FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 88 | Thursday, June 22, 1950 | No. 1764

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

Grams: "Zacatecas, Rand, London"

'Phone: Temple Bar 3951 (Private Branch Exchange)

PUBLISHED WEEKLY: 26s. per annum (Home and Overseas)

German Competition

It is the policy of the Western Powers to support all legitimate German efforts to regain their position as a leading industrial nation. Already the impact of this policy is being felt not only in Britain, but in all European countries. We hear of quotations from Germany being from 25 to 33 per cent. cheaper than corresponding British plant. Not much information has yet reached us on the export of unmachined castings, but as much of the machinery they send overseas is made up of castings, there is a great potential detrimental effect on British foundry exports. Even in 1941, there were 170,640 men, plus 10,260 apprentices employed in the German foundry industry—a figure no doubt largely augmented since that time.

Whilst before the war, German competition was felt the world over, the natural market for German exports was South-East Europe. To-day, much of that area is closed alike to the Germans as to all other European countries. Thus, it is reasonable to expect intense pressure from German sources on what are traditionally British markets. The favourable position in which German industry now finds itself is due, not only to the present set up, but also—if our information be correct—to the longer hours being worked and to the sustained hard work by the operatives. There are rumours that some German foundry workers are putting in 60 hours a week. On the other hand we doubt if German foundries are as well-equipped as the British, especially the non-ferrous section. The millions of pounds spent by the British foundry industry can surely have no counterpart in Germany.

What is probably a very important factor is that unlike mediæval days, there are to-day no spoils of victory. After the 1914 war, Germany sent thousands of railway wagons to France by way of reparation until the French makers and their employees rightly objected to being put out of business. There is a great will to work amongst the peoples of a defeated country and possibly a desire to "take it easy" by the victorious nations. What happened to the French wagon builders will again be apparent, but this time in the export markets of the world, unless the British and other interested industrial organisations make the strongest representations continually to their respective governments, whenever they find these wide discrepancies between their own and German export prices.

It may be that the Schuman plan, if it materialises, will do something to lessen this competition. The British, because of the excessively-high rate of taxation, are bady placed *vis-à-vis* with other nations, and this, of course, must, if the manufacturer is to remain in business, be reflected in the selling price. The Foundry Equipment and Supplies Association is constantly examining instances where orders are lost to Germany purely on price. Foundry Equipment is an example of an industry which has made outstanding strides during the last two decades. In overseas business it has converted a pre-war import of the order of £600,000 per annum into an export figure of about £1,000,000. This young industry needs all the support the Government can accord it. Such help is well merited.

Contents

Correspondence

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

STEEL-FOUNDING PRODUCTIVITY AND HIGHER EARNINGS

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—In the daily Press of June 15 appear abridged accounts of the annual report to be presented on June 19 to the delegate conference of the Amalgamated Union of Foundry Workers. These reports* indicate that Mr. J. Gardner is not only taking a parochial view towards the benefits of increased productivity to the national economy (one might even say the "planned economy"), but is failing to inform himself of improvements in the earnings of his members and of their live interest in higher productivity.

So far as the steel founders are concerned Mr. Gardner would have no difficulty, if he felt so disposed, in finding members of his Union in whose shops average hourly earnings have risen nearly 50 per cent. in the last four years and whose keenness to achieve higher productivity is fortified by the operation of schemes of payment by results. These schemes, which assuredly link wages paid with increasing productivity, were arranged in consultation with his Union officials, so Mr. Gardner surely has knowledge of them.

The bogey of unemployment is raised by reactionaries every time improving techniques enable man to create greater wealth with less expenditure of time and effort. Mr. Gardner knows of cases where hiatus between increasing productivity and increased order books in a foundry has been bridged without even temporary unemployment. What he fails to recognise is that unless productivity in the foundries increases a great deal more than it has done, uncontrollable unemployment will destroy most of the good work done by virtue of good relations within the foundry industry during the past decade.—Yours, etc.,

F. A. MARTIN
(Chairman, Productivity Committee, British Steel Founders' Association).

Clyde Steel Works, Sheffield, 3.
June 16, 1950.

* See reference on page 682.

Aluminium Industries of Western Europe

The use of aluminium either as a substitute for other metals involving dollar expenditure, or in applications which would result in indirect dollar savings, is the subject of a recent recommendation by the Council of O.E.E.C. urging closer technical co-operation between the aluminium industries of member countries. The recommendation is linked with the policy of the organisation to encourage the production of aluminium in member countries and their overseas territories.

It is suggested that each member country concerned should discuss with its aluminium industry, and in particular with any bodies that exist for the purpose of developing the uses of aluminium, measures for increasing technical co-operation between such industries and bodies in all member countries. The object is to promote the use of aluminium, in particular in ways which might result in dollar economy. An international meeting will be convened at which bodies concerned with developing the uses of aluminium in all member countries will discuss the possibilities of increasing technical co-operation between themselves.

Latest Foundry Statistics

The May bulletin issued by the British Iron and Steel Federation reports a decline in employment during April. Reporting as to April 8, the total at 146,599 is 272 fewer than a month earlier. Surprisingly enough, however, of this decline only 66 were males. As the total female labour only amounts to about 8,900 this loss is of the order of 2.3 per cent. Steel-founding shows an increase in employment. It gained 45 and stood at 19,232. There was in this case also a loss of two females—wedding bells?

The weekly average weight of liquid steel for making steel castings was 8,000 tons in April, as against 9,000 in March, but Easter fell in the month under review. In April, 1949, it was 7,900 tons. The weekly average production figures were 4,400 tons (March, 4,900; April, 1949—4,300, and for 1938—2,700 tons).

Coal *versus* Oil

Speaking at the North-Western Fuel Luncheon Club in Manchester on May 3, Dr. Franz Kind stated that while world coal production had doubled since 1900, oil production had increased twentyfold; but if the calorific potential of oil were reckoned as 1.7 times that of coal, the equivalent oil production to-day was 55 per cent. that of coal. Further, comparing coal with oil, the speaker pointed out that for shipping, economy of storage space favours oils. In Northern Europe generally, where coal was produced plentifully, oil was only consumed where it offered definite advantages, but coal was constantly rising in price, he said. In Switzerland, for instance, where both were imported, the value of coal and oil imported was this year about equal. The comparison was further emphasised at the society's meeting on June 7, when Sir Charles Ellis, scientific member of the National Coal Board, spoke on the subject, "Oil *versus* Coal."

Luncheon

M. & W. Grazebrook, Limited

Mr. O. F. Grazebrook presided at a luncheon held at Dudley Town Hall as a part of the bicentenary celebrations of the firm of which he is chairman. Included amongst the guests were:—The Lord Mayor of Birmingham (Ald. A. Paddon Smith, J.P.), Mr. J. R. Menzies-Wilson, O.B.E. (president of the Iron and Steel Institute), the Mayor of Dudley (Coun. G. S. Marlow, J.P.), Mr. R. M. Barrow, Mr. T. Cox, Mr. H. E. Cookson, Prof. H. W. Dickinson, Mr. V. C. Faulkner, Mr. H. Grazebrook, Mr. W. E. Harper, Mr. K. Headlam-Morley, Dr. J. E. Hurst, Mr. V. L. Nicholls, Dr. J. G. Pearce, The Venerable A. P. Shepherd, Mr. S. Somers, Mr. M. Van Marle, and Mr. E. N. Wright.

Engineering and Marine Exhibition, 1951

It has been arranged that at the Engineering and Marine Exhibition, to be held August/September, 1951, a special foundry trades section will occupy the annexe at Olympia, as on previous occasions. The Foundry Trades' Equipment and Supplies Association is sponsoring this section, and firms interested should communicate with Mr. Kenneth W. Bridges, The Engineering and Marine Exhibition, Grand Buildings, Trafalgar Square, London, W.C.2., as space is likely to be limited.

Institute of British Foundrymen *Lancashire Branch*

Annual General Meeting

and

Discussion of Cupola Charge Materials Report

The annual general meeting of the Lancashire branch of the Institute of British Foundrymen was held in the Engineers' Club, Manchester, on April 1, the branch-president, Mr. R. Laroux Handley, B.Sc. (Tech.), A.M.I.E.E., being in the chair. The minutes of the previous annual general meeting, held on April 9, 1949, were read by the hon. secretary, and were confirmed and signed.

Secretarial Report

The hon. secretary, Mr. R. S. Yeoman, then presented his report, in the course of which he said: Even the most conservative members would probably agree that the results of the year's working had been good. Under the guidance of Mr. R. Laroux Handley, the president, the branch affairs had been conducted with speed and efficiency. Neither the president nor the officers had spared themselves in promoting the business of the branch, while Mrs. Handley had been of great assistance to the president and her counsel had been at all times both practical and forthright.

Six meetings had been held up to date with an average attendance of 85, and all the Papers read had been well received and discussed. In October, 1949, Mr. H. Hornby's Paper on "Loam Moulding" had evoked an excellent discussion of a practical nature. In November, 1949, Mr. S. Horton's Paper on "Patternmaking" was a most interesting survey of and benefits from liaison between the pattern-shop and foundry production departments. In December, 1949, Dr. J. G. Pearce made a welcome return to the branch and gave an argumentative resumé of the past and future developments of the foundry industry.

Coming to 1950, Mr. F. Hudson had in January given a film show from the non-ferrous industry, entitled "Bronze Founding." The excellent results of this show were very complimentary to Mr. Hudson, who had been connected with the production of the film. In February, Mr. P. A. Russell also made a welcome return to the branch with a Paper entitled "Where is Cast Iron Going To?" This Paper dealt with the development of cast iron and possibilities of the future. In March, Mr. D. Redfern, of the Scottish branch, read a Paper on "Loam and Dry-sand Moulding," which was of an extremely interesting and practical nature.

The thanks of the branch members were due to the various lecturers for their kindness in preparing their Papers for consideration and discussion, and the Council would be always open to receive suggestions for others and to encourage new lecturers. During September, 1949, a visit had been paid to the very important and extensive works of Mather & Platt, Limited, Newton Heath, Manchester. The visit was well attended and much appreciated. In June, 1949, a party of members, under the leadership of the branch-president, visited the extremely well-equipped foundries of the Metropolitan Vickers Electrical Company, Limited, and on the same day another party of members, under the leadership of Mr. W. M. Lord, Burnley section president, visited the works of David Brown-Jackson, Limited, Salford. The parties were fully booked, and the time passed all too quickly for the visitors. The thanks of the branch were due to the directors of the various companies for their invitations and for the excellence of their arrangements and the entertainment provided.

Membership

During the past year, the membership of the branch had improved and had increased in all grades. The branch council was endeavouring to re-establish the Lancashire branch as the premier branch of the Institute, and this object could be achieved if each individual member believed that both its numerical strength and its prestige could be still further enhanced. The Council had met upon five occasions, with an average attendance of 15, though with a strength of approximately 26 members this attendance could have been better. Of the representatives to General Council, Mr. J. Jackson had been elected to the Literary and Awards Committee and Mr. S. Brooks, and the hon. secretary (Mr. R. S. Yeoman) had been elected to the Finance Committee.

Awards

A matter of particular interest to all Lancashire branch members was the 1949 award of the Meritorious Services Medal to Mr. A. Sutcliffe, and of honorary membership to Mr. J. Hogg. In each case, it was only fair to state that they were appropriate awards to members who had devoted long and valuable service to the Institute. Mr. H. Haynes and Mr. C. van der Ben had been awarded the Diploma of the Institute for their work in connection with the film show "Making Internal-combustion Engine Castings," again a very fitting award.

The Burnley section was indebted to the many long-service members who had participated in its activities. Better transport facilities would enable

I.B.F.—Lancashire Branch

more visits to be paid to the section by the officers of the branch and by friends.

Social Events

During October, 1949, the Social Committee arranged an opening social event for "Men Only," the guests being Mr. J. J. Sheehan and Mr. T. Makemson. The gathering was quite informal and the occasion was thoroughly enjoyed. The Annual Dinner and Dance was arranged for Friday evening, February 3, and was also a most successful event. The principal guests were Mr. and Mrs. N. P. Newman, Mr. and Mrs. J. J. Sheehan, Mr. and Mrs. C. Gresty, Sir Vincent and Lady de Ferranti, Dr. J. G. Pearce, Mr. T. Makemson, and Mr. G. Lambert. The Burnley section organised a social evening in March of the present year which was very well attended and proved to be a very happy family party. The section extended a very warm welcome to visiting officers of the Lancashire branch with their ladies.

Mr. A. Kirkham, a member of the Lancashire branch Council was a member of the Ironfounding Productivity Team, and had been absent from the branch with the team in America.

Two problems were now confronting the Council. The advent of the five-day week had now rendered Saturdays unsuitable for works visits, so that visits in future would have to be made on weekdays. Another matter was the holding of the branch meetings. At the present time, these were held upon alternate Saturdays and Wednesdays in the respective months. Some of the best meetings had been held on week-nights, and therefore the Council might consider the adoption of a trial period of week-night gatherings.

Finally, the hon. secretary expressed his personal thanks to Mr. T. Makemson and Mr. G. Lambert of the general office for their kindly assistance to himself during the past year, to Mr. H. Buckley, his predecessor as honorary secretary, for his help at all times, and to Mr. F. A. Harper for his excellent work as honorary treasurer. The report was approved and adopted.

Financial Report

The report of the financial position of the branch was presented by the hon. secretary and Mr. F. A. Harper, the hon. treasurer. The branch auditors, Mr. D. Cameron and Mr. F. W. Nield, stated that they had been provided with all the necessary information concerning the financial position of the branch, and that the report was a correct and satisfactory statement of its affairs.

Presentation to Mr. H. Buckley

The president then stated that, unfortunately, Mr. H. Buckley, former hon. secretary of the branch, had not been able to attend the meeting owing to indisposition. It had been intended, during the course of the proceedings, to make a presentation to him as a slight recognition of the services he had rendered to the branch, but this would now have to be deferred to a later date.

Vote of Thanks to Retiring Officers

Mr. Whyatt, in proposing a vote of thanks to retiring officers, said the business of the branch had been transacted most efficiently and its results had been of considerable interest to everyone concerned. Moreover, nothing had been lacking on the social side. Mr. Graham seconded and the vote of thanks was carried unanimously by acclamation.

The president, Mr. R. Laroux Handley, in responding for the officers and himself, thanked all the members for their very kind appreciation of the efforts which had been made to further the progress of the branch. He could assure everyone they had all tried to do their best to further the interests of members generally.

Induction of President-elect

The retiring president then announced that it was both his privilege to invite the president-elect, Mr. D. Fleming to officiate as president for the forthcoming session, and, at the same time, to wish him a very happy year of office. Mr. D. Freming was then formally invested with the badge of office and inducted into the presidential chair.

The new president (Mr. D. Fleming), in responding to the invitation which had been extended to him, said it was not his desire to make any lengthy speech at the present juncture, but he would like to say that he sincerely appreciated the honour which the members had paid him by electing him to serve in such an important office. He assured everybody that he would fulfil his duties to the very best of his ability. Whenever, metaphorically speaking, the flag of the branch had to be carried abroad he hoped to be able to display it equally as proudly as former presidents. The "flag" was going to be carried abroad very soon. He was referring to the meeting which it was hoped would be held in St. Helens in order to interest the foundrymen in that area in the Institute. There would be a Paper read by Mr. A. Kirkham, and it was desirable that a heavy contingent from the branch should attend its presentation.

Election of Senior Vice-president

The president (Mr. D. Fleming) then moved that Mr. C. van der Ben be elected senior vice-president of the branch, and the motion was carried unanimously by acclamation. Mr. C. van der Ben, in acknowledging his election to the office of senior vice-president, said that his connection with the Institute and its affairs went back quite a long way, and that he had never felt happier than he did when attending meetings of the branch. He was fully conscious of the honour which had been paid him and also the responsibilities it involved. He would certainly support the president to the very best of his ability.

The president then moved the election of the unopposed officers as follows:—Mr. R. S. Yeoman, honorary secretary; and Mr. F. A. Harper, treasurer and assistant secretary. The motion was carried unanimously by acclamation.

Election of Other Officers

The members then proceeded to vote for the offices to be filled by election by ballot. The ballot papers having been distributed, the scrutineers duly declared the results as follow:—

As junior vice-president: Mr. R. S. Yeoman; as members of branch council (for three years): Mr. A. Kirkham, Mr. F. C. Nield and Mr. W. M. Aitken; as branch representatives to the General Council (for one year): Mr. R. Laroux Handley, Mr. H. Haynes, Mr. J. Jackson and Mr. S. Brooks; as branch representative to the Technical Council: Mr. C. van der Ben; deputy, Mr. E. J. L. Howard; as auditors: Mr. F. C. Nield and Mr. D. Cameron.

Mr. S. Brooks, Mr. J. Jackson, Mr. G. C. Studley and Mr. R. Laroux Handley were unanimously appointed as members of the social committee.

Resignation from the Technical Council

The president announced the retirement of Mr. E. Longden, M.I.Mech.E., as the representative of the branch on the Technical Council. He asked Mr. A. Kirkham to propose a vote of thanks to Mr. Longden for the stalwart work he had done for the Institute on the committee.

Mr. A. Kirkham said it was an honour as well as a privilege to propose a vote of thanks to Mr. Longden, who had long experience in connection with the Technical Council. The members of the Lancashire branch were greatly indebted to him not only for the time he had spent in attending the Technical Council meetings, but also for the brilliant summaries it was his custom to give of the work done by its sub-committees. Although they were experiencing a great loss by his resignation, yet there was no doubt that Mr. Longden would continue to render assistance to his successor, Mr. van der Ben, in every way possible.

Mr. G. C. Studley seconded the vote of thanks. Everything that Mr. Longden had undertaken had been carried out very well indeed, and he had proved himself to be a very good representative of the branch in every way. The vote of thanks was carried enthusiastically.

Mr. Longden's Report

Mr. E. Longden, in outlining the work done by the Technical Council during 1949-1950, expressed his gratitude to all the members present for the hearty way in which the vote of thanks had been accorded to him. There were a number of sub-committees, all with chairmen, who had devoted much of their time to the solution of the problems they had been requested to investigate. He had been unable to accept invitations to hold such offices himself and had had to be content with making himself as useful as his other responsibilities permitted during the past 20 years or so.

