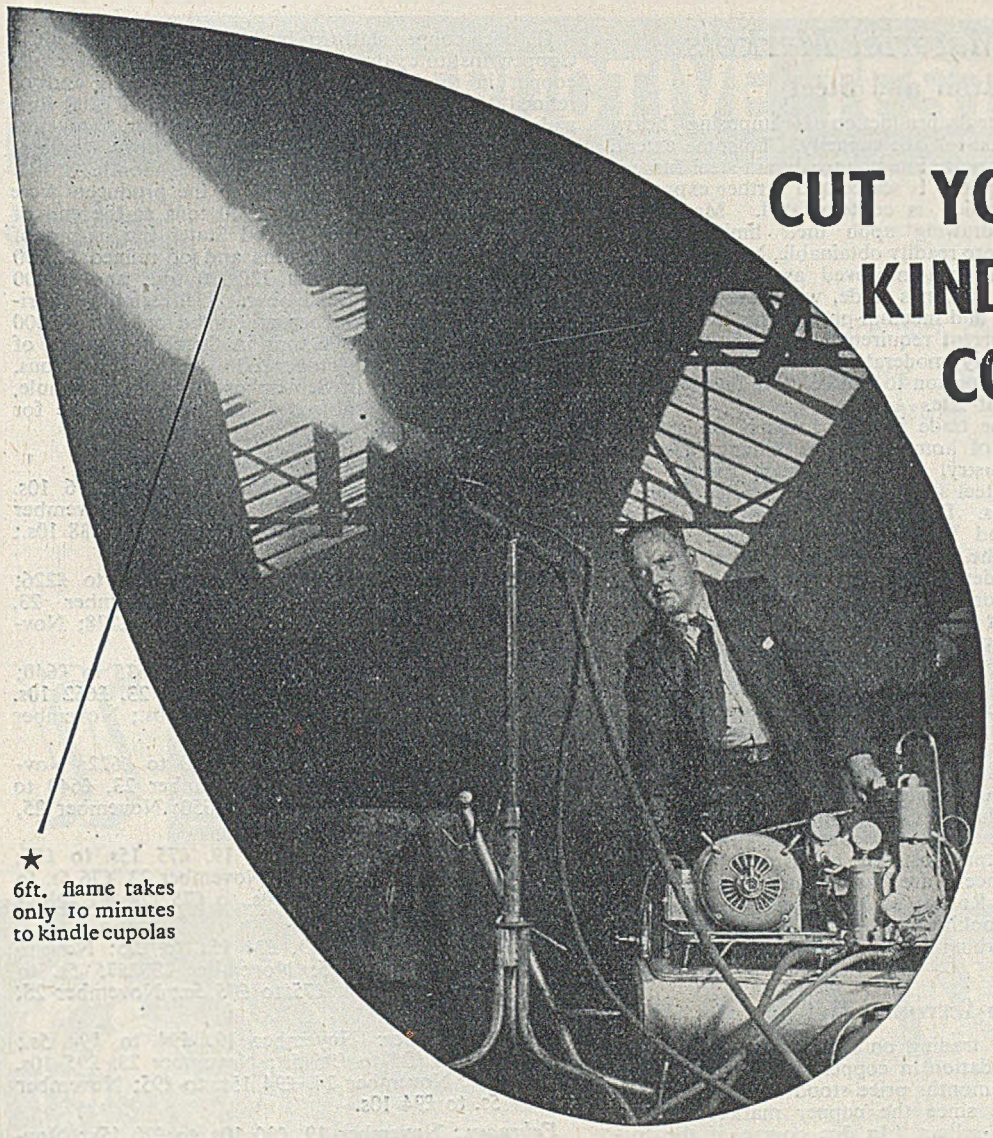
MR. ARTHUR KEATS, chairman of the Midlands Region of the Engineering Industries Association, presided at the annual dinner dance of the Midlands Region in Birmingham on November 13. Viscount Davidson, president of the association proposing the toast "The City of Birmingham" said that the city was a centre of crafts and of private enterprise which were the reasons for its greatness. Paying a tribute to the work of the association, Mr. S. A. Davis, formerly Midland Regional Controller, Ministry of Supply, said that it had done a magnificent job during the days of shortages of material.

A CASE OF MURDER in the fettling shop of Torwood Foundry, Larbert, which was reported some months ago, has resulted in John Chalmers, 16-year-old apprentice fitter, of Larbert, being found guilty by a majority verdict of the jury at a sitting of the High Court at Stirling. Because of his age he was ordered by Lord Strachan to be detained during H.M. pleasure. Chalmers had been on trial for three days charged with having on July 24 murdered Peter Stevenson Hastings, aged 51, warehouseman, by striking him on the head with a metal scoop or other similar instrument and robbing him of a purse containing two pay slips and £27 12s. 8d.

