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The Buxton Conference

The picture of the Buxton Conference of the Institute of British Foundrymen is still too close to put it into its proper perspective. Mr. Sheehan's presidential address stressed the conferences of the Institute of British Foundrymen as being a means for filling the gap in industrial life by providing an abundance of social distractions. From this angle, the sojourn at Buxton was outstanding, for night after night, entertainment of a varied and interesting nature enthralled the visitors. For a provincial gathering it was, with 560 participants, amongst the largest so far staged. Because the conference opened with a few international committee meetings, there was a large participation of overseas visitors. Amongst these were Mrs. Helen Maloney, the charming wife of the secretary of the American Foundrymen's Society, Mr. W. Maloney; Dr. Spies, the president-elect of the International Committee of the Foundry Technical Associations, and Mr. W. Gibson from Australia. Altogether, fourteen nations were represented. It was pleasing to learn from these overseas delegates, that they much appreciated that the firms which so kindly opened their works to the visitors did so with that exquisite patronage of the *grands seigneurs*. The American delegate found the traditional formalities of British functions wholly delightful.

The awards of honorary membership to Mr. John Cameron, J.P., and Mr. J. Hogg were as well received as they were well merited. The winning of the Oliver Stubbs medal by Mr. John Arnott also met with general approbation as his work has enriched technical literature for so many years. The recognition of the personal support accorded by Mr. S. H. Russell to Institute affairs since 1906 is long overdue and the award of the E. J. Fox medal now remedies the obvious omission. For the best Paper printed in the last Proceedings Mr. A. R. Martin received the Barrington Hooper award. The "Williams" lecture given by Sir Andrew McCance was a brilliant *exposé* of the influence of hydrogen in metals. During its delivery we were trying to correlate his remarks with various phenomena we have encountered and feel sure that most of the audience were indulging in much the same recreation. That, we feel sure, was Sir Andrew's object—to direct attention to a phase of metallurgy which has passed from the speculative to the region of fact in at least some fields of investigation. The general run of the Papers was to our mind insufficiently practical—a view shared by many members. Everybody, however, was pleased with the Committee Reports, deeming them to be really helpful in everyday practice. Praise was forthcoming for Sir Andrew's reference to the potential dangers arising from oxidised metallic-charge material and newly-lined ladles. It left members wondering about green-sand casting!

Members were sorry to part with Mr. Noel Newman as president, as his dignified presence, his clarity of diction and expression, his conduct of business and fund of stories have won more than esteem. However, the Institute invariably manages to retain the active participation of its past-presidents. The new president, Mr. J. J. Sheehan, is a forceful and very witty speaker. He is a technician of "no mean order," to use a particularly appropriate *cliché*, and his election was extremely popular. He well merits the honour which has fallen to him. His efforts during the next year will be well supported by his vice-presidents, Mr. Colin Gresty and Dr. C. J. Dadswell. A very high standard of organisation is expected and invariably obtained for Institute conferences. Buxton, owing to the differing locations for the various functions, presented numerous problems, yet Mr. T. Makemson and his staff produced a perfectly working machine. For this and the personal courtesies extended to us all, we tender our sincere thanks.

Contents

Mechanical Handling

Exhibits at Olympia

Increased production and the part which may be contributed to this end by mechanisation, is given comprehensive support at Olympia from June 6 to 17, where the Mechanical Handling Exhibition and Convention is taking place. No less than 16 technical papers on the subject form the convention, while the exhibition, which takes place every second year, is itself larger than ever. Materials handling, as was pointed out in the report recently published by the Anglo-American Council on Productivity, can account in some industries for as much as 85 per cent. of the cost of the finished product.

Heavy Lifting Gear

Perhaps because of its representation at other exhibitions, there is a marked absence of heavy lifting gear for foundry and steelworks plant, the emphasis being rather upon easy-handling of finished parts assembly for mass-production. Electrical equipment for heavy lifting is however shown by Metropolitan-Vickers Electrical Company, Limited, Manchester, whose display includes a working demonstration of a ½-ton "Wharton" crane pulley block fitted with Metrovick a.c. motor, a.c. "Perigrip" brake and type DOC starter; a demonstration of a "Vaughan" crane centre gear-box for long travel motion, driven by Metrovick electric motor and fitted with Metrovick control gear and electro-hydraulically operated "Perigrip" brake; typical heavy-duty d.c. type AMX motor with outputs ranging from 5 to 185 h.p.; a special line of crane motors known as the Type DK machine, sizes ranging from 3 to 185 h.p., and type KZ squirrel-cage and Type MZ slip-ring induction motors, ranging from approximately ¼ to 40 h.p.

A 20-ton mobile crane which is a feature of some prominence at the exhibition is shown by Steels Engineering Products, Limited, Sunderland. It follows the usual Coles practice of a self-propelled, fully mobile unit mounted on pneumatic tyres, with a fully slewing superstructure able to turn 360 deg. either way. Other cranes are also shown, including a 6-ton crane fitted with a 21-ft. 9-in. jib, specially developed for use in railway yards; a screw derrick crane fitted with a diesel engine and a 25-ft. jib, giving 3 tons at 9-ft. 3-in. radius and ¾ ton at 24-ft. radius. This particular crane is fitted with a tropical cab for overseas use; a complete series of Coles electric hoists is also shown. Another contribution to heavy lifting is the "Stacreep" control, of the British Thomson-Houston Company, Limited. This form of control has been developed for obtaining stable creeping speeds with a.c. motor drives, a standard a.c. wound-rotor induction motor being used in conjunction with a spring-applied thruster-controlled brake, and is particularly suitable for the hoist motions on cranes as well as for semi-automatic motions.