He was appointed a member of the first Technical Council, formed, he thought, when Mr. Jolly was the convener. In those pioneer days much spade work had to be done, but when the work became more consolidated the Technical Council developed into an effective research organisation. The calibre of its members was now particularly high and was still improving. It had been a great pleasure to be associated with gentlemen who had been, and were still, doing so much to promote the interests of the industry. In particular, he would mention Mr. A. E. Peace, who was so well known to them all. There was now an enormous mass of valuable information available to the foundry industry and to the technical and metallurgical world, the sifting of which required much care and attention. Perhaps some of it might be of little practical value, but there was certainly a great deal of it which was really worthwhile. The Technical Council had been very assiduous in crystallising the essential points of the data submitted to it, and in supplying the necessary practical information on how to get a thing done.

Mr. Longden then read a very detailed description of the research work carried on by the numerous sub-committees of the Council during the previous 12 months.

CUPOLA CHARGE MATERIALS

Mr. C. van der Ben then introduced the Report and Recommendations of Sub-committee T.S. 27—Cupola Charge Materials. Mr. C. van der Ben was a member of the sub-committee under the chairmanship of Mr. W. W. Braidwood. The Report was presented to the Forty-sixth Annual Meeting of the Institute held at Cheltenham Spa in the month of June, 1949. It has been published in the FOUNDRY TRADE JOURNAL and also in the Institute Proceedings.

Mr. Longden's comments, said Mr. van der Ben, recalled to his mind the days when this particular sub-committee was sitting and his recollection of the enormous amount of work which was done by it. He would like to pay tribute to the sterling work done by Mr. G. Lambert, who acted as its secretary. The sub-committee were deeply indebted to him for his very able assistance. In addition to the acting members of the committee, there were a number of corresponding members whose duty it was to keep the sub-committee on the rails and to point out both sins of omission and commission.

The terms of reference were to prepare a report upon available cupola charge materials. The emphasis was really upon the use of unusual or possibly, in some cases, of unsuitable material. That was to say they were not so much to be concerned with the laying down of recommendations with regard to what could be considered normal practice, but rather to deal with abnormal conditions arising from shortage of supply of normal materials. The work was rushed to some extent, and dependence was placed, mainly, upon the experience of members of the sub-committee. An extensive bibliography was prepared, and dealt with exhaustively in considering the various headings of the Report, so that really much use was made of the results of other people's work which had already been published.

The Report was divided into sections under the headings of Metals, Fuels and Fluxes. It was felt also by the sub-committee that some comment on cupola practice would not be out of place; that good

I.B.F.—Lancashire Branch

cupola practice could assist in the use of materials which were perhaps not altogether desirable.

Metals

Under the heading of metals consideration was given to pig-irons, cast-iron scrap, steel scrap and ferro-alloys. In the case of pig-irons attention was given to the use of abnormally-low or unusually-high carbon, silicon, manganese, phosphorus, and sulphur. The ideas of the sub-committee with respect to suitable blending and use of materials of unusual composition were stated. Scrap was a question of identification, segregation and utilisation. Ferro-alloys really came into the picture in so far as they were aids to using materials which otherwise were liable to lead to trouble. Fuels, of course, mainly dealt with the use of coke which, as was generally known, was nowadays not always of the best quality. There was a good discussion upon the best use of the available supplies. Opinion was very much divided about the use of swarf and the best method of utilising it.

Fluxes and slags were considered under the headings of limestone, magnesium limestone, chalk, and fluorspar.

The conclusions with respect to cupola operation more or less followed orthodox lines, concluding with some references to the use of hot-blast and one of the latest developments, namely, consideration of oxygen enrichment of the blast. Some tables had been added as an appendix to cupola control which it was felt might be useful in computing cupola charges. It was understood that considerable use had been made of such data, and many copies of the tables had been distributed through the agency of the FOUNDRY TRADE JOURNAL.

Upon the proposition of Mr. C. Cash, seconded by Mr. E. Longden, a hearty vote of thanks was accorded to Mr. C. van der Ben for his exposition of the Report and Recommendations of Sub-committee T.S. 27 of the Technical Council.

Swarf Recovery

The PRESIDENT asked whether Mr. van der Ben was able to enlarge somewhat upon the opinions expressed with regard to swarf recovery.

Mr. van der Ben was frankly somewhat against the use of swarf in the cupola under any circumstances. There had been much research work undertaken in that direction, and no doubt some of it had been successful. The published literature certainly gave that impression, but certainly the last thing he would desire to do would be to use a charge of cast-iron borings in the cupola. Many of those present knew that his foundry did use cast-iron swarf, but they had the advantage of putting it through a Sesci furnace, which was considered by the sub-committee to be a favourable method of disposing of it. Other recommendations were generally concerned with briquetting or canistered swarf and consideration was given to such matters as carbon and manganese loss, or pick up, and so on. A certain practice with cement had been successful in the U.S.A. particularly. Much research work had been undertaken in the U.S.A. with respect to the use of cast-iron borings, and in some plants it was a fairly regular practice. They were large plants handling hundreds of tons of borings per week, and these were very elaborate. Densities were obtained of approximately 70 per cent. of the cast material.

MR. F. C. NIELD said it was mentioned that there were many different types of steels with different properties, etc. There seemed to be one point of advice missing in the section which would be of great help to people who had not special facilities and who were inclined to accept all types of material as being suitable in a cupola. He would refer to high-sulphur steel which did not appear to be mentioned. It was remiss that the sub-committee had not brought the matter forward, and he warned all foundries using steel scrap to reject all material containing 0.3 per cent. sulphur and the like.

MR. VAN DER BEN admitted that the point had not come up for consideration by the sub-committee. He would only state his personal reaction to the enquirer. The answer to the question would depend largely upon the proportion of steel scrap it was proposed to use. Within reason he would not personally have any objection to the inclusion of a certain amount of high-sulphur free-cutting steel. There were occasions when he would be very glad to have it, though he would not recommend it as a general practice. He thought the problem would resolve itself largely into a question of the quantity in which it was used. By and large the great difficulty would be identification. He wondered if Mr. Nield had any experience of the grouping of such quantities of high-sulphur steel as to be a distinct menace in cupola mixtures.

MR. F. C. NIELD said that a point had been touched upon against which he desired to warn people, and that was the practice of using anything from 20 to 30 per cent. of free-cutting steel in castings. They would be almost certain to run into difficulty in the sense that the sulphur content would be very high at a time when the specificational requirements for castings had been raised, whilst the quality of coke for melting had certainly become lower.

High Sulphur for Wear Resistance

Mr. Nield was interested in the statement that it was desired to use free-cutting steel scrap; what was the specification that the lecturer had in mind?

MR. VAN DER BEN said that so far as the deliberate use of free-cutting steel was concerned, it would be used for wear-resisting irons. His foundry did use a high-sulphur pig. Mr. Nield, however, had touched upon a very broad subject, and he, Mr. van der Ben, could foresee that in the future it was likely to lead to trouble.

He could give another instance of the same sort of thing. Some steel scrap was delivered a little while ago among which were some very desirable-looking pieces, three-quarters inch diameter and eight inches long. They looked very desirable for cupola melting. Fortunately, a magnet was used, and it was found they were 14 per cent. manganese steel; using such material somebody was going to

have trouble. There were many materials found amongst grey-iron or mild-steel scrap which were not normal. Another experience went back 15 years. Large quantities of heads were available. They were grey cast iron, but unknown to the recipients, they had been cast in hot moulds and only contained 0.5 per cent. silicon. This material was used in good faith as grey-iron scrap and used for castings into cold moulds and all the resulting castings were white in fracture. There was no end to the possibilities of trouble with scrap. There might be difficulties due to an excessive quantity of nickel, chromium, etc., in any of the alloys, and he was afraid he did not just know the answer to the general problem.

Reverting to Mr. Nield's reference to high-sulphur steels and the scrap merchant, he questioned very much whether the merchant ever knew he had any high-sulphur steel in his scrap. His own experience in engineering shops was that they did not care as long as they got rid of it; they left it to the foundry to deal with.

Effect of Contamination Elements

MR. E. LONGDEN did not think that Mr. van der Ben need worry very much about his steel scrap as long as he knew what it contained. It was an old practice to gather together all the uncertain scrap there was about the shop, and then run it down to ascertain what there was in it. He could understand Mr. Nield's point, which was with respect to iron being under the influence of accidental elements which, in particular, could be introduced through scrap steel. There were enormous effects from minute percentages of such elements in the newly-developed nodular irons.

MR. F. C. NIELD remarked that the Report had been prepared for the guidance of the inexperienced as well as for the experienced. Inexperienced people did not know what they received. He thought that there should have been a rider to the Report with reference to the use of free-cutting steel with high-sulphur content.

MR. VAN DER BEN agreed that that had probably been an oversight, but he considered that those people who had no facilities for control and of knowing what they were doing were in a very difficult position in any event.

THE PRESIDENT suggested that there was one avenue of guidance which could have been cited, namely, that forging scrap should be given preference over bar stock and that sort of thing. He meant bright bar stock and normal machining stock. It was a great temptation to a founder with a machine shop to use his own surplus steel scrap which was often a very risky business. Light casting founders were aware of the dangers arising from the use of high-sulphur free-cutting steel which had been " sneaked in " as a quick way of getting rid of it. It could be a menace.

He asked Mr. van der Ben what founders could do about steel scrap of the more awkward types carrying alloys. They presented rather a problem to solve. Mr. Longden had mentioned the effects of minor elements in cast iron, and Mr. van der Ben had referred to the effect of alloys. His own foundry had experienced difficulty owing to the presence of chrome in one brand of their pig-iron. As Mr. Longden was aware, there had been considerable comment at Ashorne Hill with regard to the effect of minor elements. Personally, he felt that the drastic effects which were obtained with magnesium, cerium and other additions, when added prior to inoculation, were ladle reactions depending upon the original condition of the metal. There was a possible field of trouble which might arise in dealing with the cupola raw materials in respect to which precautions must be taken. He was not making this remark in criticism of the work done by the sub-committee because there was so little known upon the subject.

Rusty and Scaled Scrap

He would also like to have some further guidance with respect to avoiding rusty or scaled scrap, which was a matter referred to in the Report.

MR. VAN DER BEN answered that something depended upon whether the scrap was heavily rusted or burnt. He was of opinion that trouble could arise from the use of considerable portions of such material in a cupola charge. There was a tendency to excessive slag formation. In the first place, there would be a tendency to get lower carbon iron and, for want of a better word, what he would term a " dead " iron. While the temperature might be high on leaving the furnace the melt might be fluid, yet it would become sluggish in the ladle. There was very much that was not known about such effects as yet.

There had been some adverse criticism with regard to certain items in the Report; the reference to inoculation was especially criticised by one or two speakers. Inoculation had a considerable influence on the fluidity of the metal in the ladle, though he felt, personally, that some of the speakers had rather missed the point. Though they accepted the use of heavily rusted scrap and large portions of steel, etc., yet they had never inoculated the resulting iron and did not see why they should.

Inoculation by the simple addition of silicon at the spout was a safeguard well worth while practising. He was well aware that thousands of tons of fairly high-steel mixtures had been used without it, but this did not imply that such metal would not have been improved by inoculation. The sub-committee, of course, was perfectly well aware of this point of view, but the reverse picture was not put forward as to what could have resulted through practising inoculation. He mentioned the point because he thought it did bear upon the use of rusty material, and he believed that the recommendations which had been made were sound, namely, working with a softer blast, increasing the coke ratio, increasing the limestone addition, and that in very bad cases it was advisable to pre-melt the scrap into pig for subsequent re-melting. There would then be a chance of finding out what was going on before using the metal for castings.

It was a question of degree. Personally, he would deprecate using in any one charge, or any proportion of charges, a large amount of heavily burnt scrap such as fire-bars or sash weights, etc., which had a quarter inch of scale upon them.

I.B.F.—Lancashire Branch

THE PRESIDENT enquired whether Mr. van der Ben had had any experience of re-melting pig-iron obtained in that way. Was there still a persistence of difficulty, or was the difficulty minimised?

MR. VAN DER BEN said he had not had any direct experience on that score. If he happened to be faced with using a large volume of that type of material he would certainly prefer to re-melt in order to homogenise the metal. It could then probably be dealt with more efficiently on a re-melt and by limiting the proportion used. He would prefer to do that rather than to melt direct for casting.

Order of Charging

MR. SMETHURST mentioned that Mr. van der Ben had advised putting on the steel scrap first. His own practice for years past had been to put it on last. Which was correct practice? He had tried putting the steel on first and did not get good results.

MR. VAN DER BEN said his advice was to let sleeping dogs lie. If good results were obtained by putting it on last, then keep to that practice. He had nothing to say against doing it in the reverse order.

MR. RENNIE asked Mr. van der Ben's opinion with respect to tapping temperatures.

MR. VAN DER BEN did not place too much reliance upon the optical type of pyrometer. The tapping temperature, judged by the optical instrument, however, was relative and approximate.

Last Month's Steel Output

Steel production last month was at an annual rate of 16,597,000 tons, which represents the highest rate of production ever achieved in the month of May. The previous best was in May of last year, the annual rate then being 16,409,000 tons. The industry's performance last month was especially encouraging in view of the fact that production was affected by the Whitsuntide holiday, which last year fell in the month of June.

Steel output in April was at an annual rate of 16,822,000 tons, and during the first quarter of the year it averaged 16,679,000 tons. The industry's output rate so far this year has exceeded its target of 15,750,000 tons for the year.

The British Iron and Steel Federation also announces that pig-iron output in May was at an annual rate of 9,646,000 tons, compared with 9,492,000 tons in the previous month and 9,700,000 tons in May, 1949.

The latest steel and pig-iron production figures (in tons) compare as follow with earlier returns:—

	Pig-iron.		Steel Ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1950—January ..	187,400	9,742,000	305,300	15,873,000
February ..	184,000	9,588,000	325,000	16,893,000
March ..	186,500	9,696,000	329,800	17,147,000
April	182,500	9,492,000	323,500	16,822,000
May	185,500	9,646,000	319,200	16,597,000
1949—January ..	178,100	9,262,000	288,500	15,002,000
February ..	181,200	9,422,000	311,100	16,176,000
March ..	178,800	9,295,000	312,900	16,269,000
April	178,600	9,288,000	304,900	15,854,000
May	186,500	9,700,000	315,600	16,409,000

More Birthday Honours

Many of the principal awards announced in the Birthday Honours List were referred to in our last issue. Brief notes on some of the awards to other people associated with the foundry, iron and steel, and allied industries are given below.

ORDER OF THE BATH

C.B.

T. R. B. SANDERS, Assistant Controller of Supplies, Ministry of Supply.

ORDER OF THE BRITISH EMPIRE

C.B.E.

C. A. SPENCER, deputy chief scientific officer, Department of Scientific and Industrial Research; O. G. SUTTON, F.R.S., Professor of Mathematical Physics, Military College of Science.

O.B.E.

W. W. DAVIES, senior principal scientific officer, D.S.I.R.; D. C. ESPLEY, engineer, research laboratories, General Electric Company, Limited; C. D. JAMES, principal, D.S.I.R.; J. O. SHIRREFFS, chief accountant, Iron and Steel Division, Ministry of Supply.

M.B.E.

C. A. BEATON, design engineer, Monsanto Chemicals, Limited, Denbighshire; A. W. BRISCOE, works engineer, John Thompson, Limited, Wolverhampton; L. FORBES, higher executive officer, D.S.I.R.; R. J. P. MACDONALD, production superintendent, Henry Wiggin & Company, Limited, Glasgow; F. S. MARSH, technical adviser, Chesterfield Tube Company, Limited; J. H. MARSHLAND, secretary, Wear Shipbuilders' Association; E. W. MARVILL, works superintendent, F. Perkins, Limited, Peterborough; W. J. RUSSELL, production manager, Vickers-Armstrongs, Limited, Crayford; R. W. SMITH, for services as manager, engineering order department, Dewrance & Company, Limited, London, S.E.1; H. C. TRYON, research engineer, D. Napier & Son, Limited, Acton; F. S. WHITEHEAD, manager statistics department, British Iron and Steel Federation.

BRITISH EMPIRE MEDAL

I. GIRLING, safety-first officer, Aveling-Barford, Limited, Grantham; R. E. LUCAS, assistant patternshop foreman, English Steel Corporation, Limited, Sheffield; G. PERCIVAL, works superintendent, Fuel Research Station, D.S.I.R., Blackheath, London, S.E.3; T. A. WILSON, patternmaker, Hadfields, Limited, Sheffield.

Internal Combustion Engines

Important differences between the markets supplied by the industries of the two countries and the effects these differences have on industrial techniques and output are referred to in the report of the team drawn from the British internal combustion engine industry which went to the U.S.A. under the auspices of the Anglo-American Council on Productivity and the Economic Co-operation Administration. The report examines the underlying reasons for the "very considerably" higher productivity attained in America and makes a number of recommendations.

American production methods are examined in detail in the report, which also discusses trends of design before drawing general conclusions. It is pointed out that if Britain is to hold its position in the world's markets and maintain its standards of living, changes in administration policy, machine-tool supply and design, production methods, trade-union agreements, the wages structure, and personnel and supervisory training will have to be made.

Non-ferrous Investment Casting*

By Hiram Brown, B.S.†

(*Continued from page* 648)

This Paper was read on behalf of the Author by Dr. A. B. Everest. The chairman, Mr. Colin Gresty, proposed a vote of thanks to Dr. Everest for his able presentation of it and complimented him on his grasp of the subject. The vote of thanks was seconded by Mr. T. H. Weaver, and heartily accorded. (Written contributions to the discussion are invited.)