IN JANUARY this year the competitive fuel industries got together on the subject of house insulation. The fruits of their first co-operative effort were made public recently when Mr. L. W. Joynson-Hicks, Parliamentary Secretary to the Ministry of Fuel and Power, acted as "godfather" to a booklet entitled "Make your house cosier in winter," published by the Domestic Insulation Committee of the Solid Fuel, Gas, and Electricity Industries. The booklet, which carries out the 13th recommendation of the Ridley report on national fuel policy, will be distributed free to the public through gas, electricity, and appliance distributors' showrooms, and through many other organizations.

DRASTIC alterations in export and import regulations were introduced in Brazil last month. All export bills must henceforth be sold to the Bank of Brazil, either directly or through the intermediary of authorized banks. Exporters will receive the proceeds in cruzeiros at the official rate of exchange (51.408 cruzeiros to £1) and, in addition, a premium of 10 cruzeiros per dollar, or the equivalent in other currencies. The equivalent in the case of sterling is 27.6 cruzeiros. As a result, Brazilian minerals and all other high-priced products may be sold abroad at international parities, exporters receiving the same amounts as formerly in cruzeiros. No licences were issued to export iron ore during the three months ended July 30. In August, Austria, the only buyer, took 11,950 tons at U.S. $15.46 per ton.

MR. C. J. SIMMONS, M.P. for Brierley Hill (Staffs), has received a written reply from the Minister of State, Board of Trade, representing the Minister of Materials to a question he raised as to why the London Metal Exchange was allowed to reopen on August 5 for dealings in copper, with insufficient privately-bought copper in the "pipe line" between producers and the London market. Mr. Heathcote Amory in his reply states: "The Ministry of Materials bought copper at overseas points of delivery until August 4 and the copper in the 'pipe line' therefore belonged to the Ministry. In consultation with the trade, releases from Government stocks were made to cover the period until supplies from the commonwealth producers could reach this country. Consumers are still able to meet urgent requirements through the Government broker on the London Metal Exchange."



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Raw Material Markets

Iron and Steel

The rise in steel production is imposing heavy demands upon blast-furnace capacity. To some extent, basic iron and scrap are interchangeable in steel furnace mixtures, but scrap also is scarce and further expansion of pig-iron production is contemplated. Meanwhile, steelmakers are drawing upon their limited stocks. Foundry iron is more readily obtainable, but the demand for this grade also has improved as a result of the revival in the light-castings trade, while the outputs of hematite and low- and medium-phosphorus irons barely suffice to meet current requirements. The market for refined iron is only moderately active, most of the makers being in a position to handle more business than has been offered of late.

A feature of the trade in steel semis is the steadily rising proportion of home-produced material used by the re-rolling industry. Although much smaller tonnages of foreign steel semis are being handled, there is no lack of supplies. Distribution of small billets is on a better scale, and British steelmakers have made a good response to the heavier demand for sheet bars and slabs which has developed since the recent spate of home and foreign orders for sheets. The thinner gauges of sheets are most eagerly sought, but the capacity of the mills is so fully engaged that new business can only be entertained for delivery in 1954.

Home and foreign markets for finished steel products present a study in contrasts. Export orders for re-rolled bars are almost unobtainable, owing to the cut prices quoted by European exporters, and shipments of pipes and tubes have fallen away considerably. Moreover, in far too many directions is oversea trade limited by various controls and restrictions. Happily, steelworks' activity is sustained by consistently heavy home requirements. Outputs of steel plates and both black and galvanized sheets are inadequate to satisfy the swollen demand. Rollers of heavy joists and sections have substantial bookings and the collieries and British railways are absorbing large quantities of steel rails, props, arches, etc.

Non-ferrous Metals

At the close of trading on the copper market last week the backwardation in copper was no more than £11 and the three months price stood at a higher level than at any time since the copper market was re-opened, *viz.*, £228 sellers. In due course, if the forward quotation appreciates further, we may see some hedging sales against length, but this point has not yet been reached. Buying of the three months position would appear to be partly against producers' sales of November metal to consumers, but also for account of consumers, who seem to be thinking better of copper now than they did a few weeks ago. Cash stood at £239 sellers, £1 higher than a week earlier, while the forward price gained £4. Business in November zinc was very active in the course of last week's trading, but the heavy selling was well absorbed, and although the quotation closed below the best, it was nevertheless 5s. up on balance. The forward quotation gained 15s., the backwardation narrowing to £1. Lead, too, was firm and reasonably brisk business was done, the November price gaining £1 15s. and February £1 10s. Here the backwardation widened slightly, £4 dividing the spot and forward prices last Friday. Tin was a strong market due to a good U.S. demand and a sustained inquiry for Straits. Throughout the week the trend was upwards and by Friday afternoon cash had gained £22 10s. and three months £17 10s.