An interesting example of the application of electricity to lifting is given by the Westinghouse Brake & Signal Company, Limited, who are demonstrating some of the uses of Westinghouse metal rectifiers, phase converters and air control apparatus in industry, rectifiers operating lifting magnets and magnetic chucks, chargers for electric trucks, and other applications relating to mechanical handling.

Jones KL44 and KL15 mobile cranes manufactured by K. & L. Steelfounders and Engineers, Limited, are exhibited on the stand of George Cohen, Sons & Company, Limited. Asea Electric, Limited, are showing their range of electric pulley blocks and overhead cranes. Hoist blocks and overhead electric cranes are also demonstrated by the Aabacus Engineering Company, Limited.

Conveyor Equipment, etc.

Both roller and overhead conveyors are well represented in this exhibition. Hugh Wood & Company, Limited, are featuring their self-lubricating belt conveyor rollers. Their "Huwood" oil-filled rollers and idler drums are claimed to have a low frictional resistance and require a minimum of servicing. Among the exhibits on the Mavor & Coulson stand is a driving unit for belt conveyors; driving gears are available in sizes transmitting up to 200 h.p. George W. King, Limited, specialise in overhead conveying apparatus, and electric chain pulley blocks are on view operating on overhead runways by remote automatic control.

Paterson Hughes Engineering Company, Limited, concentrate mainly on a display of photographs illustrating their mechanical handling plant in action. Photographs of pouring-runways, cupola-changing telphers, mould conveyors, casting cooling conveyors and complete sand plant installed in well-known foundries are featured.

A recent development from Barron & Shepherd, Limited, is the "Roll-Race" conveyor, stated to have a coefficient of friction of below 0.01. This equipment dispenses with the normal system of rollers and is in effect a load-carrying belt running on a continuous roller-race. Positive variable-speed gearboxes and speed-reducing gears for conveyors are shown by Varatio-Strateline Gears, Limited. Speed reductions of from 3:1 to 10,000:1 may be obtained with the latter apparatus. On the stand of Fraser and Chalmers Engineering Works are large and small examples of the range of "Gyrex" screens. Screen cloths heated by town's gas or electricity have been used in the screening of iron ores with a high clay content, and it is stated by the firm that this principle could also be applied in the screening of wet foundry sand. Also on this stand is "Sherwen" electro-magnetically operated vibrating equipment, including a 4 ft. by 5 ft. foundry shakeout, and high-speed electric screens for handling fine material.

The layout and displays are of very high standard throughout, and in addition to the exhibition and convention there is an excellent show of films.

A CIVIL BUILDING LICENCE has been issued for £100,000 extensions to the Bute dry dock of Mountstuart Dry Docks, Limited, Cardiff.

Institute of British Foundrymen

ANNUAL GENERAL MEETING

Buxton, June 7

The Annual General Meeting was the opening "business" function of the Conference of the Institute of British Foundrymen held at the Spa Hotel, Buxton, on June 7, at 9.15 a.m., the president, Mr. N. P. Newman, in the chair.

The minutes of the Annual General Meeting, held at Cheltenham Spa on June 15, 1949, were, on the motion of Dr. A. B. Everest, seconded by Mr. R. C. Shepherd, taken as read, and approved.

The Annual Report of the Council for the session 1949-50, which had been printed and circulated, was presented by the chairman who mentioned that the membership was steadily increasing and the activities of the Institute also were on the increase. From the chair he proposed the adoption of the Report. Mr. R. B. Templeton seconded, and the motion was carried unanimously.

The balance sheet to December 31, 1949, and statement of accounts for the year ended December 31, 1949, was presented by the hon. treasurer and past-president, Mr. C. W. Bigg, who said they did this year show a respectable balance on the right side. He thought that to get a proper perspective members should study pages 12, 13, 14, 15 and 16 of the Annual Report. He did not propose to say anything about it.

He moved that they be adopted.

Mr. D. Howard Wood seconded and the accounts and balance sheet were adopted unanimously.

The Annual Report of the Technical Council, in the unavoidable absence of the chairman, Mr. A. E. Peace, was presented by Mr. L. W. Bolton, the vice chairman, who mentioned that it was the eighteenth report. It covered eight pages and was worth careful study. Members would see that they had ten active sub-committees working in a wide variety of fields ranging from the use of synthetic core binders to the standardisation of moulding boxes. Throughout the year, their relations with other technical bodies in the industry had been excellent, and in that connection he would particularly mention the British Cast Iron Research Association, the British Non-ferrous Metals Research Association, the British Iron and Steel Research Association and the British Steel Founders' Association.

The reports were scheduled for discussion at the Annual Meeting and he hoped there would be a good and useful discussion. He thought members would agree with him that the Report reviewed a year of continued progress. He proposed the adoption.