Control Details

All investigations indicate the necessity for good temperature control on all furnaces, including controls which allow rapid and constant increase in temperature as well as uniform holding temperature. Arrangements must also be made to introduce sufficient oxygen into the furnace readily to burn the large volume of plastic. If combustion of the plastic be not fast enough, very heavy deposits of carbon will form that are difficult to burn out and will materially affect over-all "burn-out" cycle. When wax patterns were used, pits occurred on castings as a result of small parts of investment dropping into the mould prior to or during casting. These were severe enough to cause high rejection rates. Careful "burn-out" and handling did not seem to correct more than a minor proportion of this trouble. However, this type of defect decreased considerably when plastic patterns were used. It is believed that the principal cause of this condition was the fact that when the wax melted it soaked into the investment during the drying cycle. When the moulds were fired the wax tried to force its way out of the investment, and quite often the evolution was violent enough to lift small flakes of investment to form a scabbing condition. When metal was poured into the flask, it either broke loose those films of investment or flowed around them, and in either case resulted in pitting.

With non-ferrous alloys it has been found that to obtain the best results the moulds must be cooled before pouring. Different alloys require different mould temperatures, so the range of mould temperature may be from 538 deg. C. to room temperature. To save time, to give more flexible operation, and to increase output, it is much better to

* Official Exchange Paper from the American Foundrymen's Society, presented at the Annual Conference of the Institute of British Foundrymen.

† The Author is chief metallurgist, Solar Aircraft Company, Des Moines, Iowa.

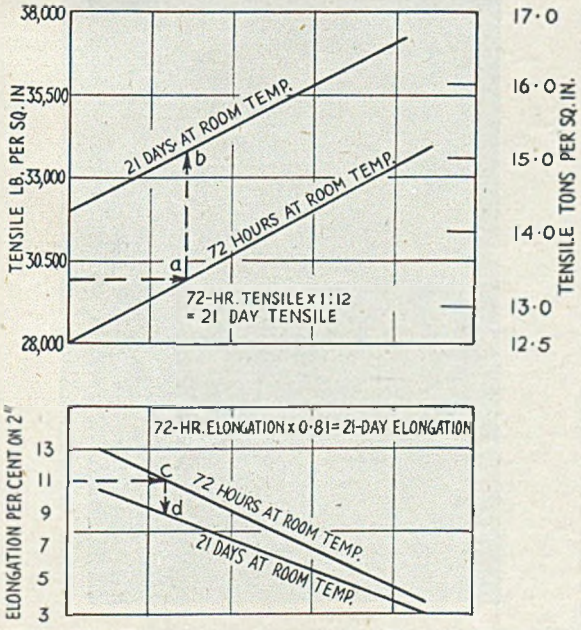


FIG. 11.—EFFECT OF AGEING ON TENSILE STRENGTH AND ELONGATION OF 40E ALUMINIUM ALLOY.

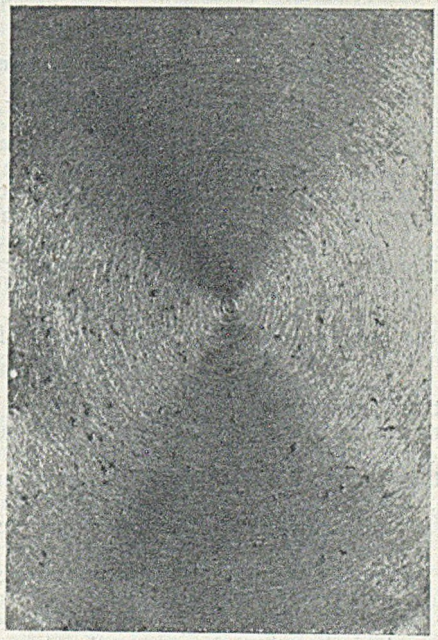


FIG. 12.—PINHOLE FORMATION AT 760 DEG. C. IN 355 ALUMINIUM ALLOY. (×1.12.)

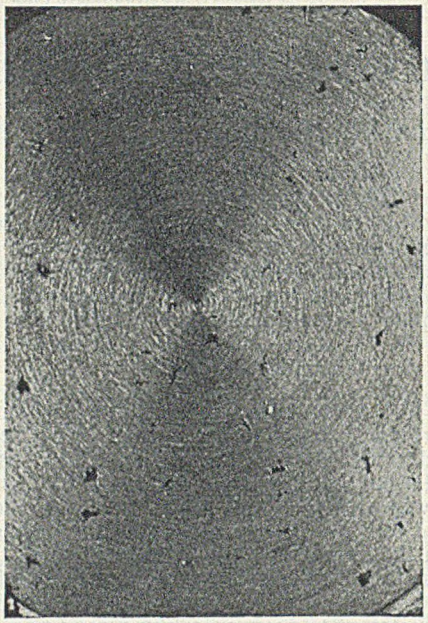


FIG. 13.—PINHOLE FORMATION AT 980 DEG. C. IN 355 ALUMINIUM ALLOY. (×1.12.)

use small, batch-type furnaces for low-temperature work than to use one big, continuous "burn-out" furnace. The cooling rate will be faster, and the moulds requiring low pouring temperatures can be segregated from those requiring higher pouring temperatures, so that it is not necessary to wait for a large furnace to cool through the respective ranges before finally casting the moulds requiring low pouring temperature.

Gating Practice or "Set-up" of Patterns

By the "set-up" of patterns is meant their joining or assembly into a unit which will be invested and cast. It is evident that if the "set-up" is to be economic and efficient, then much forethought must go into the original design of the dies or moulds. The first object is to get into the mould as many pieces as can be cast at one time with satisfactory quality. The second consideration is how this can be done rapidly on a production basis. If the number of parts required be small, or if the patterns are to be made singly of wax, then not so much advance thought is concerned, since by hand work the parts can be set up in almost any conceivable manner. However, if the patterns are to be made in groups, or still more, if injection dies are to be made for large production runs, then planning must start with mould and die design. This is so because if assemblies are to fit together satisfactorily, the patterns must be produced in size and shape that will readily lend themselves to rapid assembly. Wherever possible on injection-made patterns, the gates and runners which admit the plastic to the die cavities should be of such design that they may also be used to introduce metal into the mould cavities after the patterns have been eliminated. If these are properly designed, then for assembly it is only necessary to remove the sprue from the pattern and assemble the patterns complete with gates and runners. Then the pouring sprue necessary for the entire assembly is attached. For this purpose wax or plastic bars, flats, or other standard shapes can be used. Small pits can result if patterns be designed so that they do not join solidly and tiny spaces are left when they are placed together. Unless those spaces are filled with plastic or wax during the setting-up, the investment will flow into those cracks and result in fins of investment which will wash into the mould.

Arrangement of Patterns in the Investment

In arranging the "set-up," the following factors should be considered: ease of assembly and cementing, drainage from the ceramic mould, flow of metal into the cavity, and cut-off operation. Either round or rectangular flasks may be used. At least one-half inch should be allowed for the ceramic wall between the patterns and the flask wall, and at least three-quarters of an inch, preferably one inch, from the bottom of the "set-up" to the bottom of the flask. These thicknesses are necessary to insure sufficient strength for the ceramic to withstand the expansion of the plastic, as well as thermal shock, and the pressure used in casting the metal. The actual arrangement of patterns should be such that the minimum of straight lines or planes of weakness will be formed in the ceramic. Usually $\frac{1}{8}$ to $\frac{1}{4}$ in. should be allowed between patterns or rows of patterns. Staggered "set-ups" help to prevent cracks when using plastic patterns. That is, if the first row has a heavy shoulder of the "set-up" on the outside, then the next row should be reversed so that a short dimension of the plastic is on the

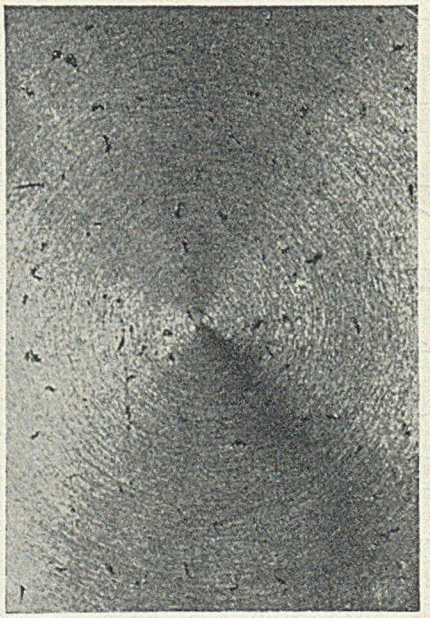


FIG. 14.—PINHOLE FORMATION IN 355 ALUMINIUM ALLOY AFTER COOLING TO 760 DEG. C. (×1.12.)

outside. Where this is impossible or impractical, then the rows should be offset by having every alternate row indented so that no two adjoining rows have a heavy section at the same level. It appears that stresses set up during expansion cause cracks which will tend to be continuous across the mould unless the lines of stresses are broken up. The staggering of "set-ups" will break up these stress lines.

Sometimes cracking occurs around areas which have large sections of plastic, such as sprues and risers. This can be minimised considerably by placing a wax pad around those areas of the pattern and the latter can be accomplished by actually placing small strips of wax at any areas where large plastic concentrations occur, or by dipping that part of the "set-up" in molten wax. The wax cushion melts and flows out of the mould before the critical expansion temperature of the plastic is reached, thus leaving room for the plastic to expand without pushing against the investment.

If flasks are made of too-thin metal, the cracking of moulds is much worse than if heavier gauge material is used. It was found that stainless-steel sheet of no less than 0.060 in. thickness should be used for flasks. Experiments were made using stainless-steel flasks of 0.037 and 0.060 in. thickness respectively. All of the castings in the lighter flasks exhibited more flash or fins than those in the heavier flasks. Similarly, casting the same parts in both square and round flasks resulted in more flash or fins in those cast in square flasks than those cast in round flasks of the same gauge.

Melting, Pouring, and Metallurgical Considerations

Melting.—Melting can be carried out in the usual types of equipment, except that very small furnaces

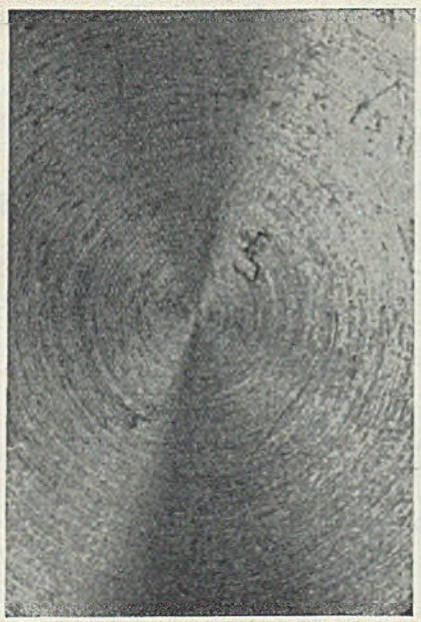


FIG. 15.—ABSENCE OF PINHOLE FORMATION AT 760 DEG. C. IN 40E ALUMINIUM ALLOY. (× 1.12.)

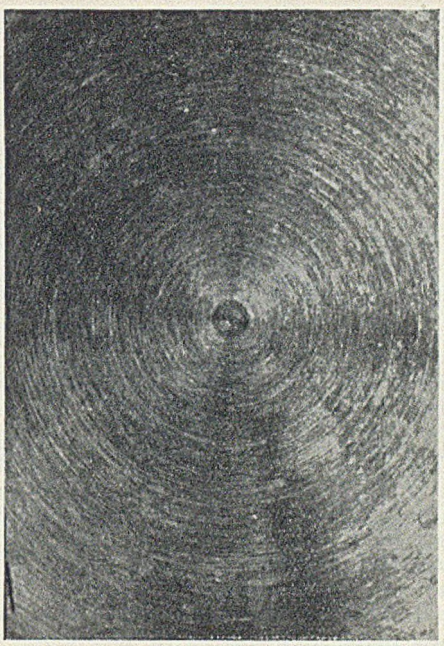


FIG. 16.—ABSENCE OF PINHOLE FORMATION AT 950 DEG. C. IN 40E ALUMINIUM ALLOY. (× 1.12.)

are used. Non-ferrous alloys can be melted in induction furnaces, or in oil- or gas-fired stationary or tilting furnaces. Usually, silicon carbide or clay/graphite crucibles are used due to their ability to retain heat while the metal is being carried to the moulds, and because they do not tend to contaminate the metals with undesirable impurities. In any case, good temperature control should be exercised.

The standard alumel-chromel or similar immersion-type thermocouples may be used. To assure accurate measurement, it is recommended that closed-end thermocouples be used. These are less likely to give erratic readings for most metals than are open-end types. Many portable pyrometers of this type, capable of measuring up to 1,370 deg. C. are available, and can be used either while the pot is in the furnace or anywhere in the shop where metal is being poured. As in other foundries, metals are subject to gas pick-up during melting and the usual fluxing or degassing methods used in other types of foundries should be applied to the metal for investment casting.

Pouring.—There are four possible methods of pouring investment castings:—(1) Static pour; (2) centrifugal pour; (3) applied pressure, and (4) vacuum. There have been reports of successful vacuum casting, but the Author's experience has included only the first three methods. If a part can be poured statically with good results, then there is no reason to pour it in any other manner. Usually, however, due to the small size and thinness of investment-cast parts, it is necessary to apply additional force to assure the complete filling of the mould. This force can be supplied by centrifugal action. It can also be obtained by pouring the metal statically

FIG. 17.—SINGLE PINHOLE WHICH IS TYPICAL OF THIS DEFECT IN ALUMINIUM ALLOYS.

and immediately lowering a pressure head over the mould and virtually blowing the metal into the mould. Where stationary pressure heads are used, the moulds are rapidly placed under the head, poured, and the pressure head tightened to seal against the top of the mould and air pressure turned on. This usually results in sprues which suck down and practically disappear when the pressure blows into the mould. (Fig. 7 shows a pressure casting machine.) Centrifugal casting requires extremely good co-ordination, if misruns are to be avoided, and in general is a more complicated process. Although this method of investment casting is used a great deal, the Author in his own experience did not find any cases where centrifugal casting would successfully cast parts which could not be successfully cast by the use of applied pressure.

In the case of applied pressure, there were two defects which were most prevalent:—(1) Non-fills, and (2) cold shuts or misruns. These in turn were due primarily to two factors:—(*a*) Insufficient pressure, and (*b*) cold metal. "Non-fills" are castings which have not been completely filled with metal. The cause seems to be lack of pressure; insufficient pressure is the result of leakage. Pressure is usually maintained solely between the pressure head and the top of the mould. Thus, if a crack forms which extends to the edge of the mould, a pressure leak occurs and full pressure cannot be maintained. Pressure leaks develop along cracks in the ceramic, or at places where patches of ceramic drop off during the "burn-out," or due to improper clamping of the pressure fixture. Some relief is possible if a pressure chamber is used to surround the mould. For example, a cylinder slightly larger in diameter than the mould can be sealed tightly to the pressure head of the pressure machine with the bottom left open. This can be lowered around the mould and sealed in rubber or some material which will make a tight seal. Then, when pressure is turned on, the cylinder becomes a pressure chamber and does not have to depend on the top of the ceramic as a seal. This is also helped by substituting quick-action valves in the place of hand valves, so that pressure is acting as soon as the valve is touched by the descending cylinder or some similar arrangement.

Misruns are defects where metal does not quite fill sharp corners or recesses or does not run the expected distance in the mould. Cold shuts are defects where streams of metal meet but do not merge to form a solid part. Both of these defects are usually due to cold metal. This can result from

TABLE I.—*Nominal Chemical Composition Per Cent. of Aluminium Alloys Used.*

Alloy.	Copper.	Silicon.	Magnesium.	Zinc.	Chromium.	Titanium.
195	4.5	0.8	—	—	—	—
355	1.3	5.0	0.5	—	—	—
40E	—	—	0.5	5.5	0.5	0.2

TABLE II.—*Tensile Properties versus Type of Gating of Test-bars.*

Alloy.	Condition.	Gating.	Tensile, tons per sq. in.	Elongation per cent. on 2 in.
195	As-cast..	Direct pour..	9.0	2.6
195	As-cast..	Indirect pour	7.3	1.1
355	As-cast..	Direct pour..	11.8	2.0
355	As-cast..	Indirect pour	11.0	2.0
40E	3 days at room temp.	Direct pour..	14.0	10.0
40E	3 days at room temp.	Indirect pour	13.4	10.0
40E	10 days at room temp.	Direct pour..	15.6	11.0
40E	10 days at room temp.	Indirect pour	14.9	10.0

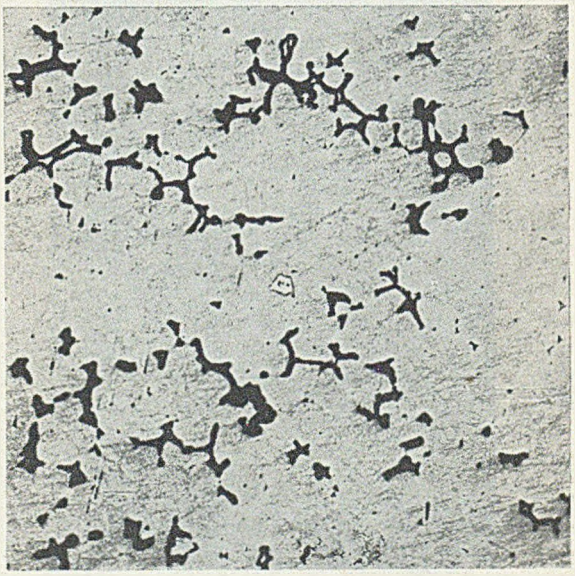


FIG. 18.—SHRINKAGE DUE TO LACK OF FEEDING IN AN ALUMINIUM ALLOY.

the transport of molten metal from the furnace to the mould, or from transfer of metal from the furnace to a cold ladle, or from improper temperature measurement. When induction furnaces, or stationary or tilting oil- or gas-fired furnaces are used, the metal must be carried from the melting furnace to the pressure machines. Even though this is but a short distance, heat loss is high because of the small amount of metal melted each time. In the case of gas- or oil-fired pots, the crucibles can be lifted out of the melting furnace and carried to the mould, thus minimising heat loss, since no intermediate transfer of metal is involved. However, where stationary induction furnaces are used, the metal must be transferred to a ladle and then carried to the mould, thus involving considerable heat loss. This condition can be overcome by using induction furnaces equipped with switch contacts in the floor under the furnace. The lifting of the furnace breaks the circuit at the switch, and since all power cables can be fastened to the floor switch and none left on the furnace to interfere with lifting, the entire melting portion can be lifted and carried to the moulds with a minimum heat loss.