October copper statistics have been published by the Copper Institute; they show that production of crude copper in the U.S.A. was 92,300 short tons and of refined 126,100 tons, which compare with 87,200 tons and 114,800 tons, respectively, in September. Deliveries to domestic users amounted to 110,500 tons in October, against 104,900 tons in the previous month. Stocks of refined copper on the hands of the producers were 84,300 tons, compared with 72,900 tons at the end of September. Outside the United States the output of crude copper was 116,400 tons and of refined 92,750 tons, which compared with 120,000 tons and 69,000 tons, respectively, in September. Deliveries to fabricators, which in September amounted only to 47,000 tons, improved to 70,300 tons in October. Stocks of refined copper at October 31 were 258,680 tons, against 236,335 tons at September 30. On the whole, the October figures showed a satisfactory change for the better.

Official metal prices were as follow:—

COPPER, Standard—*Cash:* November 19, £236 10s. to £237; November 20, £238 10s. to £239; November 23, £239 10s. to £240; November 24, £238 to £238 10s.; November 25, £237 10s. to £238.

Three Months: November 19, £225 15s. to £226; November 20, £227 15s. to £228; November 23, £228 15s. to £229; November 24, £227 to £228; November 25, £227 10s. to £228.

TIN, Standard—*Cash:* November 19, £635 to £640; November 20, £645 to £649; November 23, £662 10s. to £670; November 24, £665 to £667 10s.; November 25, £665 to £667 10s.

Three Months: November 19, £620 to £622; November 20, £627 10s. to £630; November 23, £640 to £645; November 24, £647 10s. to £650; November 25, £647 10s. to £650.

ZINC—*November:* November 19, £75 15s. to £76; November 20, £75 15s. to £76; November 23, £76 5s. to £76 10s.; November 24, £75 10s. to £75 12s. 6d.; November 25, £75 5s. to £75 10s.

February: November 19, £74 15s. to £75; November 20, £74 15s. to £75; November 23, £75 5s. to £75 10s.; November 24, £75 to £75 5s.; November 25, £74 15s. to £75.

LEAD—*November:* November 19, £94 to £94 5s.; November 20, £95 to £95 5s.; November 23, £95 10s. to £95 15s.; November 24, £94 15s. to £95; November 25, £94 5s. to £94 10s.

February: November 19, £90 10s. to £90 15s.; November 20, £91 to £91 10s.; November 23, £91 10s. to £91 15s.; November 24, £90 15s. to £91; November 25, £91 to £91 5s.

Jubilee of the I.B.F.

The Institute of British Foundrymen will celebrate the golden jubilee of their formation, on April 9, 1954, having been founded in Birmingham as the British Foundrymen's Association. The celebrations on April 9 will include the following:—(*a*) A lecture on the development of the foundry industry during the past 50 years, by Mr. V. C. Faulkner and Mr. S. H. Russell, both past-presidents. This will be delivered at the Café Royal, Regent Street, London; (*b*) in the evening there will be a banquet, also at the Café Royal, and (*c*) the Institute's own history is being compiled, and it is hoped to circulate copies of it to members. Particulars of the Jubilee Award competition for junior members have already been announced and further entries are invited, the closing date being December 31, 1953.

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

(*Delivered unless otherwise stated*)

November 25, 1953

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £13 18s. 0d.; Birmingham, £13 11s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £16 14s. 6d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £17 0s. 3d.

Scotch Iron.—No. 3 foundry, £16 11s. 0d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £18 3s. 0d.; South Zone, £18 5s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £19 3s. 0d.; South Zone, £19 5s. 6d.

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. Coast and N.-W. Coast of England, £16 12s. 0d.; Scotland (Scotch iron), £16 18s. 6d.; Sheffield, £17 13s. 0d.; Birmingham, £17 19s. 6d.; Wales (Welsh iron), £16 18s. 6d.

Basic Pig-iron.—£14 6s. 6d. all districts.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*).

Ferro-silicon (6-ton lots).—40/55 per cent., £53 10s. 0d., basis 45 per cent. Si, scale 21s. 6d. per unit; 70/84 per cent., £82 10s. 0d., basis 75 per cent. Si, scale 23s. per unit.

Ferro-vanadium.—50/60 per cent., 23s. 8d. to 25s. 0d. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 10s. 0d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £165 0s. 0d. to £181 0s. 0d. per ton; 38/40 per cent., £229 0s. 0d. to £235 0s. 0d. per ton.

Ferro-tungsten.—80/85 per cent., 15s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 18s. 3d. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent. C, £85 4s. 0d., basis 60 per cent. Cr, scale 28s. 3d. per unit; 6/8 per cent. C, £80 17s. 0d., basis 60 per cent. Cr, scale 26s. 9d. per unit; max. 2 per cent. C, 2s. 0½d. per lb. Cr; max. 1 per cent. C, 2s. 1 d. per lb. Cr; max. 0.15 per cent. C, 2s. 2d. per lb. Cr; max. 0.10 per cent. C, 2s. 2¼d. per lb. Cr; max. 0.06 per cent. C, 2s. 2½d. per lb. Cr.

Cobalt.—98/99 per cent., 20s. 0d. per lb.

Metallic Chromium.—98/99 per cent., 6s. 3d. to 6s. 9d. per lb.