Dr. A. B. Everest, seconding, said Mr. Bolton had referred to their good relations with other bodies, a point which he considered to be of considerable importance for there was growing evidence that the Technical Council was being increasingly recognised both nationally and, he thought, internationally. That was a very good sign, for the work was done voluntarily by the members.

There was another point, and that was that the work of the Technical Council was increasing. It would be quite impossible to do that work without the strong secretarial support which they received and he paid tribute to the excellent work of the Manchester office and the help that they received from the secretaries. When they were travelling round to attend meetings, and in the circulation of papers, it meant a tremendous lot of secretarial work, and to meet that he thought it had been necessary to increase the staff. That had contributed to the work and success of the committees. He seconded the adoption of the Report. When the matter was put to the meeting, the Report was unanimously accepted.

Oliver Stubbs Medal

The chairman said it gave him great pleasure to make the annual presentation of awards. The Oliver Stubbs Medal was established by the National Ironfounding Employers' Federation in 1922 "To encourage and reward efforts made by members of the Institute to impart knowledge to their fellow members on the practice and theory of founding."

The Council had unanimously decided to make the award of 1950 to :—Mr. John Arnott, F.R.I.C., F.I.M., in recognition of his outstanding services to the Institute by his work in presenting several valuable papers of high standing and by his active participation in the work of the Technical Council and technical committees.

Thanking the Institute for the award, Mr. Arnott said the announcement came as a complete surprise to him. He was, he thought, one of the rather disappearing group of general practitioners—a bit of a chemist, a bit of a metallurgist and a bit of an engineer. He thought if he was seeking membership of the Institute now he would not be quite sure under what qualification he should apply, and he was not at all sure he would be admitted.

The Medal gave him an introduction to an alloy with which he had not previously had any experience, but he promised to make his observations in the solid, and not the liquid, state.

Thinking over his past misdeeds in the way of Papers, he had turned up some of the Proceedings and found that in the year he had joined the Institute, in 1930, he had presented a Paper at the annual conference, which in that year was held in Glasgow. He thought that neither gravity nor verbosity were qualifications for that award and he could only assume that it had come to him through an over

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generous appreciation of all his activities for the Institute and the technical committees.

With regard to the technical committee meetings he would mention a point of which they might not be aware, and that was the special welcome he, and all of them from beyond the Border, received when they attended meetings in the South. They were greeted as though they had come from somewhere as far off as Greenland, and he could not help wondering if Scotland was as distant geographically as it was supposed to be politically. They had honoured him beyond his deserts and he could only thank them very sincerely for it.

E. J. Fox Medal

The chairman announced that the E. J. Fox Medal was established by Mr. E. J. Fox to be awarded annually in recognition of outstanding services to the foundry industry, not necessarily to the Institute of British Foundrymen alone. The award was made by the Council on the recommendation of two assessors who at present were Sir William Larke and Dr. J. E. Hurst. The award was made this year to Mr. S. H. Russell, past-president. Mr. Russell's official connection with the industry commenced in 1914, when he was secretary of the Institute's Conference at Leicester. He had held most of the offices in the Institute and had held many offices in various foundry trade associations. He had been very active in educational work and he was the leader of the Grey-iron Founders Productivity Team which visited the United States early in the present year.

The chairman added that he was particularly happy to be able on that occasion as president to make the award to Mr. Russell, because in his commercial associations with him he had looked upon him as one of his greatest friends and supporters, and he could do him no greater honour than make that presentation.

Replying, MR. RUSSELL said the president had made a reference to his services to the Institute. They were, he thought, only the Institute's due. He had joined in 1906 and he was proud that to-day he was one of the oldest members of the Institute. Ever since he had joined he had had much out of the Institute and his branch, and the staff at the works had always received far more in value through their membership than they had been able to put into the Institute. It was, therefore, only right that having received such enormous value that they should do all they could to further the interests of the Institute.

The president had referred to the productivity team which had visited the United States earlier in the year and he thought he should say that possibly the award came to him as a result of the activities of that body and he thought the members would share with him the appreciation of the award.

It was a grand team that he had taken out. They worked very hard and were working very hard at present in the preparation of their report for the practical ironfounders. It was not too easy a job because it had to be unanimous, but they had now got it almost to the stage of final drafting. He feared, however, it would not be available before the end of August, due to unexpected delays in printing and publication. It was a great gratification to him to receive the E. J. Fox Medal because he had known Mr. Fox for many years. He had always taken a great interest in the Institute, and particularly in the East Midlands branch. He thanked the president for his remarks when presenting the Medal, and the assessors for their kind consideration.

Meritorious Services Medals

The chairman announcing the award of the Meritorious Services Medals said the Medals were awarded at the discretion of the Council, not necessarily annually, and were intended to recognise particularly valuable services to the Institute.

For the present year the awards had been made as follow :—

Mr. T. R. Walker, M.A., who had recently relinquished the honorary secretaryship of the Sheffield branch after 23 years service. In addition to his work as a branch secretary, Mr. Walker had presented many Papers and served on numerous committees of the Institute and had also represented the Institute on other committees.