TABLE III.—*Effect of Metal Temperature on Tensile Properties Using the Direct-pour Technique.*

Alloy.	Condition.	Metal temperature.	Tensile, tons per sq. in.	Elongation per cent. on 2 in.
195	As-cast	732	5.8*	1.0*
195	As-cast	718	10.0	2.5
195	As-cast	705	10.2	4.0
195	As-cast	690	10.1	3.5
195	As-cast	677	9.9	4.0
40E	3 days at room temp.	732	14.4	15.5
40E	3 days at room temp.	718	14.1	13.5
40E	3 days at room temp.	705	14.2	13.5
40E	3 days at room temp.	690	14.2	13.0
40E	3 days at room temp.	677	14.0	14.0
40E	10 days at room temp.	732	14.8	12.0
40E	10 days at room temp.	718	15.7	11.0
40E	10 days at room temp.	705	15.7	11.0
40E	10 days at room temp.	690	15.4	12.0
40E	10 days at room temp.	677	15.7	11.0

* Bars had coarse, dendritic structure.

TABLE IV.—*Effect of Mould Temperature on Tensile Properties Using the Direct-pour Technique.*

Metal.	Condition.	Metal temperature, deg. C.	Mould temperature, deg. C.	Tensile, tons per sq. in.	Elongation per cent. on 2 in.
195	As-cast	705	205	8.7	4.0
195	As-cast	705	Room temp.	10.6	3.0
40E	3 days at room temp.	705	205	13.1	11.5
40E	3 days at room temp.	705	Room temp.	13.3	12.0
40E	10 days at room temp.	705	205	15.2	11.5
40E	10 days at room temp.	705	Room temp.	15.0	10.0

TABLE V.—*Nominal Chemical Composition of Copper-base Alloys Used.*

Alloy.	Zn.	Sn.	Pb.	Si.	Mn.	Al.	Be.	Co.	Fe.
Silicon brass	14	—	—	4	—	—	—	—	—
85-5-5-5	5	5	5	—	—	—	—	—	—
Beryllium copper	—	—	—	—	—	—	2.0	0.5	—
Manganese bronze	38	—	—	—	1.0	1.0	—	—	1.5

Metallurgical Considerations

There are a number of metallurgical factors to be considered, such as:—(1) Gating; (2) mould temperature, and (3) metal temperature. Gating includes getting the metal into the mould cavity in a manner which will ensure sound castings with good mechanical properties, and passages for the escape of air or mould gases, which, due to the tightness of the ceramic, cannot escape through the mould walls.

TABLE VI.—*Sand-cast Specifications for the Copper-base Alloys Shown in Table V.*

Alloy.	Min. tensile, tons per sq. in.	Min. elongation, per cent. on 2 in.
Silicon brass	26.8	16
85-5-5-5	13.4	20
Beryllium copper	35.7	20
Manganese bronze	29.0	20

It is believed in many quarters that very thin gates and small risers can be used on investment castings which proportionally are much smaller than those used on sand castings. This quite often leads to serious trouble, particularly in regard to mechanical properties. The Author has previously shown[6] that with plaster castings, it is possible to increase tensile strength by 13 per cent., and an elongation by 50 per cent., and reduce micro-shrinkage by in-increasing the size of gates and risers.

It is, furthermore, often stated that investment test-bar properties are lower than sand-cast values. This is not true if proper test specimens are used and proper gating is employed. Since investment castings are smaller than sand castings, it is only fair that a test specimen smaller than 0.5 in. dia. be used. Therefore, the standard tensile specimen for investment casting is 0.25 in. in diameter and has a one-inch gauge length. Usually $\frac{3}{8}$ in. threaded shoulders are cast on the specimen and the bar is pulled as-cast (see Fig. 8). Using this specimen, tensile properties equivalent to sand-cast properties for equivalent materials can be obtained. Pouring temperatures can be kept lower than for sand casting, and fine-grained, sound castings can be produced.

TABLE VII.—*Tensile Properties versus Type of Gating of Test-bars.*

Alloy.	Gating.	Tensile, tons per sq. in.	Elongation per cent. on 2 in.
Silicon brass	Direct	32.1	30.7
Silicon brass	Indirect	32.7	28.7
85-5-5-5	Direct	13.0	39.7
85-5-5-5	Indirect	17.8	38.2
Beryllium copper	Direct	36.6	24.0
Beryllium copper	Indirect	33.9	16.5

Non-ferrous Gating Practice

In order to obtain the best results with non-ferrous alloys, a wide range of mould and metal temperature is necessary. Two types of test-bar gating were tried: (1) direct pour, and (2) indirect

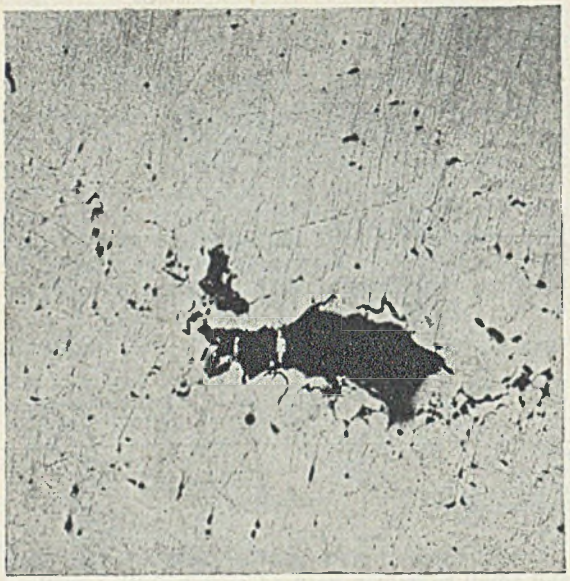


FIG. 19.—GAS HOLE IN ALUMINIUM ALLOY SURROUNDED BY MICROPOROSITY.

pour. These are shown in Figs. 9 and 10 respectively. In each case external pressure of 20 lb. was applied immediately after pouring. First, aluminium alloys were tried. Nominal compositions of the alloys are shown in Table I.

From the data in Table II, it can be seen that all of the aluminium alloys tested gave the best results with direct pouring. Using the direct-pour gating, further tests were made with two aluminium alloys to determine the effect of pouring temperature on the tensile properties of test specimens. The two alloys showed very low sensitivity to pouring temperatures used, as shown in Table III. However, 732 deg. C. was too high for 195 alloy and gave very bad results. In general, 705 deg. C. appeared to be satisfactory for both.

The same two aluminium alloys were used to determine the effect of mould temperature on the tensile properties of test-bars. The two alloys showed a different degree of sensitivity to mould temperature as shown by Table IV. The aluminium/copper alloy showed definite increase in strength when the mould temperature was reduced from 205 deg. C. to room temperature. The aluminium/zinc/magnesium alloy showed very little change with variation in mould temperature. Similar tests were conducted on copper-base alloys. The nominal chemical composition of the alloys used are shown in Table V. Table VI shows the sand-cast requirements for the alloys tested.

The effect of gating practice on tensile properties is shown in Table VII. Again as in the case of aluminium alloys, the copper-base alloys gave best results using direct-pour methods. The effect of metal temperature is shown in Table VIII. In each case there was an optimum pouring temperature which gave best combination of tensile and elongation. This was 900 deg. C. for silicon brass, 1,065 deg. C. for 85-5-5-5, and 1,010 deg. C.

TABLE VIII.—*Effect of Metal Temperature on Tensile Properties Using the Direct-pour Technique.*

Metal.	Metal temperature, deg. C.	Tensile strength, tons per sq. in.	Elongation per cent. on 2 in.
Silicon brass ..	955	28.4	29.0
Silicon brass ..	930	29.5	27.0
Silicon brass ..	900	29.3	29.0
Silicon brass ..	870	27.9*	11.0*
85-5-5-5	1,120	16.1	36.0
85-5-5-5	1,095	16.6	41.0
85-5-5-5	1,065	17.3	40.0
85-5-5-5	1,040	15.8*	28.0*
Beryllium copper ..	1,095	35.1	26.5
Beryllium copper ..	1,065	35.2	28.0
Beryllium copper ..	1,010	36.1	29.0

* Dross in the bars.

for beryllium copper. When the pouring temperature was too low, dross remained in the bars, so it is clear that pouring ranges must be selected to avoid this condition. Table IX shows the effect of mould temperature on tensile properties. The

TABLE IX.—*Effect of Mould Temperature on Tensile Properties Using the Direct-pour Technique.*

Metal.	Metal temperature, deg. C.	Flask temperature, deg. C.	Tensile, tons per sq. in.	Elongation per cent. on 2 in.
Silicon brass	930	480	31.7	28.25
Silicon brass	930	Room temp.	33.1	27.0
85-5-5-5	1,065	480	16.3	27.0
85-5-5-5	1,065	Room temp.	10.7*	9.0*
Beryllium copper ..	1,010	595	37.2	21.5
Beryllium copper ..	1,010	480	37.7	24.0
Beryllium copper ..	1,010	Room temp.	37.0	28.0

* Bars contained dross.

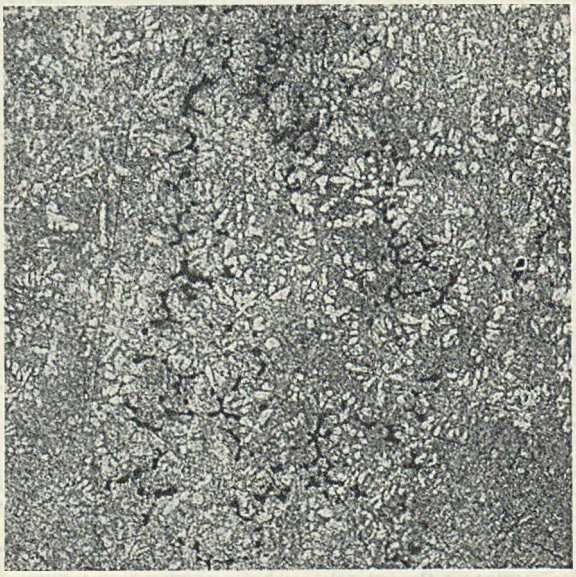


FIG. 20.—SHRINKAGE AREA CAUSED BY POOR FEEDING OF AN ALUMINIUM ALLOY.

85-5-5-5 alloy showed a tendency to trap a rough oxide film when mould temperature was too low. The other alloys showed little variation in properties with decreasing mould temperature, and, in general, a mould temperature of 480 deg. C. seemed to be satisfactory for all of these alloys.

Manganese bronze was the only alloy tested which could not be made to produce uniform and satisfactory results. If tensile was satisfactory, elongation was too low. If elongation was satisfactory, tensile was low. Table X shows typical examples of this; numerous specimens were cast, but the answer to the erratic results was never found. The only tangible fact uncovered was that,

TABLE X.—*Effect of Gating on Tensile Properties of Manganese Bronze.*

Gating.	Metal temperature, deg. C.	Mould temperature, deg. C.	Tensile, tons per sq. in.	Elongation per cent. on 2 in.
Direct	1,010	480	31.9*	16.4*
Indirect	1,010	480	33.2	20.5
Direct	1,010	480	26.3*	15.2*
Indirect	1,010	480	28.5	26.5

* Bars contained dross.

due to the excessive drossing of the alloy, it was necessary to use indirect pouring. The bars with direct pouring were always badly drossed. The variation of metal or mould temperature did not seem to help at all.

When 85-5-5-5 brass castings were removed from the mould, they were found to have a thin, hard, black coating. It was difficult to remove this coating even with a file. It was found that it would loosen rapidly by immersing the parts in hot 15 per cent. nitric acid, rinsing in cold water, drying with an air blast, and then sand blasting the part. This produced a part with a very smooth finish. Probably this skin resulted from a reaction between the lead content of the alloy and the ceramic mould, since this problem was not encountered with lead-free

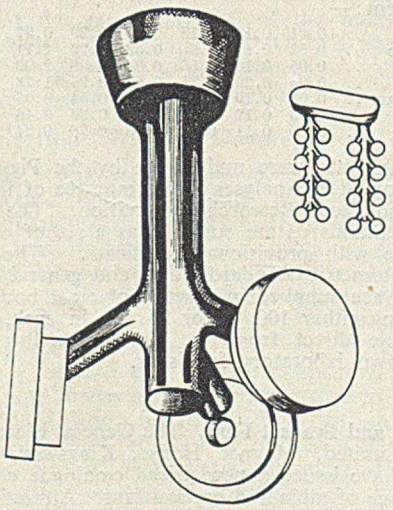


FIG. 21.—TREE-TYPE GATING ARRANGEMENT.

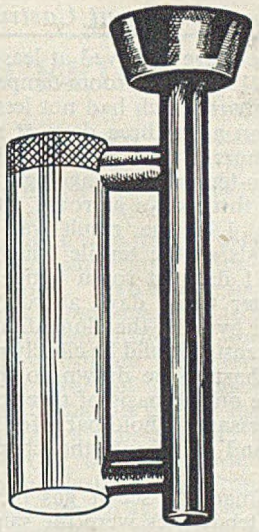


FIG. 22.—BOTTOM-POUR GATING ARRANGEMENT TO SUPPLY HOT METAL, FINALLY, TO THE TOP OF THE CASTING.

alloys. Lipson, Markus, and Rosenthal[1] have shown that quite a wide range of mechanical properties can be obtained by quenching copper-base alloys by dumping the moulds into cold water.

In casting 40E aluminium, one unusual fact was noted. In every case, test-bars which had not less than 12.7 tons per sq. in. tensile after three days

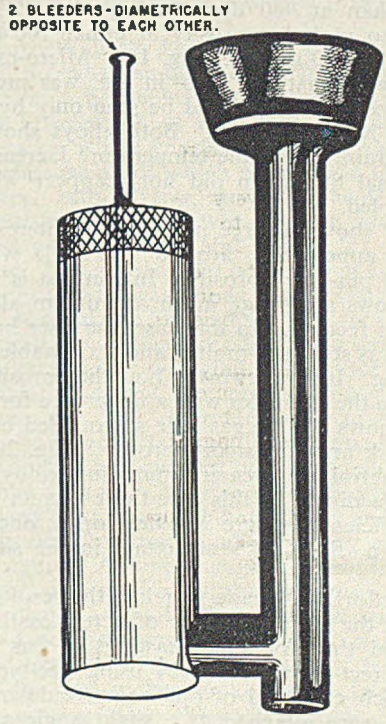


FIG. 23.—METHOD OF VENTING USED TO RELEASE AIR FROM THE TOP OF THE MOULD CAVITY.

Non-ferrous Investment Casting

at room temperature achieved at least 18.8 tons per sq. in. after 21 days of room-temperature ageing. Similarly, test-bars which had not less than 3.75 per cent. elongation after three days at room temperature had no more than 3 per cent. elongation after 21 days' room-temperature ageing. If the tensile strength after three days at room temperature was multiplied by 1.12, the result was within a few hundred pounds of the tensile which could be expected after 21 days at room temperature. If the elongation after three days at room temperature was multiplied by 0.81, the elongation after 21 days at room temperature could be closely predicted. This permitted a chart to be drawn so that predictions could be made on the basis of three-day ageing and it was not necessary to hold parts for 21 days before final testing and shipment; the chart is shown in Fig. 11.

Tests were made to see if gas pick-up and pin-hole porosity tendencies were the same as for sand castings. The alloys retained the same characteristics except that conditions were exaggerated by the slow cooling. Heats of 355 and 40E aluminium were heated progressively from 705 to 980 deg. C. with specimens poured at 55 deg. C. intervals as the metal was heated and cooled. Test blocks 1½ by 1 by ½ in. were cast and machined for visual examination and polished for micro-examination. The 355 alloy formed pinholes even when poured at 760 deg. C. (Fig. 12). Holes were larger at 980 deg. C. (Fig. 13). After cooling to 760 deg. C. the holes were still present, but more scattered and smaller than at 980 deg. C. (Fig. 14). The 40E showed no pinhole porosity at either 760 deg. C. (Fig. 15) or 980 deg. C. (Fig. 16). Micro-examination showed that the gas in 40E was present as microporosity, which could be seen only by microscope or X-ray methods. Both alloys showed increased grain size as the temperature increased and the original fine grain did not reappear when the metal cooled.

Fig. 17 shows a large pin-hole; of interest is the rounded appearance around the hole which is typical of pin-hole porosity. In contrast is Fig. 18, which shows shrinkage in an aluminium alloy due to lack of feeding. In this case, the riser broke off while it was still semi-molten and was unable to feed the casting. It is noteworthy how the porosity tends to eat into the dendrites with a finger-like formation. Fig. 19 shows a large gas hole surrounded by many small, dark areas of microporosity. Fig. 20 shows another shrinkage area in aluminium alloy caused by poor feeding. In this case there was an air leak and insufficient pressure was developed; once again there is a finger-like structure in the shrinkage porosity.

Some effort was made to relate the results of the tests with the gating practice of actual castings. It was found that for small castings it was best to use the direct-pour method by using tree-type "set-ups," which consisted of one or more down-sprues to which were attached at a slight angle as many castings as there could be found room for. Each casting was attached to the down-sprue by a slender gate (Fig. 21). For large castings, ½ in. or more in thickness and 3 in. or more long, it was found best to use indirect pouring methods, whereby the metal entered the casting at the bottom. At the top of the casting was placed another gate to allow the escape of air during pouring and which acted as a place for a "hot shot" at the end of the pour to supply hot metal at the top of the casting where it was needed during solidification (Fig. 22). If bottom gating is not used on large castings and air vents are not supplied at the top of the mould, air is likely to be trapped in the cavity and will appear as blows, non-fills, or as dendritic, crystalline, or rough-surface appearance on the castings. Sometimes, the top gate may be omitted if adequate venting is supplied as shown in Fig. 23. Using this method of indirect pouring, castings up to 1½ in. thick and 6 in. long, or even solid-elbow shapes, can be successfully cast.

BIBLIOGRAPHY.