Metallic Manganese.—93/95 per cent., carbon-free, £225 0s. 0d. to £232 0s. 0d. per ton; 96/98 per cent., £255 0s. 0d. to £262 0s. 0d. per ton.

Ferro-columbium.—60/75 per cent., Nb + Ta, 40s. 0d. to 70s. 0d. per lb., Nb + Ta.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £25 12s. 6d.: tested, 0.08 to 0.25 per cent. C (100-ton lots), £26 2s. 6d.; hard (0.42 to 0.60 per cent. C), £28 0s. 0d.; silico-manganese, £33 16s. 0d.; free-cutting, £28 16s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £32 12s. 0d.; case-hardening, £33 0s. 0d.; silico-manganese, £34 17s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic soft up to 0.25 per cent. C, £29 16s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £30 16s. 0d.; acid, up to 0.25 per cent. C, £33 0s. 0d.

Sheet and Tinplate Bars.—£25 11s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £30 6s. 6d.; boiler plates (N.-E. Coast), £31 14s. 0d.; floor plates (N.-E. Coast), £31 15s. 6d.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £28 9s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £32 4s. 6d.; flats, 5 in. wide and under, £32 4s. 6d.; hoop and strip, £32 19s. 6d.; black sheets, 17/20 g., £41 6s. 0d.; galvanized corrugated sheets, 24 g., £49 19s. 6d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £51 14s. 3d.; nickel-chrome, £73 3s. 6d.; nickel-chrome-molybdenum, £80 18s. 3d.

Tinplates.—57s. 9d. per basis box.

NON-FERROUS METALS

Copper.—Cash, £237 10s. 0d. to £238 0s. 0d.; three months, £227 10s. 0d. to £228 0s. 0d.; settlement, £238 0s. 0d.

Tin.—Cash, £665 0s. 0d. to £667 10s. 0d.; three months, £647 10s. 0d. to £650 0s. 0d.; settlement, £665 0s. 0d.

Zinc.—November, £75 5s. 0d. to £75 10s. 0d.; February, £74 15s. 0d. to £75 0s. 0d.

Refined Pig-lead.—November, £94 5s. 0d. to £94 10s. 0d.; February, £91 0s. 0d. to £91 5s. 0d.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £105 0s. 0d.; rolled zinc (boiler plates), all English destinations, £102 15s. 0d.; zinc oxide (Red Seal), d/d buyers premises, £90 0s. 0d.

Other Metals.—Aluminium, ingots, £150 0s. 0d.; magnesium, ingots, 2s. 10½d. per lb.; antimony, English, 99 per cent., £210 0s. 0d.; quicksilver, ex warehouse, £61 15s. 0d.; nickel, £483 0s. 0d.

Brass.—Solid-drawn tubes, 22½d. per lb.; rods, drawn, 32⅜d.; sheets to 10 w.g., 250s. 9d. per cwt.; wire, 30¼d.; rolled metal, 237s. 6d. per cwt.

Copper Tubes, etc.—Solid-drawn tubes, 27⅝d. per lb.; wire, 268s. 9d per cwt. basis; 20 s.w.g., 297s. 9d. per cwt.

Gunmetal Ingots.—R.C.H. 3/4 per cent tin, £191 10s. 0d. to £196 0s. 0d.; BS. 1400—LG2 (85/5/5/5), £197 0s. 0d. to £202 0s. 0d.; BS. 1400—LG3 (86/7/5/2), £207 0s. 0d. to £212 0s. 0d.; BS 1400—G1 (88/10/2/½), £260 10s. 0d. to £265; BS. 1400—G1 (88/10/2/1), £254 0s. 0d. to £259 0s. 0d. per ton.

Phosphor-bronze Ingots.—BS. 1400—P.B1, guaranteed A.I.D. released, £277 0s. 0d. per ton.

Brass Ingots.—BS. 1400—B3, £164 0s. 0d. to £169 0s. 0d.; BS. 249, £181 0s. 0d. to £186 0s. 0d., per ton.

Phosphor Bronze.—Strip, 351s. 6d. per cwt.; sheets to 10 w.g., 373s. 3d. per cwt.; wire, 44⅝d. per lb.; rods, 39d.; tubes, 37d.; chill cast bars: solids 41d., cored 42d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × .056, 3s. 0¾d. per lb.; round wire, 10g., in. coils (10 per cent.), 3s. 6d.; special quality turning rod, 10 per cent.; ½ in. dia., in straight lengths, 3s. 5d. All prices are net.

Forthcoming Events

NOVEMBER 30

Incorporated Plant Engineers

West and East Yorks :—"Some Recent Applications of Electronics in Industry," by R. H. Wheat, 7.30 p.m., at Leeds University.

Royal Society of Arts

Cantor lecture, "Alloys" II :—"Selection of Metals and Alloys for Industrial Use," by G. L. Bailey, 6 p.m., John Adam Street, Adelphi, London, W.C.2.