A second award had been made to Mr. A. S. Wall, who was still honorary secretary of the Wales and Monmouth branch, an office which he had held for several years. Mr. Wall had been not only a capable and devoted secretary, but by his personality and his personal contacts he had done much to promote the interests of the Institute and of its individual members in Wales and Monmouth.

Following the presentation, MR. WALL, who responded for both, said he considered the award a good illustration of the democratic nature of the Institute. If members considered the individual records of the recipients they would see that they had both been branch secretaries, but whereas Mr. Walker started with education and was an M.A., he himself had begun on the foundry floor. He thanked them all for the awards and would also specially mention the assistance he was always receiving from Mr. Makemson and the head office. Furthermore, he acknowledged the support and consideration which he had received from the firm by whom he was employed. Without that he could not have carried out the duties of the office of secretary.

British Foundry Medal and Award

Calling on Mr. Barrington Hooper to make the presentation of the British Foundry Medal and Award, the chairman said it had been established by Mr. Barrington Hooper, C.B.E., and the FOUNDRY TRADE JOURNAL, and was awarded annually to the Author of the paper adjudged to be the best presented to any meeting of the Institute and accepted for publication in the Proceedings. The Medal for the present year was awarded to Mr. A. R. Martin, B.Sc., A.R.S.M., for his Paper on " Some Notable Aluminium Castings." With the Medal there was an award of £10.

MR. MARTIN, replying to the presentation, said that the Council in making that award had helped him to go a long way towards achieving one of his ambitions. He regarded it as a valuable testimonial, and it was one of which he was very proud. A part of the honour should be shared because the castings which formed the basis of his Paper were made by work of his colleagues.

Honorary Membership

The chairman, announcing the presentation of Honorary Membership Certificates said it was a very pleasant duty. The first was to a very old friend of the Institute, in the person of Mr. John Cameron, J.P., the senior living past-president of the Institute. As a comparatively young foundryman, said the chairman, he had always looked on Mr. Cameron as personifying the dignity of the Institute, and he asked him to come forward and receive the certificate of Honorary Membership.

MR. CAMERON, who was received with applause and cheers when he stepped up to the platform, said he really felt at a loss how to express himself on that occasion. It was 33 years since he had become a member of the Institute, and when he had done that he knew now that he had done one of the best jobs that he had ever done in his life. When he attended the present meeting he had thought of all the friends he had made during the 33 years. Now he was attending to meet old friends and to make some new ones. It had been a great satisfaction to him that he had joined the Institute and he liked to tell the young men what the Institute had done for him, not only in the way of friendship and comradeship, but also in the way of contacts with other foundrymen from all over the world.

It had also been a great satisfaction to him that he had joined in time to meet some of the old pioneers. They were grand men who started the Institute with about a dozen members. If they could have lived to see how it had grown he was sure they would be proud of it.

During his time he had had almost every honour that could be given; he had been appointed their representative at many gatherings and had been presented with the Oliver Stubbs Medal; and he had had the greatest honour that could be given any foundryman, that of being elected president of the Institute.

He thanke dmembers for the very kind words which had accompanied the presentation and assured them they were greatly appreciated. He hoped he might be spared to attend at least one more conference to see his old friend Mr. Colin Gresty take up the office of president. He it was who made the meetings at Newcastle in 1924 the greatest they had had up to that time. He was looking forward to seeing if Mr. Gresty could keep up that high level.

The second certificate of Honorary Membership went to Mr. Joshua Hogg, past-president of the Lancashire branch, who, explained the chairman, was responsible for putting it on its present very successful footing.

MR. HOGG in a brief speech of thanks said that any little service he had been able to do the Institute in the past had never been an effort, it had always been a pleasure.

Election of Officers for 1950-51

President

The chairman's announcement that it gave him great pleasure to propose the election of Mr. John Sheehan as president for the coming year, was received with applause. He had known "John," if he might call him that, for a number of years and realised now that he was one of the most respected foundrymen in this country. From his recent visit to the States he knew his fame had spread far afield. In Cleveland many people had asked him to convey their good wishes.

He had a great asset for his year of office in his charming wife who, he was sure, would support him valiantly in his duties.

DR. H. T. ANGUS, president of the Birmingham branch, seconded the proposal and said he thought no better choice could have been made for the position of president. The proposition was carried by acclamation, and the chairman then invested Mr. Sheehan with the chain of office.

Thanking the meeting for his election, MR. SHEEHAN said he was very conscious of the honour they had conferred upon him, and was very thankful there had been a two-year period of preparation for the position The responsibilities of office were heavy, and to do a minimum of justice to the position needed tact and thought. He had had the advantage of many excellent mentors in the persons of the past-presidents and none better than the most recent. To have achieved the confidence of his colleagues in a very critical profession was pleasant and a trifle revengeful —they had, by appointing him president of the Institute, belied some of his teachers who had chided him for his unpunctuality, his master in apprenticeship who said he could never amount to much if he continually kept his hands in his pockets, and some not so fond relations who insisted that all his natural inclinations followed those of the most unfortunate members of the family's ancestry. On the present occasion he had a slight measure of revenge on them all. Seriously, he had had much good fortune, and perhaps the greatest had been becoming a foundryman—it was thus he had found his friends and, to paraphrase Sacheverell Sitwell in his latest book, "were I to mention friendly foundrymen by name, it would be a list of all foundrymen I have met."