1 Sweeny, W. O., "Precision Casting Comes of Age," *Steel*, January 6 1947, p. 220.
2 Morey, W. A., Capt., "Industrial Status of Precision Castings," *American Foundryman*, October, 1945, p. 33.
3 Post, Charles T., "Precision Casting With Plastic Patterns," *Iron Age*, November 15, 1945, pp. 54-57.
4 Moore, Thomas T., "Investment Material for Industrial Precision Casting," *Foundry*, March, 1949, p. 196.
5 Soil Mechanics Lab., M.I.T., "Casagrande's Nomographic Chart for Solution of Stoke's Law," Cambridge, Mass.
6 Brown, Hiram, "New Aluminium Alloys and Processes," *Aluminium and Magnesium*, October ,1944, pp. 24-27, 39.
7 Markus, H., Lipson, S., and Rosenthal, H., "Precision Cast Copper-Base Alloys," *Iron Age*, November 8, 1945, pp. 64-73.
8 Neiman, Robert, "Precision Casting by Investment Moulding Process," *A.F.A. Transactions*, Vol. 52, 1944, pp. 349-383.

Spectrographic Standard Steels

Bureau of Analysed Samples, Limited, 234, Marton Road, Middlesbrough, announce a new development, *viz.*: a series of eight spectrographic standard steels in the form of (*a*) rods ¼ in. diam. by 6 in. long, and (*b*) fine turnings as standards for analytical purposes and photometric standardisation (construction of graphs).

The percentage chemical compositions are as follows, tabulated in the ascending order of each constituent:—

Silicon ..	0.01	0.13	0.18	0.25	0.29	0.37	0.62	0.81
Manganese ..	0.02	0.17	0.36	0.53	0.79	1.11	1.21	1.42
Nickel	0.05	0.18	0.56	0.84	2.08	2.92	4.10	5.15
Chromium ..	0.04	0.20	0.35	0.53	0.96	1.72	2.34	3.07
Molybdenum ..	0.01	0.19	0.32	0.43	0.54	0.95	1.29	1.41
Vanadium ..	0.03	0.12	0.22	0.26	0.36	0.46	0.52	0.65
Copper ..	0.09	0.11	0.11	0.18	0.23	0.24	0.31	0.50

The analyses were undertaken by the Pig-iron and Low-alloy Steel Analyses Sub-committee of the British Iron and Steel Research Association. The Spectrographic Standards are supplied as a set of eight rods complete with provisional certificate. The turnings for photometric standardisation and general chemical analyses are supplied in a series of eight bottles, each containing either 100, 50 or 25 gm. in each. All are obtainable direct from the Bureau or through any well-known laboratory furnisher.

Table and Bracket Fans. The General Electric Company, Limited, Magnet House, Kingsway, London, W.C.2, have issued a new priced catalogue covering a wide range of table and bracket fans. Attractively presented and well-illustrated, the pamphlet runs to eight pages.

Institute of British Foundrymen

BUXTON CONFERENCE PROCEEDINGS

Reception of Presidential Address and Edward Williams Lecture

After a brief interval following the Annual General Meeting, the delegates at the Conference of the Institute of British Foundrymen at Buxton held earlier this month gathered to hear the Presidential Address, given by Mr. J. J. Sheehan, B.Sc., A.R.C.Sc.I.

Introducing his address,* Mr. Sheehan emphasised that it was, from its nature, an expression of personal opinion. He had called it "A way of living," and to him it was an expression of personal feelings regarding the Institute.

Proposing a vote of thanks to the president for the address, MR. N. P. NEWMAN, immediate past-president, said it had been not only an education, but had also shown that the president was an artist. And when he used the word "artistic" he did not mean something that was first appreciated from the antique. Their president had the artistic sense in his soul and had applied it to learning how to enjoy life. He thought he had put into words what many of his audience thought. He had given expression to what were fundamental beliefs and were the true way of life.

Mr. C. Gresty, senior vice-president, seconded and described the address as "inspiring." He had been particularly interested in the remarks about the value of the foremen's courses. He had had the experience of attending the training course this year and had found it an education. The enthusiasm of the men attending was unbounded, and the way they got down to rapid straightforward discussion was amusing. Those who were present as chairmen learned what foremen thought of management.

The only other point he would add was that he fully agreed with the president's remarks about the value of branch work. After all it was only in the branches that the great majority of the members ever got a chance of participation. Only a portion were lucky enough to get to conferences.

The vote was carried by acclamation.

Edward Williams Lecture

Sir Andrew McCance, who delivered the Edward Williams Lecture, said how greatly he appreciated being asked to address the members. In the choice of subject there was, fortunately, no restriction, and he hoped that the subject which he had chosen "Gases in Steel," might be one in which the members would find some interest.

(Here followed the address*).

Proposing a vote of thanks to Sir Andrew, DR. J. E. HURST said it was a particular pleasure to him to make the proposition because of his own interest in the subject of gases—though his interest was confined to gases in cast iron. His personal interest was such that he felt a strong temptation to start a discussion, but in the case of the Edward Williams Lecture he had to resist.

However he was quite sure that Sir Andrew could have chosen no more important subject on which to address foundrymen. Gases were in themselves elusive and he could assure members from personal contact with the problem that there was no more elusive problem to investigate than that of gas in metals. It was, however, of fundamental importance to all who had to handle molten metals. Ever since his first contact with the foundry industry he had been endeavouring to find a solution to the problem of producing castings free from unsoundness and had always come up against the difficulty of understanding the nature of the gases which were present in liquid metals.

He always admired and often envied the courage and also the facilities that the steel people had at their disposal when they undertook to deal with that problem. In that context, he reminded members that Sir Andrew McCance had very modestly referred to the work of others, he had said nothing about his own efforts and the inspiration that he had given in the early days, and continuously to the investigation of that problem. It pleased Dr. Hurst to think that in the Institute they now had a general committee engaged in dealing with the problem as far as it applied to cast iron.

The Edward Williams Lecture was founded with the object of providing an opportunity for an address by a leader in a particular subject and they now had in the Proceedings at least a dozen Edward Williams lectures which constituted a very valuable source of reference all of which were at the time of their delivery, authoritative pronouncements. Sir Andrew's lecture would, he was sure, be added to that list, and would be read and re-read for a long time to come. The address had been well in keeping with traditions and he was happy to propose a very hearty vote of thanks to Sir Andrew McCance.

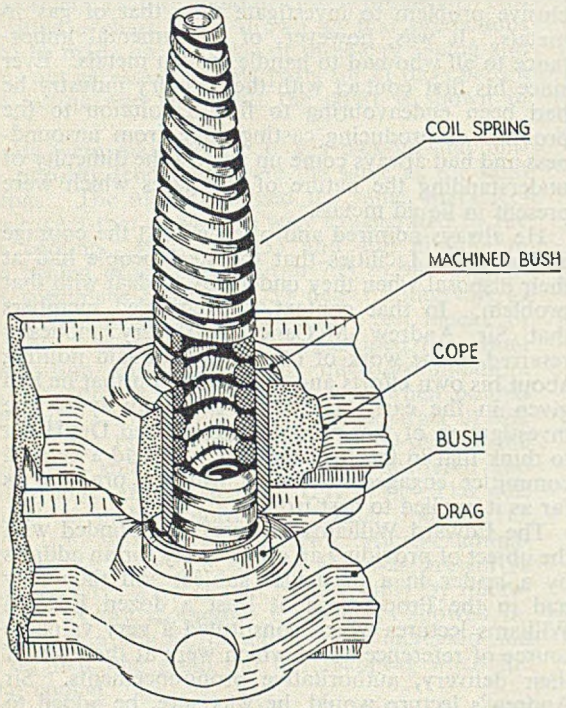
Dr. Dadswell, junior vice-president, who seconded the proposition, said he was glad to undertake that duty, particularly when it was remembered that Sir Andrew was the vice-chairman and managing director of the largest steel-producing organisation in Scotland and, of its type, one of the largest in the British Empire. As such, they would realise that he must be a very busy man, yet he had devoted time to attending the Conference and delivering a most absorbing lecture. As one engaged in steel casting himself, he possibly realised all the more the importance of the lecture. While Sir Andrew was speaking, he could not help wondering how it was that anyone ever made a sound steel casting. He had shown how the steel maker could remove from the liquid steel some of the inherent dangers of containing gas as it left the furnace, but the "foolish

(*Continued on page* 682.)

* Printed in the JOURNAL June 8.

Coil-spring Moulding-box Pins

Mr. B. Faure, of *Faure et Cie,* the well-known founders of Riven, in the French Ardennes, has invented a really novel type of moulding-box pin. It is covered in the United Kingdom by Patent No. 590,049. The general appearance of this pin is shown in Fig. 1 and as assembled in a two-part moulding box in Fig. 2. The main feature of Mr. Faure's invention is that it replaces the usual rigid pin by a spiral spring, which though elastic throughout its general length, carefully registers the two box parts at its seat. What follows are abstracts from Mr. Faure's notes.



All moulding operations necessitate that when closing boxes there should be precision mating, as the dimensional accuracy of the finished casting depends on this factor. For foundries making thin castings of, say, just over $\frac{1}{8}$-in. thick, for stove work and the like, the tolerances cannot be allowed to exceed $\frac{1}{10}$ mm. without serious repercussions in the serviceability of the part. A tolerance of a $\frac{1}{10}$ mm. implies for a two-part-box casting a mating tolerance of the same order. Thus, when moulding each part, a box is placed on a pattern plate and is mated in relation to the latter by means of a pin, giving a tolerance A which can be called A and which is based on the precision of the pin in relation to the pattern plate and a second tolerance B, which covers the precision of the box-part. Then, in actual working, these tolerances are added or subtracted. Each box-part obeys the same rule, and thus for a complete mould there is possible maximum tolerance of $2A + 2B$. Therefore, the total tolerance of a half mould in relation to the one covering it (when the various tolerances are not compensatory) can end by being six times as great as the initial single tolerance.

From a practical point of view, when using high-grade equipment of a normal construction, the tolerances of the pins should not be in excess of $\frac{1}{10}$ mm. in relation to the pin holes. Under the least favourable conditions, the eccentricity can be of the order of $\frac{1}{10}$ mm. and as this can be unidirectional or the opposite, the variations in the casting along the joint line can be $\pm \frac{1}{10}$, or 1.2 mm. "out." An ever-present difficulty is the brutal fashion in which the labourers handle moulding box-parts and the like. Then there is the fact that the boxes are heated in the course of their use and especially so when during the casting and progressive solidification of the metal heat is given up in turn from the sand to the box. However, though it is possible to obtain precise mating with only one pin for each box, it is extremely difficult to have this same precision with two pins. Numerous inventors have worked on this problem and have produced mechanical devices of varying complication, all of which had as their objective the mating of one part depending on the

(*Continued on page* 682.)

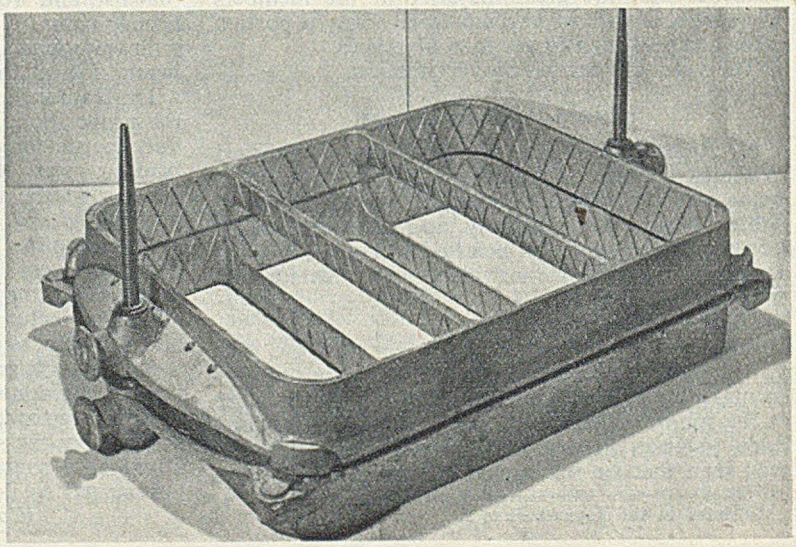


FIG. 1 (ABOVE).—GENERAL APPEARANCE OF COIL-SPRING MOULDING-BOX PIN.

FIG. 2 (RIGHT).—PIN ASSEMBLED IN TWO-PART MOULDING BOX.

British Iron and Steel Research Association

Annual Report

Of major interest to the foundry industry in this 100-page report is the section dealing with steel castings. This is reproduced below:—

The activities of the steel castings division continued in 1949 broadly as in 1948. The main fields in which research has proceeded are the melting and freezing of steel; the properties and testing of steel castings; the examination of new moulding materials and refractories, and the investigation of their properties; and also the causes and prevention of silicosis.

No further consultations have been held with the British Steel Founders' Association on collaborative steel-foundry research, though it has been indicated that the newly formed research and development division of that Association will collaborate with other organisations.

Throughout the year, a substantial amount of work has been carried out by committee members in their own laboratories, and a further considerable proportion of the work of the division has been carried out under research contract in University departments. Some iron and steel melting units are being installed at the Association's research station at Sheffield, where most of the divisional staff of ten are stationed, and these units will facilitate research that has hitherto been carried out as opportunities occurred at various member firms.

Two conferences were held during the year. The first in May, 1949, on Cupola and Converter Refractories, and the second in September on Foundry Steel-melting Processes. The latter occupied two full days and was well attended by steel founders who numbered 58 out of 103 present.

Melting Research

The increasing interest in the acid-electric process was evident at the latter conference particularly among those who had recently visited the U.S.A. Preliminary consideration of research required in this field has indicated that there is need for a more rapid method of determining the bath composition, as well as for more fundamental information on non-equilibrium conditions associated with the electric-arc process.

One research project concerned partly with this method of steel melting is the investigation of the fluidity of steel produced by different processes. Considerable progress has been made during the year. The fluidity is measured by the distance the metal will run into a spiral sand mould when poured at a constant rate. A special ladle has been designed for the test, since the constancy of the rate of entry of the metal into the test spiral is essential if reproducible results are to be obtained. In the laboratory studies of fluidity, a marked point of inflexion has been observed in all the curves relating the length of spiral to temperature. The effects of increasing amounts of carbon, phosphorus, chromium, copper, nickel, molybdenum, vanadium, aluminium and titanium have been studied: and the last two, which have a particularly high affinity for oxygen, have been observed to exert the greatest effect on fluidity, reducing it considerably. This result supports the theory that surface oxide and silicate films control and restrict fluidity.

Among many other de-sulphurising agents, magnesium and its alloys have been investigated; but difficulty has been experienced in ensuring that the magnesium reacts with the sulphur and not with the atmospheric oxygen. Tests are now being carried out in which the de-sulphurising agent is projected by a high-pressure jet of air or nitrogen into a stream of metal such as is formed at a cupola spout. Preliminary tests of this method with magnesium have reduced the sulphur content to about 0.01 per cent. Claims that 99.8 per cent. of sulphur has been removed by using sodium carbonate and sodium monoxide are being investigated.

German claims that phosphorus has been reduced from 0.1 per cent. to 0.01 per cent. by the use of a sodium-carbonate/lime-slag mixture have not been confirmed by small-scale trials, though this may have been due to the slag not being sufficiently hot, and further tests are necessary. A phosphorus reduction from 0.044 per cent. to 0.024 per cent. was obtained by an addition of barium peroxide. This material is promising, as it provides the basic oxidising conditions necessary for the removal of phosphorus, and barium phosphate is very stable.

Oxygen Enrichment

The use of oxygen in the side-blown converter is now well established in commercial practice. Equipment is being prepared at the Sheffield research station for a controlled laboratory investigation of the use of oxygen in both converters and cupolas, using from one to ten cwt. of steel. Further commercial trials of oxygen in the cupola have demonstrated its effect in raising the temperature, reducing the fuel consumption, and increasing the rate of melting. The trials have also proved that this application is of real commercial value as a means of controlling the rate of output from a cupola more effectively. A talk was given on this subject at a recent conference held by the British Cast Iron Research Association, and it appears that oxygen enrichment has great possibilities in cupolas for iron foundries.

The temperature rise during the blow of a converter has been studied by using a thermocouple embedded in the lining, and preliminary results indicate that during the carbon blow this rise is small.

B.I.S.R.A. Annual Report

Solidification of Steel

Particular attention has been given to the mechanism of freezing, burning-in, and hot-tearing. Earlier co-operative work on the mechanism of freezing has been collated and published. The theory that solidification progresses by the formation of crystallites, which fall through a still-liquid mass of metal at the freezing temperature, has been supported by a series of experiments in which a thin metal sheet was inserted horizontally in the mould, and crystallites were observed to be deposited on this shelf as well as at the bottom of the mould. It has also been shown that the temperature of molten metal in the mould is almost uniform until solidification begins, and that there are then temperature gradients at the liquid/solid interface and at the metal/sand interface. The results obtained may find a practical application in the design of feeder heads which will allow crystallites to be fed from the head into the casting. The effect of convection currents will next be examined by casting blocks at various inclinations to the horizontal.

Further work on burning-in has indicated that metal penetration is not progressive as casting temperature increases but depends upon the attainment of a particular casting temperature for each set of conditions. The effect of composition has been studied, and in general the increase in fluidity caused by alloying elements is associated with a lowering of the temperature at which penetration occurs. The pick-up of elements such as nickel and chromium by the sand adjacent to the casting has been found to be small. In the case of high chromium and 2 per cent. silicon steels there was a reduction in the $FeO\text{-}SiO_2$ reaction, which, with the formation of fayalite ($2FeO\text{-}SiO_2$), has been previously associated with burning-in. Pronounced pick-up of manganese by the sand has been observed in the case of a 13 per cent. manganese steel. The effect of various mould paints on burning-in has been determined at 1,680 deg. C., the temperature at which pentration occurred. The performance of fused alumina, zirconia and a silicon carbide base material was good, whereas that of silica flour, molochite and ferric oxide was poor.