DECEMBER 1

Incorporated Plant Engineers

London branch :—"Financial Implication of Plant Installation," by H. L. Layton, 7 p.m. (preceded by tea at 6.30) at the Royal Society of Arts, John Adam Street, Adelphi, W.C.2.

Edinburgh branch:—"Maintenance Painting," by T. A. Banfield, 7 p.m., at 25, Charlotte Square.

Institute of British Foundrymen

Coventry and District Students' section:—Works visit to British Piston Ring Company Limited, Coventry, at 2 p.m.

Institute of Metals

South Wales local section:—"Metallurgical Research in the Electrical Industry," by Ivor Jenkins, 6.45 p.m. (preceded by tea in the Refectory at 6.0). University College, Metallurgy Dept., Singleton Park, Swansea.

Sheffield Metallurgical Association

"Specifications—Friends or Foes?" by S. Barraclough, 7 p.m., B.I.S.R.A., Hoyle Street, Sheffield.

DECEMBER 2

Institute of British Foundrymen

London branch :—"Bell Founding," by H. M. Howard, 7.30 p.m., at the Waldorf Hotel, London, W.C.2. The London section of the Institute of Metals will be official guests.

Institution of Production Engineers

Wolverhampton branch :—"Human Relations in Industry," by Professor T. U. Matthew, 7.15 p.m., in the Wolverhampton and Staffs. Technical College, Wolverhampton.

DECEMBER 2

Purchasing Officers' Association

Tees-side branch:—Visit to Head, Wrightson & Company's Teesdale Ironworks.

Stafford group:—Films:—"Spotlight on Industry" and "Story of Steel," 7.30 p.m., in the Lecture Room of the Stafford Public Library, Lichfield Road.

Institution of Mechanical Engineers

Applied Mechanics Group Discussion :—"Materials for Pipelines in the Process Industries and their Fabrication," 6.45 p.m., at the Institution, Storey's Gate, St. James' Park, London, S.W.1.

DECEMBER 3

Institute of British Foundrymen

Southampton section:—Films "Casting a Cylinder Block," and "Casting of Hiduminium Alloys," 7 p.m. in the Technical College, St. Mary Street.

Purchasing Officers' Association

Slough and District branch:—Debate on "Price Rings and Manufacturing Association are a boon to the Buyer," 7.30 p.m., at the Reindeer Inn, Slough.

Society of Chemical Industry

Chemical Engineering Group, Bristol :—"Metallurgical Trends of Interest to the Chemical Industry," by L. Rotherham, Joint Meeting with the Institute of Metals.

Leeds Metallurgical Association

"Some Modern Copper-base Alloys," by E. Voce, 7.15 p.m., in the Chemistry Department, Leeds University.

Institute of Fuel

North-western section:—"Modern Approach to Smoke Abatement," by A. Marsh, 7 p.m., at Liverpool Engineering Society's Rooms, 9, The Temple, Dale Street, Liverpool.

DECEMBER 4

South Wales section:—"Insulation of Industrial or other Large Buildings," by H. G. Goddard, 6 p.m., at South Wales Institute of Engineers, Park Place, Cardiff.

Society of Industrial Engineers

Manchester:—"Work Measurement Techniques," by J. D. Kerse, 6.45 p.m., at the Engineers' Club, Albert Square.

DECEMBER 5

Institute of British Foundrymen

Lancashire branch :—"Pressure-cast Aluminium Pattern Equipment," by D. H. Potts, 3 p.m., at the Engineers' Club, Albert Square, Manchester.

Wales and Monmouth branch:—"Casting Design in Relation to Production," by J. H. Pearce, and G. D. Whitehouse, 6 p.m., at the Engineers' Institute, Cardiff.

CLASSIFIED ADVERTISEMENTS

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

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FOUNDRY MANAGER METALLURGIST, A.I.M., age 53, wide experience manufacture general castings and rolls in straight and alloy cast iron, chilled and grey. Also commercial.—Box 3902, FOUNDRY TRADE JOURNAL.

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SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive or a woman aged* 18-59 *inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order,* 1952.

STEEL FOUNDRY requires Sales Engineer for North Western Counties. Essential qualifications are (1) Selling experience (2) Knowledge of Foundry processes (3) Engineering background. This is a full time staff appointment and a car will be provided; agents and part time representatives, as such, are not required. Letters only to The Sales Manager, CATTON & CO., LTD., Leeds, 10, giving information on career to date, age, health and salary envisaged.

OWING to the resignation of our South Wales & West of England Representative (due to ill health) a vacancy occurs on our outside staff for a suitably enthusiastic and energetic young man with sound knowledge of the Foundry Trade, to handle the sales of our very comprehensive range of Specialised Foundry Materials and Requisites. Applications will be considered from men having some Foundry connection and experience, and preferably resident in South Wales. Apply in confidence with full details of age, experience, etc., to—BRITISH FOUNDRY UNITS, LTD., Retort Works, Chesterfield.

SITUATIONS VACANT—*contd.*

DRAUGHTSMEN required, preferably with experience of Gravity Dies, Pressure Dies or Plastic Moulds.—Apply JOHN DALE, LTD., London Colney, Herts.