The president then invested Mr. Newman with the Past-president's Badge and asked him to continue in the chair to the end of the meeting.

Continuing the business of the meeting the chairman said he thought their president had already started something which might give rise to argument for he did not know on which breast to pin the Past-president's Badge!

Senior Vice-president

His next duty was to announce that Mr. Colin Gresty had been nominated for the position of senior vice-president.

MR. V. C. FAULKNER, proposing the election of Mr. Gresty mentioned that in 1924 Mr. Gresty had proposed him for the position of junior vice-

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president. Now he could return the compliment by asking them to accept him as their president-elect. It was about 1922 when Mr. Gresty started working for the Institute and he had gone on ever since. If that was not a good enough qualification for the position of vice-president, to which he was proposing they should elect him, then he knew of no other.

Mr. John Bell seconded the proposition and said he was sure Mr. Gresty was well qualified to follow in the steps of the other illustrious foundrymen who had held that office.

Mr. Gresty was unanimously elected and invested with the Senior Vice-president's Badge by the chairman.

Thanking the meeting he said he had joined the Institute in 1917 and it had been one of the greatest pleasures of his life to work for the Institute. He belonged to other bodies, but the Foundrymen in his estimation claimed pride of place. Reference had been made to a conference in Newcastle which seemed to have been rather famous. He hoped that when their turn came next year at Newcastle they would be able to give them something up to standard. He thought they might go better because conferences had now reached a very high standard indeed.

Junior Vice-president

The chairman announced that Dr. C. J. Dadswell had been nominated junior vice-president.

Proposing Dr. Dadswell's election, MR. J. G. BAILES said for Dr. Dadswell's career he would refer them to the last issue of the Journal, but for the present he asked them to look at his cheery face. There was always a smile there and he thought he would make an admirable " junior." For the future he thought his work and energy and everything connected with him would prove an asset to the Institute.

MR. JOHN GARDOM, who seconded, said Dr. Dadswell was a trained engineer, and unlike many engineers who were always anxious to let them know that they had done some time in the foundry, he remained there. His first contact with him had been in the war when he was trying to make tractor tracks. Dr. Dadswell was sent along as the expert, and Mr. Gardom's first reaction was that he was another expert sent along to tell them all about it. He was classed as an expert himself and he did not like meeting another one (Laughter). But it was not very long before he had been impressed by what Dr. Dadswell knew of foundry work and he came to regard him rather as " foundryman " Dadswell than as Dr. Dadswell, and from what he had since learned of him he thought he would much prefer to be recognised as a foundryman rather than as a doctor. He was confident Dr. Dadswell would fill the office of president, when he reached it, as well as anyone who had preceded him.

When put to the meeting the resolution was carried unanimously.

Having been invested with the Junior Vice-president's Badge, DR. DADSWELL said he was very conscious of the honour they had done him in electing him to that position and it was with some humility, having heard of the long activities of Mr. Cameron and others that morning, that he recalled that it was just twenty years since he first attended an Institute meeting in Sheffield. In the local branch he had been appointed to office and had gained experience. Those appointments had given him a sense of pride because of the confidence placed in him by his fellow members. He sincerely hoped that in the office to which they had elected him he would be able to do justice to the position and contribute to the well-being of the Institute.

Election of Auditors

The election of J. & A. W. Sully and Company was proposed by Mr. Vincent Delport, seconded by Mr. Arnold Wilson and carried unanimously.

Members of Council

The secretary anonunced the result of the ballot for the election of five members of the Council for two years ending June 1952. The scrutineers reported that Dr. A. B. Everest, Mr. R. L. Handley, Mr. Barrington Hooper, C.B.E., Mr. A. E. Peace, and Mr. R. C. Shepherd, had been elected.

Bye-law 9

THE CHAIRMAN, referring to a notice of motion said he had tried, as far as finance was concerned, in running the Institute, to look at matters as he would for his own business. They all knew in the running of the Institute that it was important to keep it solvent. They all knew that since the war costs had been on the increase and he feared they were still increasing. None of them wished their business to be forcibly curtailed. They wanted their organisation to grow and increase in efficiency and if possible to increase its services to the members, but none of those things could be done without finance. The costs of running the Institute had increased and it was, he thought, true to say that without the grant which they had received through the Joint Iron Council from the pig-iron levy, they would be in a very difficult position indeed. He begged them to look at the matter realistically and although they disliked having to pay more for anything he begged them in voting on the motion which he had to put, to face up to the position. They had to be sure that the Institute in the next few years remained solvent and would be able to carry out its function.

Before putting the motion he had to mention that they had had two official protests, one from the South African branch and one from the Newcastle branch. He believed also that the Scottish branch had expressed disapproval, although it had not been an official expression.

A few years ago the same position arose and they all feared that as a result of increases they would lose members, but the facts had not borne that out. He hoped they would not panic on that occasion and think because they had an increase of subscription that they would lose members. Surely what they

got out of the Institute was worth paying the annual subscription for?