Hot-tearing

The research on hot-tearing has been continued using the sand mould having the internal contour of a round bar, into which metal supports are inserted at the extremities of the mould so that a fixed stress can be applied to the bar on cooling. It has been observed that the tearing temperature is generally of the order of 1,400 deg. C. and that a reduction in the casting temperature reduces the temperature of tearing, and increases the stress required to cause tearing. Sulphur has been observed to exert the most pronounced deleterious effect on hot-tearings as was well known. Carbon above 0.2 per cent., and most of the normal alloying elements added in small quantities increase the susceptibility to tearing, though further additions of chromium, molybdenum, titanium and vanadium reduce this tendency. The effect of deoxidation practice on susceptibility to hot-tearing is to be studied.

Previous findings that homogenising treatments have little effect on the properties of good-quality steel but can considerably improve the ductility and impact strength of certain steels of inferior quality, have been confirmed by further work. The inferior steel used in these tests was produced by the acid-electric process. A detailed report on this work is to be published shortly.

Further studies of the effect of sulphur and phosphorus upon mechanical properties have shown that the deleterious effect of sulphur on the ductility and impact properties is most marked in the as-cast condition, the effect of sulphur being more pronounced than that of phosphorus.

In an investigation of the effect of the steelmaking process on the weldability of steel castings, the welding test is to be modified since it has caused weld cracking in all cases with 2 per cent. nickel-chromium-molybdenum and 1 per cent. chromium-molybdenum steels, made by different processes.

The creep properties of steel castings have been reviewed and compared with those of wrought steels, and plans have been made for the determination of further data to ascertain whether the method of finishing and de-oxidising a molten charge affects the creep characteristics of the castings after heat treatment.

The magnetic properties of steel castings have been reviewed and the standardisation of magnetic testing methods, the best magnetic properties obtainable with steel of moderately high tensile strength, and the effect of cooling rate and specific cooling range on magnetic properties, are being considered.

Non-destructive Testing

Further comparison of radiographic and ultrasonic techniques has confirmed the remarkable correlation between the findings of the two methods, and a detailed report is in preparation. Fundamental research on ultrasonic testing, which was agreed last year by the committee to be necessary for the practical application of the method to steel castings, has now begun at the National Physical Laboratory.

The effect of various X-ray and gamma-ray techniques on the quality of the radiographs of steel up to 4 in. thick, has been examined. The preliminary results indicate that, for steel 1 in. thick, low-voltage X-rays and fine-grain film give the best results, and for greater thicknesses, higher voltage and lead screens give better results than salt-screen technique. With steel 2 in. thick, gamma-rays with lead screens give results comparable to those with high-voltage X-rays (1,000kv.) with lead screens, and to medium voltage (400 kv.) X-rays with salt screens. Salt screens with gamma-rays gave very poor results with steel less than 4 in. thick.

Close liaison has been established with the Atomic Energy Research Establishment on the subject of radioactive isotopes for industrial radiology. Radio cobalt which has an active life of many years will probably be available shortly at low cost. Other radioactive isotopes which may be useful are those of tantalum and iridium. Statements have been prepared for the guidance of radiologists on a number

of the more specialised aspects of radiology such as the recommended density of radiographs.

Moulding Materials

Attention has again been given to the possibility of saving dollar expenditure by replacing Wyoming bentonite by other bonding clays. Several materials with comparable properties are now being marketed. Further core-bonding agents examined have exhibited properties of considerable promise, in particular a modified linseed-oil by-product, available in commercial quantities at an appreciably lower price than linseed oil. Reasonably good properties have also been observed with two plastic base materials, one being an urea-formaldehyde resin which has been developed by the manufacturers to overcome the obnoxious fumes normally associated with the use of this type of resin. A large amount of information has now been obtained on core-bonding materials, and it is intended to do no more work on this subject, but to concentrate on fundamental studies of the bonding of sands. A dolomite clinker and a calcined serpentine are being examined on a laboratory scale for their suitability as moulding materials.

Experiments with a di-electric heater have demonstrated the rapid core baking attainable by this method and have shown that the presence of water in the cores is necessary for the generation of heat. It has been observed than when drying refractory shapes by this method, there is no moisture gradient through the material as is the case with normal heating methods. This moisture gradient is a possible cause of weakness in the refractory mass.

Refractories

The work on converter refractories was presented at the conference on Cupola and Converter Refractories and the general experience of delegates supported the previous findings, that operational factors can outweigh any differences in the refractories in determining the life of a lining. The effects of ramming density and of drying conditions are being investigated, and the use of strain gauges to measure the weight of a converter continuously, and hence to deduce the wear of the lining, is being studied.

Further aerodynamical studies have shown that with two tuyeres placed tangentially, the impingement of back eddying gases against the refractories, which has been associated with regions of maximum wear, can be prevented, and back eddying can be restricted to the centre of the vessel. Tests with a small converter of this design, using molten metal, will be carried out at the Sheffield research station. The review of published information of cupola refractories made last year, has been followed by the drawing up of a programme of research, which takes into account the recent developments with water-cooled tanks in place of refractories, and the possible benefits of a change of internal contour. Experiments will be made in the first instance in a foundry cupolette.

Silicosis

The dust conditions in twenty foundries have been surveyed by the Association's investigator in collaboration with the Factory Inspectorate, some on more than one occasion. An Owen's jet counter instrument has been mainly used to measure the dust concentration, although the autographic recording instrument constructed by B.I.S.R.A. physics department has also been employed.

Considerable variation in the dust concentration at different foundries has been observed. In one case the concentration was as low as 800 particles c.c. whereas in another it was 6,000 particles per c.c. The examination of these dusts has been assisted by the development of the semi-micro analytical method for the determination of free silica.

A meeting was held early in the year of the authorities and investigators in the field of silicosis, and as a result the work at Reading University has been extended to ascertain whether the toxicity of siliceous dusts is due to silica itself or to some other agency such as minor constituents or highly activated particles.

Refractories Section

The section has continued to co-operate with the British Ceramic Research Association and various steel and refractory firms through the joint refractories committees. In addition to co-ordinating the researches of these committees, the section has met increasing demands for guidance on refractory problems from other departments and divisions of B.I.S.R.A.

Electric-furnace Refractories

A survey has been made of the literature on electric-furnace refractories, with the object of guiding the research programme. The existing information reveals no correlation between the consumption of refractories, their test properties or operating conditions. An attempt is being made to fill this serious gap in our knowledge.

Steel-foundry Refractories

Close study of the data accumulating from the trials of side-blown converter linings at Cattons & Company still fails to reveal any definite relationship between performance—as indicated crudely by lining life—and refractory properties. The strain-gauge converter weighing device is now working and results are being obtained on lining wear and such factors as blowing loss. Work on the application of water cooling to the cupola is being co-ordinated with similar developments at the Austin and Ford Motor Companies. The work of the chemistry department, which is co-ordinated with that of the steel castings division, includes spray cooling of the shell, and water cooling of the tuyeres, whereas the motor companies are trying panel cooling of the shell above the tuyeres.

Fundamental Research

The research on the attack of refractories by slags has developed along the lines of investigating the interdiffusion of two glassy slags at 1,500 deg. C. The melts, so far examined are in the lime silica alumina system. The diffusion rates obtained were about 0.1 to 1.0 $cm.^2$ per day. The results agree with the view that diffusion can be a rate determining factor in the erosion of refractory by slag.

British Blast Furnaces in the March Quarter, 1950

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

Derby, Leicester, Notts, Northants, and Essex.

Name of firm.	In blast at end of first quarter, 1950.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Clay Cross	—	—	1	—	1	1	2
Ford Motor	—	—	1	—	1	1	1
Holwell Iron	—	1	2	—	3	3	4
Kettering Iron & Coal	—	—	2	—	2	2	2
New Cransley Iron & Steel	—	—	1	—	1	1	2
Renshaw Iron	—	—	2	—	2	2	2
Sheepbridge	—	—	1	—	1	1	1
Stanton Ironworks: Stanton-by-Dale	—	—	5	—	5	5	5
Staveley Iron & Chemical	—	—	4	—	4	4	4
Stewarts and Lloyds: Corby	—	4	—	—	4	4	4
Wellingboro' Iron	—	2	—	—	2	2	3
Total	—	7	19	—	26	26	30

Lancashire (excl. N.-W. Coast), Denbigh, Flint, and Cheshire.

Brymbo Steel	—	1	—	—	1	1	1
Darwen & Mostyn	—	—	—	1	1	1	1
Lancashire Steel Corp'n	—	2	—	1	3	3	4
Total	—	3	—	2	5	5	6

North-West Coast.

Barrow Ironworks	2	—	—	—	2	2	3
Charcoal Iron	—	—	1	—	1	1	1
Millom & Askam	2	—	—	—	2	2	3
United Steel: Workington	2	—	—	—	2	2	3
Total	6	—	1	—	7	7	10

Lincolnshire.

Appleby-Frodingham	—	7	—	—	7	7.7	9
Lysaght, J.: Scunthorpe	—	4	—	—	4	4	4
Thomas, R., & Baldwins: Redbourn	—	2	—	—	2	2	2
Total	—	13	—	—	13	13.7	15

North-East Coast.

Cargo Fleet Iron	—	2	—	—	2	2	2
Consett Iron	1	1	—	—	2	2	2
Dorman, Long: Acklam	—	3	—	—	3	3	4
Redcar	—	2	—	—	2	2	2
Cleveland	—	2	—	—	2	2	5
Bessemer	—	2	—	—	2	2	3
South Bank	—	—	—	2	2	2	4
Grangetown	—	—	—	—	—	—	2
Gjers, Mills & Co.	2	—	—	—	2	2	5
Pease & Partners	2	—	—	—	2	2	3
Skinningrove Iron	—	2	—	—	2	2	2
South Durham Steel & Iron	—	2	—	—	2	2	2
Total	5	16	—	2	23	23	36

Scotland.

Bairds & Scottish Steel: Gartsherrie	1	1	1	—	3	3	5
Carron	—	—	1	—	1	1	4
Colvilles	—	2	—	—	2	2.2	3
Dixon's	—	1	1	—	2	1.3	6
Total	1	4	3	—	8	7.5	18

South Wales and Monmouthshire.

Briton Ferry Works	1	—	—	—	1	1	1
Guest, Keen, Baldwins: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	2	—	—	2	2	3
Steel Co. of Wales: Margam	—	2	—	—	2	2	2
Total	2	6	—	—	8	8	10

George Cohen's Chairman Retires

MR. LAWRENCE LEVY, who has hundreds of friends among the British metallurgical industries, with which he has been connected for over half a century, is retiring from the board of George Cohen Sons & Company, Limited, on June 30, at the age of 73. He will, however, retain his chairmanship of certain subsidiary and associated companies.

He is a grandson of "Old George" Cohen, who gave his name to the firm, which was founded in 1834, and his father was the late Lewis Levy, who became senior partner in 1890. Joining in 1893, as—to use his own expression—"a junior stamp-licker," after four years' apprenticeship, he was made a junior partner and took a particular interest in the scrap iron and steel side of the business. The tonnages which were regularly shipped in that era from the firm's wharf at Regent's Canal Dock would be regarded as large even to-day and cargoes of 2,000 and 3,000 tons were normal. There was, in particular, a flourishing export trade with Italy, in iron and steel scrap and, in cast iron, with Australia. Mr. Levy travelled widely on the firm's affairs and, being fluent in French and knowing some Italian, often accompanied his father on Continental trips as an interpreter.

Shipbreaking was another of the firm's activities which soon fell within Mr. Levy's purview and he began to play a leading part in the management of an associated concern. The Shipbreaking Company, which operated first at Blackwall Point and then at King's Dock, Swansea, and Briton Ferry, in South Wales. Many large vessels, in-

cluding dozens of British and foreign "men of war," were broken up there.

Mr. Levy became managing director of this company and was for many years recognised as one of the foremost British experts in shipbreaking.

In 1924 George Cohen Sons & Company were registered as a private limited company and, in common with the other partners, Mr. Levy became a director. On the death of Mr. Michael Cohen, in 1928, he was elected chairman—an office which he held until 1947, when the company became a public one and the present chairman, Mr. Cyril M. Cohen, was elected.

There can be few men who have a more intimate knowledge or experience of the scrap industry in all its aspects than Mr. Levy. He has, moreover, always played a leading part in its organisation and was, for example, founder and first president of the London and Southern England Scrap Iron and Steel Merchants' Association.

British Blast Furnaces in the March Quarter, 1950—*continued.*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of first quarter, 1950.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	1	2
Lilleshall	—	—	1	—	1	1	2
Round Oak Steelworks	—	—	1	—	1	1	3
Shelton Iron, Steel & Coal	—	3	—	—	3	3	3
Stewarts and Lloyds: Bilston	—	3	—	—	3	3	3
Total	—	6	3	—	9	9	13
Sheffield.							
Park Gate Iron & Steel	—	1	—	—	1	1.5	2
GRAND TOTAL	14	50	26	4	100	100.7	140

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

District.	1949.				1950.
	March.	June.	Sept.	Dec.	March.
Derby, Leics, Notts, Northants, and Essex	25.0	24.4	25.3	25.4	26
Lancs (excl. N.-W. Coast), Denbigh, Flint, and Ches	5	4.9	5	5	5
Lincolnshire	14.2	15	14.6	14.8	13.7
North-East Coast	24	23	23	23	23
Scotland	8.2	8.8	9	8.7	7.5
Staffs, Shrops, Worcs, and Warwicks	9	9	8.4	9	9
S. Wales and Monmouth	8	8	7.9	8	8
Sheffield	1	1	1	1	1.5
North-West Coast	7	6.6	6.6	7	7
Total	102	100.7	100.8	101.9	100.7

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

Book Reviews

Eighty Years of Enterprise. By R. Stanley Lewis, M.I.Mech.E. Published by W. S. Cowell, Limited, Ipswich. Price 10s. 6d. net.

This well-illustrated book is the story of the creation and subsequent development of Ransome & Rapier, Limited, of Ipswich. It is very much more interesting than most stories of this type, because the firm have ventured into so many different fields. In their time, they have tackled railway material, sluice gates for dams, revolving stages for theatres, escalators, aeroplanes, the Stokes gun, shells and excavators, to mention but a few. Except for sketchy paragraphing, the Author, obviously as a result of much painstaking research work, has produced a really interesting account of the history of this great enterprise. He has, moreover, been well supported by his publishers, and the result is extremely creditable. The book is not very technical and will appeal to a much larger public than the solely mechanical engineer. The inaugurations of the Chinese and Southwold railways are typical examples of the virility of private enterprise—a factor sometimes lost sight of in these days of state monopolies. In fact the whole book stresses this point. The reviewer recommends his readers to acquire this book. It is well worth the price asked. If, however, the reader happens to be a customer, he may receive it *gratis*. V. C. F.

Organising for Output. Published by the British Institute of Management, 8, Hill Street, London, W.1. Price 2s. 6d.

The reviewer deems this booklet to be the best so far produced by the British Institute of Management. It is addressed to the workers and their representatives, and because of this, it is suggested that a more "catchy" title might have been chosen. Something like "Inside Information" would seem to be appropriate. It is a thoroughly good book. The sections are of just the right length; the diagrams are clear, and the illustrations well chosen. Moreover, it is written in easily understandable language. The book shows very clearly that so far as ownership is concerned the actual structure of a factory cannot be changed fundamentally. With the passage of time and the growth of the works, more indirect labour has to be employed and paid for. Only by the use of labour-aiding devices and enlightened management can this be done without imposing too much stress on the actual producers. Hence this booklet is an excellent medium for enlisting the operatives' co-operation in the fullest utilisation of the newer industrial set-up so clearly described.

V. C. F.

A NEW design and research building is to be built by C. A. Parsons & Company, Limited, Newcastle-upon-Tyne. It is hoped that building work will begin early next year.

Coil-spring Moulding-box Pins

(*Continued from page* 676.)

one hand on the location of a pin in a precision-machined bush and on the other hand by the use of an oval bush. This method, which is used in most foundries, is an improvisation with which founders lacking anything better must be content.

Using the coil-spring box-pins, however, the following potentialities are shown:—

(1) Maintaining tolerances of the order of $\frac{1}{100}$ mm. (photographs accompany Mr. Faure's notes of jobs in production which show tolerances of from 0 to $\frac{18}{1000}$ mm.); (2) the absence of wedging when closing moulds; (3) despite the flexibility, there is a maximum degree of precision in the final mating due to the progressive rigidity of the pins during the closing process; (4) there is compensation provided to neutralise to a large extent the effect of expansion of the box parts due to heating; sticking no longer occurs when the two parts are in proper contact; and (5) the increased length of the pin reduces the wear on the box-parts—an important factor in mechanised production where a box may be used a number of times each day.

In his own foundry, Mr. Faure has been able to reduce by six per cent. the section of his stove-grate castings, and the weight and thickness is now extremely regular. This is very advantageous as many of the castings have to be enamelled.

Foundry Productivity

Productivity in the iron-foundry industry in 1949 reached a record level of 24.3 tons of iron and malleable castings per worker, according to figures given by Mr. J. Gardner, general secretary of the Amalgamated Union of Foundry Workers, in his annual report. The figure for 1949 was 1 ton per man higher than in the previous year, which was itself a record. Workers in the steel foundries produced an average of 12.22 tons of castings per man during 1949, which was an increase of 15.9 per cent. in productivity compared with 1948.

"Higher earnings do not correspond to the higher productivity returns or the effort which made these returns possible, and still less is it shown in the basic rates," says Mr. Gardner. Even more important was the fact that increased productivity had not brought about any feeling of greater security. Dismissals were becoming more frequent and there was a growing uneasiness that finding a job would be more difficult. Little encouragement had been given by employers to the setting-up of joint production committees in the immediate post-war period.

Referring to planning and nationalisation, Mr. Gardner comments: "The Steel Bill is on the statute book, but enthusiasm for vesting day, when this industry will be taken over by the State, if that should really happen, is not very pronounced."

Non-ferrous Productivity Team

Representatives of the United Kingdom non-ferrous metals industry are in the United States to study the methods of production and the productivity of the industry there. The team—17 strong—is led by Mr. W. F. Brazener, managing director of The Mint, Birmingham, Limited. The visit has been arranged by the Anglo-American Council on Productivity and the Economic Co-operation Administration.

Obituary

MR. SYDNEY SHORTELL, sales representative of F. Parramore & Sons (1924), Limited, ironfounders, etc., of Chapeltown, near Sheffield, has died.