FOREMAN required. Small jobbing Iron Foundry. 10/12 moulders, castings up to 30 cwts. Wage £12 10s. per week. Manchester area. State age and experience. —Box No. 3893, FOUNDRY TRADE JOURNAL.

NON-FERROUS Foundry Foreman or Manager required, experienced in production of high quality bronze castings including manganese bronze, phosphor bronze, etc. Good progressive position for capable man able to improve quality. Midlands district. State experience, wages required.—Box 3895, FOUNDRY TRADE JOURNAL.

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FOUNDRY FOREMAN required by South West Lancs. Co., engaged on General Engineering Castings up to 5 tons. Must be time served moulder capable of giving firm instructions in all aspects of Green, Dry and Loam Work. Organising ability essential. State wages required.—Box 3892, FOUNDRY TRADE JOURNAL.

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SITUATIONS VACANT—*contd.*

REPRESENTATIVE required by well-known Non-ferrous Foundry in Midlands for sale of Bronze and Aluminium Castings, in London area, on commission and expenses basis.—Give details of experience, etc., to Box 3897, FOUNDRY TRADE JOURNAL.

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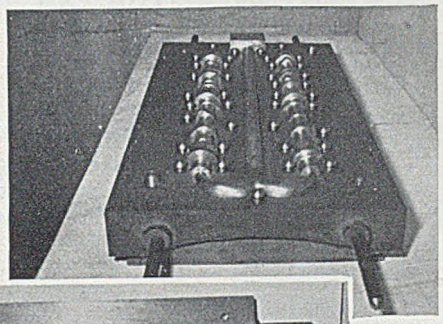

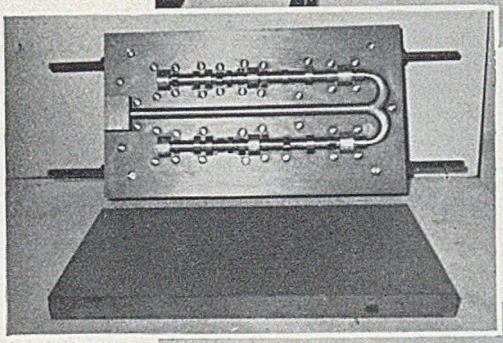

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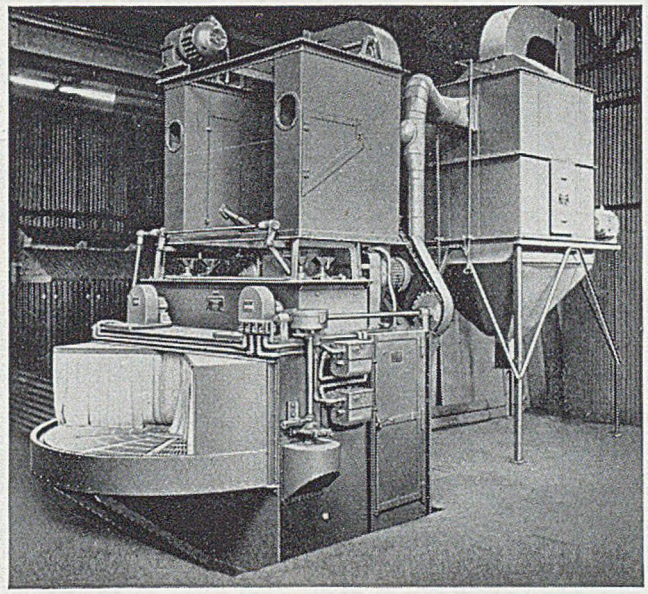
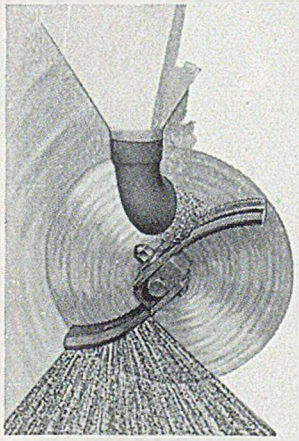
"SAND WIZARD" SHOTBLASTING MACHINES

and



Rotary Table Type Machine



their service to industry

The high standard of castings demanded today focuses attention on the fettling shop and the necessity for up-to-date equipment to ensure that the cleaning costs are kept at an economical and competitive level.

"Sand Wizard" Airless Shotblasting Machines have for many years provided the efficient answer to this important problem and their faithful service to Industry is reflected in the large numbers in daily use all over the world, and by the repeat orders continually received. One firm alone has recently placed an order for their 27th "Sand Wizard."

Besides the type illustrated, Rotary Barrel and Continuous Machines are available, and are fully described in separate folders available on application.