The motion which he had to put was:—"That subject to the approval of the Privy Council the following be and is hereby adopted as Bye-law 9 of the Institute in place of the present Bye-law 9 which shall cease to have effect, and that Bye-law 9 hereby adopted shall come into effect on the 1st January next following the date when such approval of the Privy Council shall have been obtained:—

> Bye-law 9. Members, Associate Members, Associates, and Subscribing Firms shall pay an annual subscription according to the scale following, that is to say:—
> Member, £3 13s. 6d., Associate Member, £2 12s. 6d., Associate 21 years of age or over, 10s., under 21 years of age, 5s. Subscribing Firm £10 10s. No subscription shall be payable by Honorary Secretaries of Branches during their tenure of office, or by a Member who is the representative of a Subscribing Firm."

MR. C. W. BIGG, the hon. treasurer, seconded the motion and said he thought the president had put it in such a logical manner that anything he might say would make it no clearer to them. When put to the vote the resolution was carried, six only voting against.

Vote of Thanks to Retiring President

THE PRESIDENT (Mr. Sheehan) asked if he might interrupt the proceedings for a very pleasant task, a vote of thanks to the retiring president, Mr. Newman. It was his great pleasure to propose a hearty vote of thanks to Mr. Newman for his services as president during the past year. He had brought to the office, charm, dignity and personality unexcelled and all the enthusiasm of his tender years (laughter), balanced by the logic of a clear and concise mind as evidenced by the way in which he had handled that meeting. He felt the Institute had benefited by his year of office.

MR. P. H. WILSON, O.B.E., a past-president, who seconded said he was glad to be associated with that motion. Three years ago when it had been his pleasure to invest Mr. Newman with the badge of office of junior vice-president, he had remarked that he felt confident that Mr. Newman would not only fulfil that office with enthusiasm, but that when it came to the time, he would prove himself a first-class president. He thought they had every reason to know that he had done that. During his term of office although he was associated with quite a number of bodies, including public work, he had taken on other duties, one being the chairmanship of the Council of Ironfoundry Associations, which happened to coincide with his term of office as their president. Despite all that he had put in a great deal of work on account of the Institute. He thought they could assure their retiring president that he was leaving the job with the greatest respect from the members and the satisfying knowledge that he had fulfilled the office with a high degree of efficiency. The motion when put to the meeting was carried with acclamation.

Mr. N. P. Newman's Reply

Replying, MR. NEWMAN said he thought their remarks were indeed very kind. During his year of office he had extracted the greatest pleasure out of his duties. He had made many new friends, and he supposed the experience would stand him in good stead for the rest of his life. Of the many who had helped him during his year of office the first he would like to thank was his wife. They might not be aware of the fact—husbands usually were—that in its way the strain of being president's wife was usually greater than it was for the president. She had attended every function during the year at which ladies were invited and he was very grateful to her for the moral support which she had given.

Next he would thank the past-presidents, many of whom were present, for their support and advice and particularly Mr. Templeton who had supported him during his duties and at the various functions which he had had to attend.

Then there were the senior and junior vice-presidents. They could help a president tremendously during his year of office, and he had greatly benefited from that help.

The Council and the various committees also had given loyal support by their attendance.

Finally, as Mr. Wilson had mentioned, during the year he had taken on very heavy responsibilities in connection with the Council of Ironfoundry Associations. It was not always too easy and he had only found it possible in conjunction with his work for the Institute by the magnificent support given by head office in the person of Mr. T. Makemson and Mr. G. Lambert. He had had to make it clear very early on that his time would be very heavily pressed and on every possible occasion both of them had done every possible thing to make his task as light as possible and had been an invaluable help.

The year had been a very pleasant one and he left it with mixed feelings and some relief. Perhaps during the next year he would be able to have some more evenings in his garden, but he thanked them all for the kindness they had shown him.

The chairman then asked for the approval of the meeting to a proposal that they should send a cable of greeting to the American Foundrymen's Society. He was anxious that that should be done this year because they were so kind and hospitable to him when he attended their function only a few weeks ago at Cleveland.

This suggestion was unanimously approved.

The chairman also announced that they had present a number of representative foundrymen from overseas. Among them were: Mr. Spies, vice-president of the International Committee, president of the Dutch Association; Mr. Lamoureux, president of the Belgian Association; Mr. Henon, vice-president of the French Association; Mr. Olivo, of the Italian Association (who had had to return), but other representatives were still present; Mr. Gibson, who brought the special greetings of the New South Wales branch of the Institute of Australian Foundrymen; Mr. Lissell of the Swedish Association, and Mr. Drachman, also of the Swedish

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Association. They all very much regretted that Professor Pisek, president of the International Committee, Czechoslovakia, was unable to be present. There were also a number of other visitors from overseas, including several members of the Institute, and to all those visitors he gave a very hearty welcome.

National Foundry College

The chairman then announced that they had present, Dr. Pearce who would address them on the National Foundry College.

DR. PEARCE said he was grateful for the opportunity of saying a word about the college for, except in special cases the foundry industry did not attract students from places of higher education such as universities, so that as they were all agreed the industry needed, and needed increasingly, well-trained men, the only alternative was to educate and train them for themselves, starting with those who had taken up the industry and had already demonstrated their capacity for responsibility within it. That, at any rate, was the idea he had when the British Foundry School started, and the British Foundry School was the origin of what were now called national colleges.