MR. THOMAS DAVIDSON, who retired three years ago from the position of managing director of Ward & Davidson, Limited, brassfounders and coppersmiths, of Monkwearmouth, Sunderland, has died at the age of 72.

MR. BENJAMIN COLLINS DYSON, managing director of Carrick & Foster, Limited, ironfounders, etc., of Bingley (Yorks), and a director of Ellerby Foundry, Limited, Leeds, and of Castleford Ironworks, Limited, has died at the age of 71.

GENERAL THOMAS STEVENS HAMMOND, chairman of the board of the Whiting Corporation, Harvey, Ill., and a past-president of the American Foundrymen's Society, the Foundry Equipment Manufacturers' Association, the National Foundry Association, and the National Metal Trades Association, passed away at his home in Chicago on June 15. General Hammond was well known in the business world. Entering the employ of Whiting Corporation in 1907 as assistant purchasing agent, he rose to be president and general manager. General Hammond's long military career began as a private in the Illinois National Guard in 1915 and included service in both World Wars.

Patents and Trade Marks

Heavy arrears of work still exist in the examination of patent and trade mark applications, states the annual report of the Comptroller-General of Patents, Designs, and Trade Marks for 1949. Some headway has been made, it continues, but further progress depends to a great extent on the recruitment of suitable scientific and other staff.

The number of patent applications in the year was 33,347, and 20,703 were sealed. The corresponding figures for 1948 were 33,626 and 15,558, and for 1938 37,973 and 19,314. The number of trade marks registered was 8,006, compared with 7,397 in the previous year and 5,265 in 1938. Total receipts amounted to £1,016,466, compared with £972,050 in 1948.

The report points out that the Patent Office library needs room for expansion and there is an urgent need to give more space to the public rooms. As a result of recommendations from the Royal Society Scientific Information Conference of 1948 with regard to the state of and use being made of existing scientific and technical libraries, consideration is being given, in conjunction with the Lord President's Advisory Council on Scientific Policy, to the possible use of the library, without detaching it from the Patent Office, as a nucleus of a central reference library of science and technology in London.

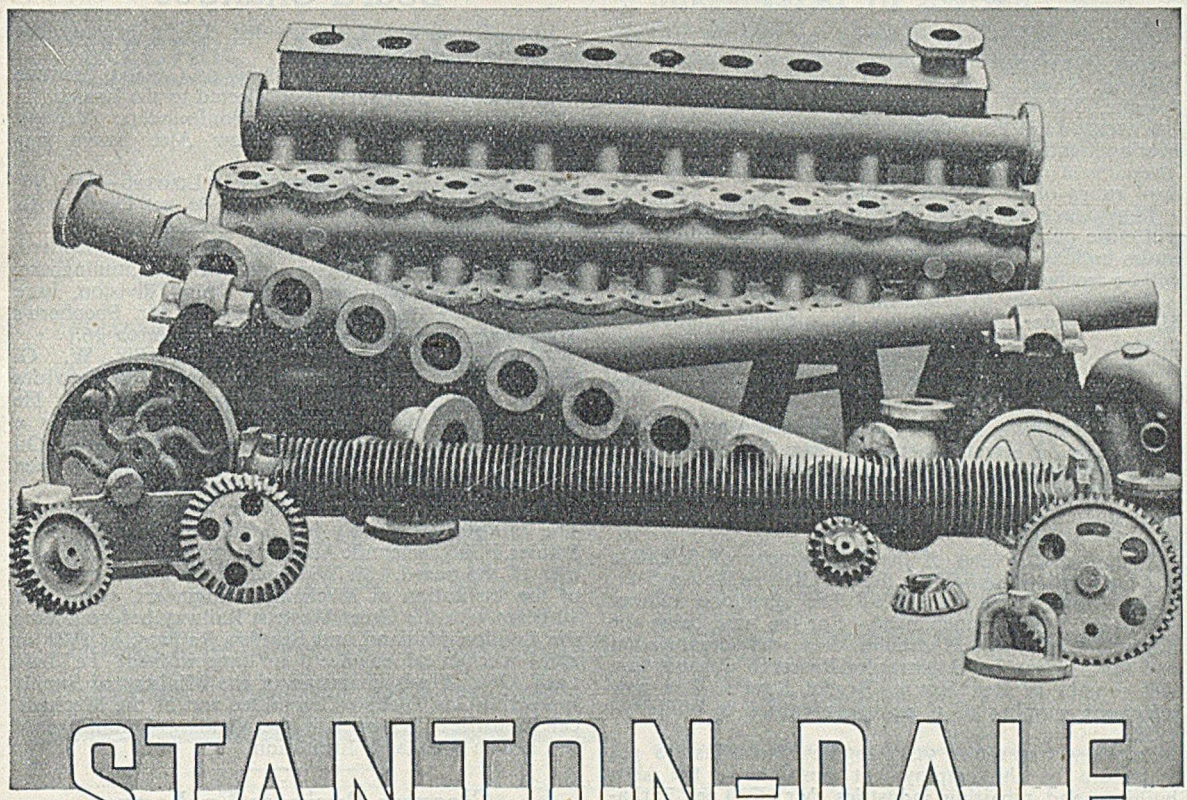
Buxton Conference Proceedings

(*Continued from page* 675.)

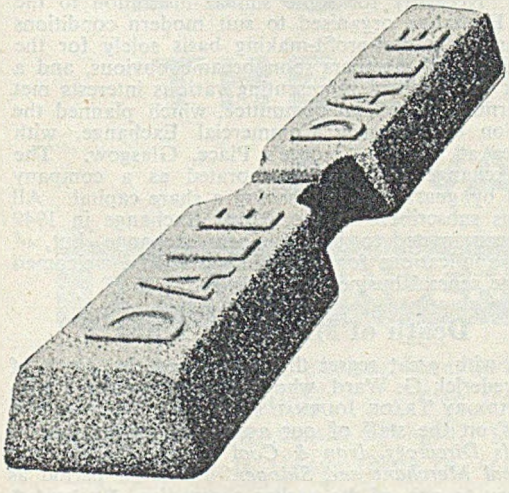
fellows" on the foundry floor went and poured it into a green-sand mould where, it seemed to him, there was every opportunity for it to find more hydrogen.

Sir Andrew, as they would realise, was somewhat unique among the Edward Williams lecturers; Dr. Hurst had mentioned Sir Andrew's many eminent predecessors, but in Sir Andrew was coupled a scientist and a leading industrialist—a very happy combination.

The vote of thanks was carried by acclamation and the Conference was then adjourned.



STANTON-DALE



REFINED PIG IRON

Designed to meet the demands of high quality castings, which are, strength, machineability and resistance to wear.

All these can be secured by using Stanton-Dale Refined Pig Iron in your cupolas.

The above illustration shows a group of castings made from this iron by a well known economiser maker.

PROMPT DELIVERY

THE STANTON IRONWORKS COMPANY LIMITED NEAR NOTTINGHAM

News in Brief

BORAX CONSOLIDATED, LIMITED, on June 26, will re-occupy their pre-war offices at Regis House, King William Street, London, E.C.4, telephone number Avenue 7333/8.

ZWICKY, LIMITED, Slough (Bucks), are to use the Engineering Centre at Glasgow as a permanent showroom. The current display is a selection from the firm's standard range of filters and pumps.

THE WORKS OF Bruce Peebles & Company, Limited, will close on the evening of June 30 for the Edinburgh trades holiday. They will re-open on July 10. No goods will be received or despatched during the holiday period.

STEWARTS AND LLOYDS, LIMITED, have recently fulfilled an order for 78 miles of pipeline connecting Gretna, Manitoba, with a new refinery under construction at Winnipeg. This order, worth $750,000, was the first large order received by the firm from Canada.

BROOK MOTORS, LIMITED, have opened a new branch at 124, Union Street, Aberdeen. Mr. W. J. Ward, of the Sheffield branch, has been appointed manager. Mr. Brailsford Sykes, formerly at the Liverpool office, has been appointed assistant sales engineer at Sheffield in place of Mr. Ward.

THE HEADQUARTERS of the Department of Scientific and Industrial Research are now at Charles House, 5-11, Regent Street, London, S.W.1. The telephone number (Whitehall 9788) is unchanged. For the time being the headquarters of the Hydraulics Research Organisation and the Mechanical Engineering Research Organisation will remain in Rex House, Regent Street. The new telephone number of these organisations is Whitehall 1952.

AFTER A THREE-DAY VISIT to the North-East to get a picture of the employment position in the ship building and repairing industries, Mr. F. Lee, Parliamentary Secretary to the Ministry of Labour, said that he felt there was no need for despondency about the future of those industries. Neither did he see any danger of a slump in the heavy engineering industry, where there was at present a shortage of skilled technicians.

MR. L. E. C. STEWART, Southern-Western area representative of Vokes, Limited, filtration engineers, of Guildford, Surrey, has now taken over, in addition, the Midland area, which embraces the counties of Lincoln, Nottinghamshire, Leicester, Staffs, Derby and Shropshire and North Wales. MR. E. J. LAWRANCE, who has handled Vokes' products ably for some years in the South and South Midlands, now includes the Eastern counties of Norfolk, Suffolk and Cambridge.

PETROCHEMICALS, LIMITED, have introduced "Catarex" Pitch, a product of the Catarole cracking process, which can be supplied to any specified melting point within the range 40 deg. C. to 100 deg. C. This material, which is odourless and tasteless, is said to possess properties which in many respects lie between those of straight-run petroleum, bitumen and coal-tar pitches. In absence of nitrogen and oxygen compounds and in its very low sulphur content it is superior to both these products.

ORDERS for jute machinery for Pakistan totalling over £3,000,000 have been placed with British textile engineering firms. Fairbairn, Lawson, Combe, Barbour, Limited, Wellington Foundry, Leeds, have secured a contract for £1,250,000 worth of equipment, and the remainder of the work will be carried out mainly by Dundee and district concerns. Machinery to go to Pakistan will include 3,000 looms, and spinning and preparing machines. It is intended for use in three new jute works in Pakistan, each of 1,000 looms' capacity.

Board Changes

JOHN THOMPSON, LIMITED—Mr. D. L. Murray has been appointed a director.

INTERNATIONAL NICKEL COMPANY OF CANADA, LIMITED—Mr. George Sharp has been elected to the board.

MATTHEW SWAIN, LIMITED, ironfounders, Newton Heath, Manchester—Mr. Matthew Alec Swain has been appointed a director.

LONDON ALUMINIUM COMPANY, LIMITED—Mr. H. Salvin has been appointed director to act jointly with Mr. J. F. Millership as works director.

RUSTON & HORNSBY, LIMITED—Mr. R. C. Shepherd, general foundries manager, and Mr. J. Cunningham, M.B.E., general manager of the Boiler division, have been appointed directors. [Details of Mr. Shepherd's career were published in our issue of March 16.]

PETROCHEMICALS, LIMITED—Lt.-Gen. Sir W. G. Lindsell has found it necessary to curtail his activities and to relinquish the chairmanship of the board. He will continue to be associated with the group as a director of Petrocarbon, Limited, and Manchester Oil Refinery, Limited. Sir Robert Renwick has been appointed a director and elected chairman.

POWER JETS (RESEARCH & DEVELOPMENT), LIMITED—The Minister of Supply has appointed Sir William A. Stanier, F.R.S., Scientific Adviser to the Ministry, as chairman of the board. Sir William, who is a past-president of the Institution of Mechanical Engineers, served for 40 years with the Great Western Railway before joining the London Midland and Scottish Railway in 1931 as chief mechanical engineer, an appointment he held until 1944. He is chairman of the Ministry of Supply Industrial Gas Turbine Committee and of the Mechanical Industries division and the Welding Committee of the British Standards Institution.

Glasgow Business Exchange

Following the closing down of the Royal Exchange at Glasgow, a Commercial Exchange has been formed to take its place and provide a meeting place for a widespread business community in Scotland, particularly in the iron and steel, coal, insurance and shipping interests. Necessity for some similar institution to the Royal Exchange organised to suit modern conditions and run on a non-profit-making basis solely for the convenience of members soon became obvious, and a number of members representing various interests met and formed an interim committee, which planned the formation of the new Commercial Exchange, with premises at 75, St. George's Place, Glasgow. The new exchange will be incorporated as a company limited by guarantee, not having a share capital. All previous subscribers to the Royal Exchange in 1949 have been invited to join the new exchange, but, of course, applications for membership will be welcomed from the general business community.

Death of Mr. F. G. Ward

It is with great regret that we record the death of Mr. Frederick G. Ward, who has been associated with the FOUNDRY TRADE JOURNAL since 1904. Before that, he was on the staff of our associated publications—*Rylands Directory, Iron & Coal Trades Review*, and the *Coal Merchant and Shipper*. After a period as secretary to one of the earlier companies—Eagland & Company, Limited, which was absorbed by Industrial Newspapers—he desired an outdoor life and became commercial representative in the London area. His colleagues mourn the loss of a valued associate and join his many friends in the iron and steel industry in extending their sympathy to his relatives.

Raw Material Markets

Iron and Steel

It is unlikely that there will be any material improvement in the light-castings trade until the demand for castings from the building industry expands. There are hopes that this will not now be long delayed. Meanwhile, the call for supplies of Northamptonshire high-phosphorus iron is restricted. Derbyshire high-phosphorus iron, on the other hand, is well taken up by the general engineering and textile engineering foundries. Supplies of low- and medium-phosphorus iron are in strong request, and there is also a keen demand for hematite and refined irons. Deliveries of hematite are often protracted; stocks are very low at producing points and there is difficulty in obtaining early despatch of the required analyses, especially of the higher silicon descriptions.

The export trade continues to be confined to refined iron because of the high rate of consumption at home of other grades. As previously stated, there is no great interest at present in Northamptonshire high-phosphorus iron, but it is felt that any appreciable increase in the demand would quickly account for available tonnages.

Current deliveries of foundry coke are quite satisfactory, but scheduled allocations for the summer period have been fixed too high in some instances, and it is likely, therefore, that supplies from ovens so affected will experience difficulty in meeting their commitments later. Higher freight charges led to the delivered prices of foundry coke being increased as from May 15 by 3s. 5d. per ton for Durham and Welsh grades and by 2s. per ton for Lancashire coke. As from June 14, hard coke prices were increased by an average of 2s. per ton.

The sheet mills continue to be very busy. They are fully booked ahead, with the result that it is very difficult to place new business. There is little activity at the heavy mills and, apart from the smallest sizes, the light mills are not busy.

Non-ferrous Metals

Following an increase in the US zinc price to 15 cents last week, the Ministry of Supply advanced its selling limit by £4 to £127 10s. per ton, the highest ever. Consumers are now acting with the greatest possible circumspection and it must be expected that they will continue to buy on a hand-to-mouth basis for some time to come. Probably we shall find a similar tendency in copper and lead, particularly in the case of lead, for news has now come through that stockpiling activity in lead is to be much reduced. The rise in lead came to an end some weeks ago and the price has been steady at 12 cents, having risen from 10 cents. But, from now on, the trend in lead may well be downward, especially as purchasing by the authorities for the strategic reserve has been cut down, which will make all the difference to the tone of the market.

At the time of writing, no shading of the US price has occurred, but on the Continent there is a tendency to reduce the quotation. What has happened in lead should serve as a warning in regard to the other metals, for we must not lose sight of the fact that stockpiling by the US Government has had a lot to do with the recently soaring prices. In the opinion of a good many people, it only needs a whisper that the stockpiling of zinc and copper is to come under review for there to be uneasiness and hesitation among consumers. In due course this would doubtless lead to lower quotations.

Tin prices have been weaker. It is reported that the Government has sold half the tin it held when the market was opened in November, which means that some 20,000 tons were disposed of. In tin circles surprise is expressed at the magnitude of the disposal, which was certainly very good.

Metal Exchange tin quotations were as follow:—

Cash—Thursday, £602 10s. to £603; Friday, £598 15s. to £599; Monday, £596 10s. to £596 15s.; Tuesday, £594 to £594 5s.; Wednesday, £596 to £596 10s.

Three Months—Thursday, £604 to £604 10s.; Friday, £600 to £600 10s.; Monday, £597 10s. to £597 15s.; Tuesday, £595 to £595 10s.; Wednesday, £597 10s. to £597 15s.

The scrap market has been moderately firm, but consumers are now showing resistance to high values and it looks as if from now on the margins between old and new metals are going to be wider again. But, for the present, dealers are doing their best to keep prices up and are holding out for a high level in HC copper scrap at any rate. Stocks of refined copper in US producers' hands, at May 31, were down to but little over 50,000 short tons. Deliveries during May increased by 12,000 tons to 13,850 tons according to figures published in New York.

Industrial Art Bursaries Competition, 1950

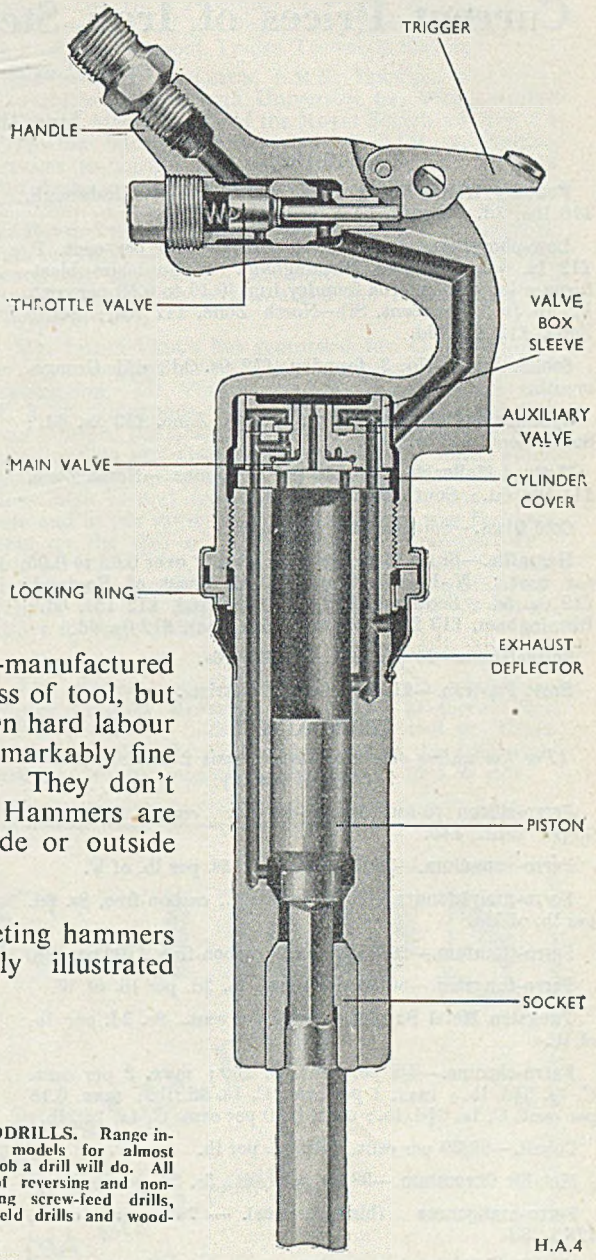
The Council of the Royal Society of Arts is again organising an Industrial Art Bursaries Competition, which is to be divided this year into the usual sections, amongst which are those for the design of domestic electrical appliances, domestic solid-fuel-burning appliances, and electric-light fittings. The primary purpose of these bursaries is to allow successful candidates to broaden their knowledge and experience by travel abroad and the study of foreign design, or, in certain cases, to obtain art training or industrial experience in this country.