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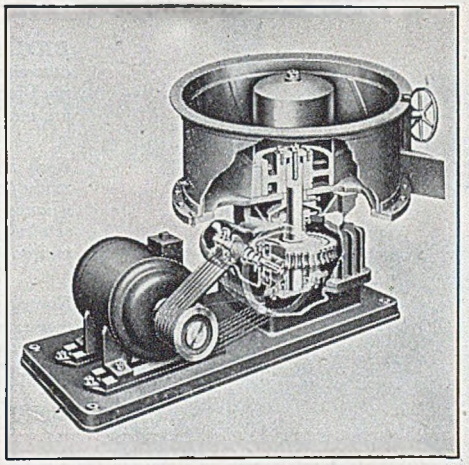
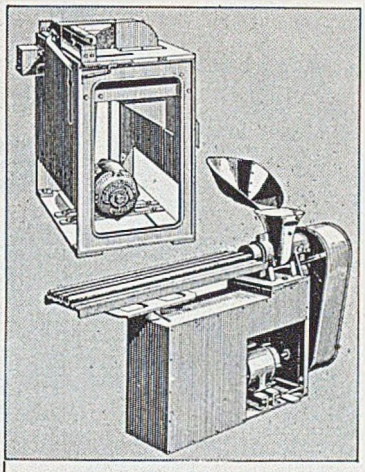
Other Products include: Centrifugal Casting Machines, Core Blowing Machines, Sand Dryers and Mixers, Cupolas, Drying Ovens, Mechanical Chargers, Spark Arresters, Ladles and Rumblers

FORDATH MACHINES IN THE FOUNDRY

—lower costings in the office





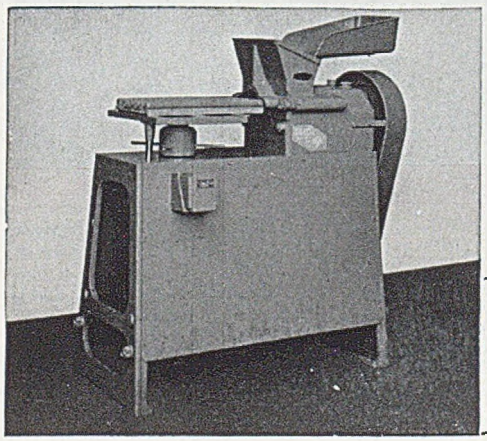
(ABOVE LEFT) FORDATH 'NEW TYPE' MIXING MACHINES *use the well known Fordath principle of rubbing and folding without crushing in each of the seven models in the range.*

(ABOVE RIGHT) FORDATH CUT-OFF MACHINES *have many years of satisfactory service built into them.*

The FORDATH MULTIPLE ROTARY CORE MACHINE *has an enviable reputation for accurate extrusions in foundries everywhere.*

Fordath 'New Type' Mixers, one for everybody, seven sizes to cope with batch capacities from 20 lbs. to 1 ton. To mix foundry silica sands with core bonding compounds *without crushing*. Stiff compounds as low as 1% can be completely dispersed through the sand, coating each grain with a film of binder. Mixing blades rotate in a horizontal plane, conveying the sand from the centre of the pan, rubbing it thoroughly against rubbing plates and tumbling it back to the centre. Two to three minutes is enough and the batch is discharged in a well aerated homogeneous mix. Gears and bearings totally enclosed.

The Fordath Multiplunger Core Machine is going to town, to the country, to export markets, wherever there are foundries. The thrust of the core sand through the multiple die is provided by plunger action instead of a rotating worm. Quality and consistency of the core sand mixture are not critical factors. Dimensionally accurate extrusions are satisfactory with sands of poor quality and even facing sand or plain red moulding sand can be extruded. With all sands, the core mix is at its best when Glyso is the bonding agent.



The FORDATH MULTIPLUNGER CORE MACHINE *admirably exemplifies the success of equipment designed by foundrymen for foundrymen.*

The Fordath Multiple Rotary Core Machine extrudes cores from ⅛ inch to 6 inches. Multiple extrusion of up to ten (smallest diameter) cores simultaneously and accurately. All dies have venting device. Senior model (power driven) and Junior (power or hand operated bench model).

Fordath Core Cut-off Machine cuts cores up to 3 inches diameter accurately to lengths required. Motor and roller bearings totally enclosed.