His object was to urge foundry firms in all branches of the industry to nominate men to take the course at the National Foundry College. It was a staff college for men who had to have some practical experience, some technical knowledge and who were going to make good. It was governed by the industry and offered a nationally recognised diploma for an academic year's study, and if the entrants were not up to the diploma-course requirements, a preliminary course prepared them in six months, finishing six months before the succeeding diploma course, to permit further industrial experience to be gained in the meantime.

The students of the college visited foundries each week, had special lectures, laboratory work, and education in foundry technology, foundry engineering and foundry management. The most important thing of all, they had to look at a foundry job, a blueprint or a sketch, and learn how to plan a complete scheme of foundry production according to the number required and, of course, the whole industry was covered—grey and malleable cast iron, cast steel, and the cast non-ferrous metals.

Since 1948 two preliminary and three diploma courses had been held and 55 students had attended—34 grey and malleable, 10 steel and 11 non-ferrous. Some were skilled in more than one branch. Of the 55, 41 came from Great Britain and 14 from China, Ceylon, India, Irak, Egypt, Switzerland, Norway, South Africa. The fee now fixed for overseas students would have a discouraging effect on them. They liked the college to have an international reputation, but the foreign student had to pay the full quota for the course.

He thought they would agree that the number of students from this country was not enough and he suggested that bearing in mind the respective sizes of the three branches—grey and malleable for one, steel for two and non-ferrous founding for three—the number of students for cast iron ought to be considerably increased. In fact he thought the industry could with profit have at least 500 men so trained. That was, the college should have about 100 men a year to do that training within a measurable period of say five years. The cost was small, the time was short, and what worried him particularly was that firms in the industry were not nominating appropriate men themselves. Some part of the increased numbers were coming by way of further-education and training grants for ex-service men, scholarships by the colleges or local authorities. One student at present was working on an Institute award. The facilities were exceptional, including a well-equipped hostel which kept the man for three guineas a week, and there was an active group of ex-students, the Foundry Technical Group. Their war-time records in industry showed how former students of the British Foundry School held down big responsibilities during difficult days and to-day old students (all still young men) were found in the ranks of managing directors and general works managers. One ex-student had been elected to the Ironfounding Productivity Team to the U.S.A. and another to the Non-ferrous Team.

The college was the key-stone of foundry education in Great Britain. It had close relations with regional foundry education through the technical colleges and twenty-six foundry teachers from all over the country attended a recent Easter course under the Ministry of Education. One of their past-presidents, Mr. P. H. Wilson, was a vice-chairman of the board of governors and the Institute was represented by the board by Mr. C. C. Booth. By its constitution and the mode of operation, the college avoided practically all the criticism which could be directed in the ordinary way against technical education. The industry was rapidly moving towards greater technical control, mechanisation, improvement of working conditions, use of power aids, in which a balanced and trained mind could be of the utmost advantage.

Although the college was financially supported to some extent by a group of interested institutions, including the I.B.F., and the Joint Iron Council, its continuation would be impossible without the generous support, moral and financial, of the Ministry of Education. The industry told the Ministry in the beginning that the college was necessary. The cost of such an institution was largely independent of the number of students and hence a reasonable annual cost per student requires an adequate number, say a minimum of 25 or 30. If the Ministry concluded that the college was not adequately supported by the number going through then it would be quite impossible to re-establish it on any basis likely to be satisfactory to the industry except at a cost the industry probably could not face.

At the conclusion of Dr. Pearce's remarks the chairman said he thought it would be fitting that they should take that opportunity of expressing their appreciation of the work of Mr. C. C. Booth, who was I.B.F. representative on that body and for the work he had done for the school. This was approved by acclamation.

Non-ferrous Investment Casting

*By Hiram Brown, B.S.**

(Official Exchange Paper from the American Foundrymen's Society presented at the Annual Conference of the Institute of British Foundrymen last week)

The Author first reviews systematically and with some detail the elements common to both ferrous and non-ferrous precision-casting techniques, including degree of accuracy, pattern manufacture, pattern materials (there is a section on plastic patterns), and investment materials. Then follows a precise account of the working of a typical process along with a number of practical hints and recommendations and with emphasis on the need for a high degree of technical control at every stage. Finally, there are sections on metallurgical factors related to the alloys employed and a note on gating practice and its significance in connection with soundness of the castings produced.

THE term "investment casting" is used by the Author in preference to the usual term "precision casting," since the latter title is felt to be misleading. The word "precision" implies very close tolerances such as can be given by machining. Casting accuracy does not approach that degree of precision. In some cases, unfortunately, the inaccuracies of the investment-casting process have resulted in its being facetiously labelled "the approximate casting process." Much of this ill-feeling resulted from the industry overselling its product during the war. The investment casters could not produce the extremely close tolerances they advertised. Also, they accepted orders for parts which could have been made cheaper and better by some other process.

This all points to the fact that investment casting has very definite limitations. So long as it is kept in its channels, it performs a very useful purpose. With ferrous and high-temperature alloys, many parts are precision cast because machining of the metal used is difficult or costly. In the non-ferrous field this problem does not exist. The principal use of investment castings is, thus, for one of the following reasons:—(1) Parts are very small and can be cast many at a time in investment moulds; (2) shape is such that it would be impossible to cast by other casting methods and too costly for other types of fabrication; (3) tolerances specified are closer than can be maintained by any other casting process, and (4) tolerances or finish requirements are such that no machining or trimming of any sort is permissible over large areas and where parting line of any sort would not be permissible.