The competition is open to full-time, part-time, and evening-class students between the ages of 17 and 30 on September 1, 1950, who intend to take up industrial design as a career, and have studied for not less than one term since September 1, 1949, at an art, architectural, technical, or other college or school approved by the Society for the purpose of the competition. Entry in the domestic solid-fuel-burning appliances section is also open to any draughtsman, clerk, or similar person, within the same age limits, already engaged in the solid-fuel-burning appliances industry, provided that his application is sponsored by the Coal Utilisation Joint Council.

Detailed particulars of the competition are available from the secretary of the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2. The closing date for the receipt of entry forms is September 30.

High-duty Irons. The International Meehanite Metal Company, Limited, of 66, Victoria Street, London, S.W.1, has issued a new brochure of a character quite different from its usual publications, being more descriptive and less factual. This makes the booklet more " readable," but perhaps of less value to engineering designers. However, by means of a wealth of illustration it whets the appetite for further technical information, and for such there is provided a list of bulletins and leaflets. If this be the object of this publication, then it has been very satisfactorily achieved. Amongst other things it discloses an organisation for the common-sense exploitation of a process that others similarly placed would do well to emulate.

MACHINED TO CLOSER TOLERANCES THAN YOUR CAR ENGINE

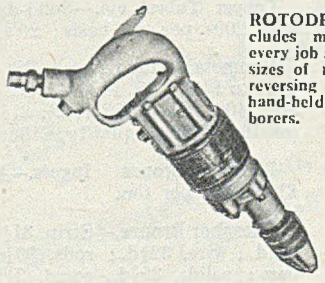


HOLMAN *Pneumatic Hammers* are precision-manufactured to an unusual degree of accuracy for this class of tool, but they are also robust, hardy and powerful. On hard labour or light duties, they allow the worker remarkably fine control, thanks to their sensitive throttle. They don't recoil and they don't waste air. Holman Hammers are available with open or closed handle, inside or outside trigger.

Note : The range includes chipping and riveting hammers of many types and sizes. Fully illustrated catalogues await your request.

DELIVERY EX STOCK

RIVETERS. For all classes of work. Latest designs give easy but precise control. No vibration, no maintenance, no trouble. Holders-on also supplied.



ROTODRILLS. Range includes models for almost every job a drill will do. All sizes of reversing and non-reversing screw-feed drills, hand-held drills and woodborers.

ROTOGRINDS. Smooth-running and quiet. Full range of precision-grinding and heavy-duty types for internal grinding, cleaning castings, polishing, buffing, scaling, fettling, etc. "Straight" or "grip" handles supplied.

H.A.4

The first name for lasting service

BROS. LTD.
Holman
CAMBORNE . ENGLAND

TELEPHONE : CAMBORNE 2275 (7 LINES)
TELEGRAMS : AIRDRILL, CAMBORNE
SUBSIDIARY COMPANIES, BRANCHES AND AGENCIES THROUGHOUT THE WORLD

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

(Delivered, unless otherwise stated)

June 21, 1950

PIG-IRON

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

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

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

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

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

Cold Blast.—South Staffs, £16 3s. 3d.

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

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

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

FERRO-ALLOYS

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

Ferro-silicon (6-ton lots).—45 per cent., £33 15s.; 75 per cent., £49.

Ferro-vanadium.—35/60 per cent., 15s. per lb. of V.

Ferro-molybdenum.—70/75 per cent., carbon-free, 8s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £109 per ton.

Ferro-tungsten.—80/85 per cent., 7s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 8s. 3d. per lb. of W.

Ferro-chrome.—4/8 per cent. C, £60; max. 2 per cent. C, 1s. 5½d. lb.; max. 1 per cent. C, 1s. 6d. lb.; max. 0.15 per cent. C, 1s. 6⅞d. lb.; max. 0.10 per cent. C, 1s. 7d. lb.

Cobalt.—98/99 per cent., 13s. 6d. per lb.

Metallic Chromium.—98/99 per cent., 5s. 3d. per lb.

Ferro-manganese (blast-furnace). — 78 per cent., £28 3s. 3d.

Metallic Manganese.—96/98 per cent., carbon-free, 1s. 7d. per lb.

SEMI-FINISHED STEEL

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

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

Sheet and Tinplate Bars.—£16 16s. 6d.

FINISHED STEEL

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

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

Alloy Steel Bars.—1-in. dia. and up: Nickel, £36 8s.; nickel-chrome, £52 16s. 6d.; nickel-chrome-molybdenum, £59 9s. 6d.

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

NON-FERROUS METALS

Copper.—Electrolytic, £186; high-grade fire-refined, £185 10s.; fire-refined of not less than 99.7 per cent., £185; ditto, 99.2 per cent., £184 10s.; black hot-rolled wire rods, £195 12s. 6d.

Tin.—Cash, £596 to £596 10s.; three months, £597 10s. to £597 15s.; settlement, £596 5s.

Zinc.—G.O.B. (foreign) (duty paid), £127 10s.; ditto (domestic), £127 10s.; "Prime Western," £127 10s.; electrolytic, £128 5s.; not less than 99.99 per cent., £129 15s.

Lead.—Good soft pig-lead (foreign) (duty paid), £96; ditto (Empire and domestic), £96; "English," £97 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, all English destinations, £143 15s.; rolled zinc (boiler plates), all English destinations, £141 15s.; zinc oxide (Red Seal), d/d buyers' premises, £119.

Other Metals.—Aluminium, ingots, £112; antimony, English, 99 per cent., £160; quicksilver, ex warehouse, £16 15s. to £17; nickel, £386.

Brass.—Solid-drawn tubes, 19⅝d. per lb.; rods, drawn, 25⅜d.; sheets to 10 w.g., 23⅞d.; wire, 24⅜d.; rolled metal, 22⅜d.

Copper Tubes, etc.—Solid-drawn tubes, 21½d. per lb.; wire, 209s. per cwt. basis; 20 s.w.g., 217s. 9d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £130 to £136; BS. 1400—L.G.3—1 (86/7/5/2), £138 to £143; BS. 1400—G1—1 (88/10/2), £181 to £239; Admiralty GM (88/10/2), virgin quality, £190 to £237, per ton, delivered.

Phosphor-bronze Ingots.—P.B1, £200-£240; L.P.B1, £140-£154 per ton.

Phosphor Bronze.—Strip, 31½d. per lb.; sheets to 10 w.g., 33½d.; wire, 32⅝d.; rods, 30⅝d.; tubes, 36d.; chill cast bars: solids, 30⅝d., cored, 31⅝d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 2s. 1⅜d. per lb. (7%) to 3s. 1½d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 2s. 7⅜d. (7%) to 3s. 7½d. (30%); to 12 in. wide, × .056, 2s. 8d. to 3s. 7½d.; to 25 in. wide × .056, 2s. 10d. to 3s. 9½d. Spoon and fork metal, unsheared, 2s. 6½d. to 3s. 5⅜d. Wire, 10g., in coils, 3s. 1½d. (10%) to 4s. 0⅜d.; (30%). Special quality turning rod, 10%, 3s. 0½d.; 15%, 3s. 5d.; 18%, 3s. 9½d.

Personal

MR. H. HOPWOOD, secretary of the Tees-side Industrial Development Board, has resigned that post to take up an appointment with a local firm.

MR. JOHN MCCRACKEN, works manager of the Clydebridge Steel Works, Cambuslang, of Colvilles, Limited, has completed 50 years' service with the firm.

MR. HUGH CAMERON has been appointed manager of the Sheffield district sales office of The United Steel Companies in succession to the late Mr. J. P. Ibbotson.

MR. W. R. STEVENS, a member of the research staff of the General Electric Company, Limited, has been re-elected vice-president of the Illuminating Engineering Society.

MR. F. M. ROGERS has been appointed to the Board of Sidney Flavel & Company, Limited, ironfounders and engineers, of Leamington Spa, in the capacity of sales director.

MR. C. J. DAY was elected president of the Keighley Association of Engineers at the annual general meeting on June 9, succeeding Mr. J. Nicholson, the retiring president.

MR. E. C. SEED, chief engineer and sales manager of Cowlishaw, Walker & Company, Limited, Biddulph, Stoke-on-Trent, is the new president of the North Staffordshire branch of the Association of Mining, Electrical and Mechanical Engineers.

MR. STANLEY B. RIPPON, engineering sales manager in the heavy constructional division of the Thorncliffe Ironworks of Newton Chambers & Company, Limited, has been appointed general sales manager of the division. He graduated in engineering at Sheffield University and served his apprenticeship at a Sheffield steelworks before going to Thorncliffe 20 years ago. Mr. Rippon represents the company in a number of trade associations. He is a member of several technical bodies and is president of the Engineering Draughtsmen's Section of the National Trades Technical Society.

SIR EDWARD APPLETON, F.R.S., Principal and Vice-Chancellor of Edinburgh University, has been awarded the Gold Albert Medal of the Royal Society of Arts for 1950—the Society's highest award—"for outstanding services to science and industrial research." Princess Elizabeth, president of the Society, will make the presentation of the medal in private during the autumn. Sir Edward was secretary of the Department of Scientific and Industrial Research from 1939 to 1949, and was prominent in Britain's scientific contribution to the atomic bomb. He was awarded the Nobel Prize for Physics in 1947.

MR. JAMES VENUS has succeeded Mr. G. L. Watkins as naval architect with the Aluminium Development Association. Mr. Venus served his apprenticeship with R. & W. Hawthorn, Leslie & Company, Limited, and was awarded the I.N.A. Duke of Northumberland prize and the City and Guilds Silver Medal for naval architecture and shipbuilding. Subsequently he held positions with several companies both on the commercial side and in the shipyard and, in addition, was for some time on the staff of the Ministry of Transport as a ship surveyor. Mr. Venus will be responsible for continuing and extending the A.D.A. programme of investigations into the large-scale application of aluminium alloys to ships of all types.

THE ANNUAL "open" days of the laboratories of the Motor Industry Research Association at Great West Road, Brentford, Middlesex, this year will be Thursday and Friday, June 29 and 30, when the laboratory will be open for inspection from 2 p.m. to 5.30 p.m.

CLASSIFIED ADVERTISEMENTS

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

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

SITUATIONS WANTED

FOUNDRY FOREMAN (39) desires change (C.I.). 25 years' practical experience machine, plate, jobbing; good organiser. Willing to train unskilled men.—Box 608, FOUNDRY TRADE JOURNAL.

HARD-WORKING Indian (25), with 7 years' practical experience in engineering castings—ferrous and non-ferrous—seeks opportunity to further experience under advanced conditions; ready to serve at any position with moderate remuneration.—Box 610, FOUNDRY TRADE JOURNAL.

YOUNG energetic ENGINEERS' PATTERNMAKER, with experience of intricate cylinder work and capable of exercising high skill in construction and design, with knowledge of pattern shop control, seeks a position with an engineering firm offering good future prospects and advancement in or near London area.—Box 630, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER (age 35) desires change; 12 years' experience of repetition castings, including motor car cylinders, heads, etc., and general engineering castings in high duty and grey iron; capable of full sand and metal control, and training of unskilled labour.—Box 520, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER / SUPERINTENDENT (36), 12 years' executive experience, seeks change, where experience of modern methods of production, mechanised, jobbing, cupola, sand control can be utilised. Used to high-class engineering castings.—Box 584, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

CHIEF ESTIMATOR for Foundry Section of large Engineering Concern (Manchester-Salford area). Applicants must have experience of Steel Foundry and Pattern Shops, and be of Higher National Education standard. Excellent opportunity for suitable candidate.—Reply, giving full particulars, to Box 564, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN, accustomed to production of Aluminium Alloy Sand Castings. Must be fully experienced in estimating, and good knowledge of pattern design. Birmingham district.—Box 606, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required for Foundry in North-West manufacturing High Duty Iron Castings. Must be used to high speed machine moulding, and plate moulding methods, with unskilled labour. Good disciplinarian. Good prospects for the right man. House will be provided. Please state age, salary, and experience.—Box 616, FOUNDRY TRADE JOURNAL.

ENGINEER'S Pattern Maker required. —Apply C. F. DOYLE, LTD., Weston Works, Faversham.

SITUATIONS VACANT—*Contd.*

FOUNDRY requires WORKS ENGINEER, to supervise electrical and mechanical maintenance (no steam), to manage labour and control maintenance expenditure of approximately £25,000 per annum; also to assist in development and layout of plant. Experience of working to annual budget desirable.—State qualifications, experience, and salary envisaged to Box 624, FOUNDRY TRADE JOURNAL.

GENERAL MANAGER, with first-class engineering and administrative experience, required take charge very modern works. Light engineering; iron and steel foundries. Salary according qualifications. Excellent prospects suitable man.—Apply Box 999, FOUNDRY TRADE JOURNAL.

LIGHT Engineering Company in South Wales requires the services of an ENAMEL PLANT SUPERVISOR. Applicant should be under 45 years of age and possess experience of bonderising, stove enamelling, and the testing of solutions. Previous supervisory experience essential. Housing accommodation will be made available. Salary £600-£700, according to previous experience.—Apply to Box 638, FOUNDRY TRADE JOURNAL.

MANAGER required for Iron and Steel Foundries; experience in mechanised foundry essential. Excellent prospects; good salary to suitable applicant. References.—Apply Box 622, FOUNDRY TRADE JOURNAL.

METALLURGICAL CHEMIST required to take charge of Chemical Laboratory at Non-ferrous Metal Works situated West of London. Good experience in the analysis of Non-ferrous Alloys and Alloy Steels essential. Knowledge of Spectrograph Analysis and corrosion testing an advantage.—Write, giving full details of qualifications, experience, age and salary required, to Box S.763, WILLINGS, 362, Grays Inn Road, W.C.1.

WORKS METALLURGIST required for Engineering Works in India operating large foundries and forge. Applicants should have specialised in grey iron and steel foundry metallurgy, but should have experience of general ferrous metallurgy and heat treatment, etc. Minimum salary Rs. 1,440 per month (sterling equivalent £108 at 1s. 6d. exchange). 4-year agreement, free passages, medical attention, and Provident Fund.—Apply in writing to Box 3514, c/o CHARLES BARKER & SONS, LTD., 31, Budge Row, London, E.C.4.

MAINTENANCE ENGINEER wanted for Foundry in the Midlands. Intimate knowledge of all well-known types of moulding machines essential. Capable of taking charge of the complete maintenance and overhaul of moulding machines of various types.—Apply, giving age, experience, and salary required, to Box 646, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

MANAGER wanted for Non-ferrous Metals Foundry, Manchester district. Must be practical man, good organiser and disciplinarian. State qualifications, experience, wages required, and when at liberty.—Box 618, FOUNDRY TRADE JOURNAL.

ASSISTANT METALLURGICAL CHEMIST required for Foundry of large engineering works in Midlands. Must be fully experienced in sand testing and cupola control.—Write, giving age, salary required, and details of experience, to Box 640, FOUNDRY TRADE JOURNAL.

HEAD FOUNDRY FOREMAN wanted. Preference given to man with Pattern Shop experience and modern methods for producing light grey iron castings from moulding machines and plate patterns. Cupola control essential.—Applicants please state age, particulars of experience and salary expected, to Box 642, FOUNDRY TRADE JOURNAL.

EXPERIENCED man required to operate and maintain 15-cwt. Cupola, cast iron. For Foundry on South-East Kent coast.—Box 644, FOUNDRY TRADE JOURNAL.

PROFESSIONAL

E. LONGDEN, M.I.MECH.E., CONSULTING FOUNDRY ENGINEER, AVAILABLE TO ADVISE ON GENERAL FOUNDRY PRACTICE, FOUNDRY METALLURGY AND MECHANISATION - CAST IRONS, MALLEABLE IRON, STEEL AND NON-FERROUS CASTINGS. — "ROSEVILLE," 11, Welton Avenue, Didsbury Park, Manchester, 20.

BUSINESSES FOR SALE

FOR immediate Sale small established Jobbing Iron Foundry in busy industrial centre in South Wales, with Pattern and Machine Shops, and all usual offices, stores, cranes and equipment. Premises, in first-class condition, and yard occupy three acres. Railway Siding in yard for loading and unloading, and good road transport facilities.—Further particulars from ALLEN PRATT & GELDARD, Solicitors, 49 and 50, Mount Stuart Square, Cardiff, with whom offers should be lodged.

MODERN Light Castings Iron Foundry, Southern England, 37 tons weekly, labour available. Total floor space approximately 26,840 sq. ft. Foundry 11,760 sq. ft. Stores, Office, Canteen, etc., 2,880 sq. ft. Pattern Shop, etc., 720 sq. ft., and two-storey Machine Shop (at present let off), 11,520 sq. ft. Total area of site, over 3 acres. Price of property £20,000, plus goodwill, plant and stock at valuation.—Principals only may apply for further particulars to Box 620, FOUNDRY TRADE JOURNAL.