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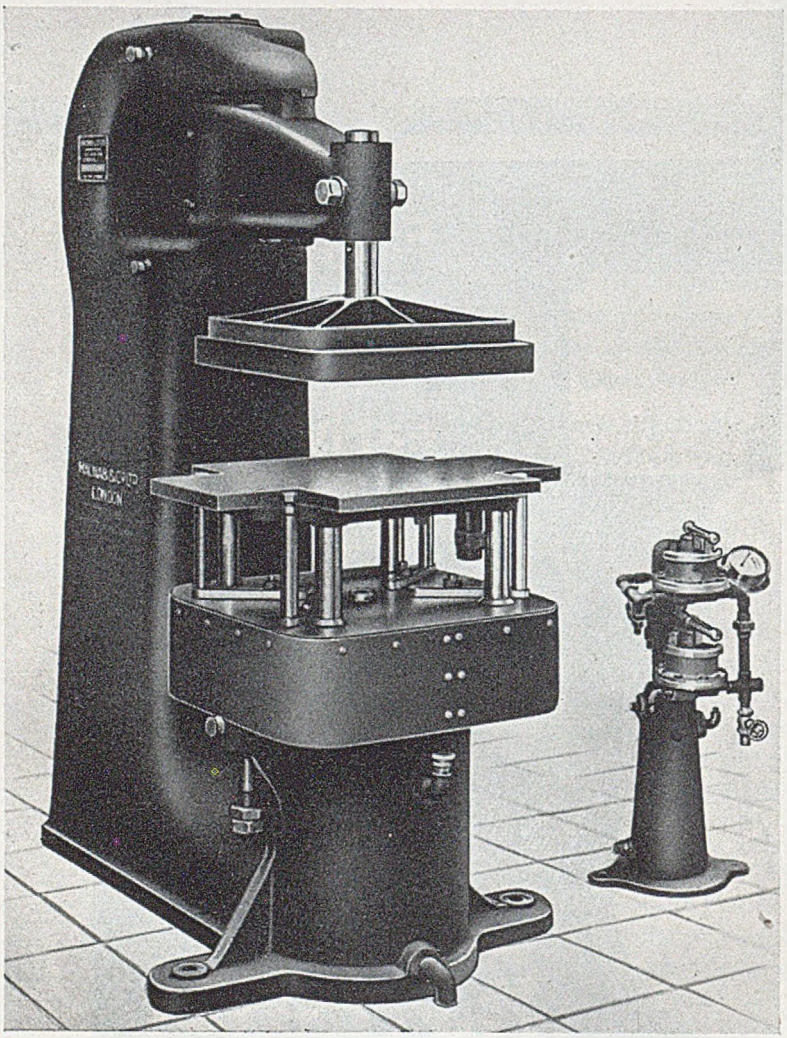
MACNAB

MOULDING MACHINES



The Machine which will specially appeal to those Foundries whose work necessitates the use of a variety of different size moulding boxes for small and medium size castings.

for High Production

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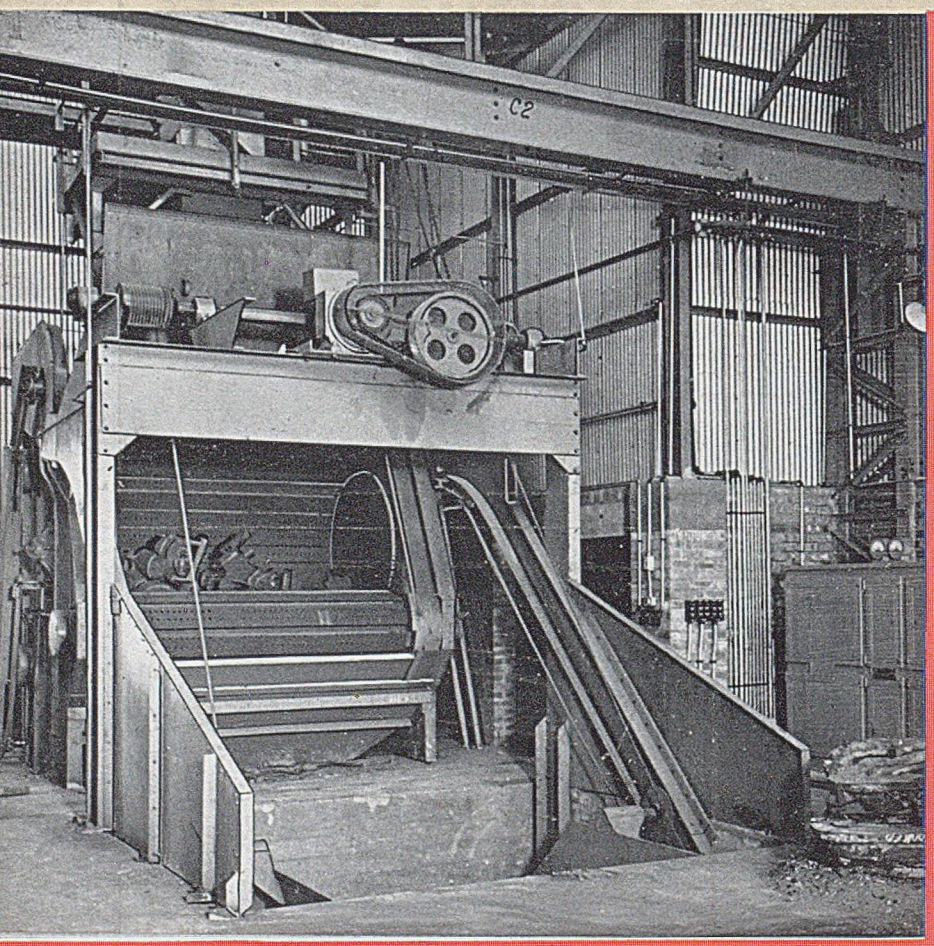

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