The costs of investment castings are high, so from the competitive and commercial viewpoint it seems safe to say that, if the part can be made by any other casting process, investment casting should not be considered (except for small runs, as for experimental parts, etc.). During the recent war, cost meant little compared with the necessity for obtaining parts. After the war, industry had time to redesign components in order to eliminate costly parts. This resulted in a tremendous decline in orders for investment castings and caused numerous investment foundries to shut their doors.

Early Difficulties

Part of the difficulties encountered by investment casters were due to the fact that the process mushroomed rapidly from a dental and jewellery business to a large-scale commercial process. The commercial parts were larger, more intricate, and more demanding in dimensions. The jewellers and dentists had the purpose not of precision in regards to measurements, but rather that the accuracy desired was one of fidelity of reproduction. The industry had not had sufficient time for pilot or experimental work to determine the fundamentals necessary for large-scale operation. Troubles were fought by hit-and-miss methods which amounted to guesses more than to fundamental knowledge of the process. When price again became a factor, the high rejection rates made costs excessive, and, due to lack of pilot or research work, many companies were unable to continue.

The result of this crisis was that the industry analysed itself and tried a new approach. Advertising statements have become much more subdued, and practical tolerances have been changed. This is well expressed by a statement from one of the leaders in the field. "Tolerance of 0.002 to 0.003 inch can be produced in small parts under closely-controlled laboratory conditions. However, it now appears that commercial tolerance of ± 0.005 inch per inch with a minimum of ± 0.003 inch can be maintained in the majority of parts supplied in production quantities. When closer tolerances are required, a finishing operation is generally necessary. Perhaps the fullest advantage of investment casting is gained by casting profiles to size and finishing bearing surfaces or other close-tolerance surfaces by grinding or machining."[1]

Investment casting has been well explained in the following words: "An investment casting should be defined as a metal-casting process employing an expendable pattern in conjunction with an unparted or one-piece mould. The mould is made of ceramic material which completely covers the pattern and has no line of separation, *i.e.*, no cope or drag."[2]

The practices for investment casting do not closely resemble those of any other casting process. It is similar to permanent moulding in two respects:—(1) The greatest dimension of investment castings is usually in the vertical position in the mould instead of horizontal as in the case of sand castings, and (2) the permeability of the mould is low and venting is a problem. It differs from permanent moulding and die casting in the rate of cooling in the mould, and differs from permanent-mould, die-, and sand-casting

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in that the casting cavities are almost completely hidden and the mould cannot be parted for examination before pouring.

In general, investment casting is a complex process that can be carried out only by thorough and continuous research into background principles and a careful check on the process as it is put into production. The close dimensional tolerances actually leave no margin for error. Because of the variety of factors involved, only general rules may be developed. Actually, each type of casting to be produced is a rule unto itself. A careful compilation of data and experience will allow a certain number of predictions to be made on the job at hand, but for the complete accuracy needed, only a careful study by the best " pilot shop " methods will ensure a successful and economical production schedule. This necessitates a well-equipped laboratory and sufficient financial stability to absorb experimental costs.

Pattern Materials

A variety of materials can be used so long as the patterns are expendable. Wax, plastic, frozen mercury, low-melting point metals, and sulphur all have been tried. Wax, plastic, and mercury are the materials commonly used in production. The properties of each are very different and so pattern-making must be handled in a manner to suit the material.

Wax Patterns

Use of wax as the pattern material is quite old and has been written about many times; therefore, only a summary of this subject will be given so that a comparison can be made with other pattern materials. A wide variety of waxes is used, including beeswax, carnauba, and several crystalline-type petroleum waxes. Some are proprietary and are sold in compounded form ready to melt. Some manufacturers prefer to melt and mix their own waxes. The various ingredients all have special effects on the final product; for example, carnauba wax, which has a vegetable base, is hard, and has high melting point; albacar wax is a synthetic wax, but is also hard, and has high melting point; burgundy pitch and turpentine both tend to lower the melting point and to impart some elasticity to the mix which would otherwise be very brittle. Not only must the ingredients be added in strict observance of a formula, but they must also be added in proper order since both of these factors influence the properties of the wax.

There are to-day a number of proprietary waxes in compounded form which give good results. It is probably better to select one of these than to try to blend a number of ingredients. One factor, however, must be observed closely. All waxes have different shrinkage characteristics, and once a wax is decided upon and a pattern mould made, it may be impractical to change the wax type without either re-tooling the moulds or building new ones. This means that a great deal of experiment and thought should be carried on before finally selecting the wax which will be used in production.

Wax patterns are fragile and must be handled carefully to avoid the chipping of corners and edges. Even fingernails will cause deep scratches on wax patterns. Often it is necessary to place completed wax patterns individually with great care. Also, if allowed to remain in store too long, wax patterns may become brittle and shatter like glass. On the other hand, small nicks, holes, or similar defects can be patched with a hot needle or knife blade or small soldering iron. Fig. 1 shows comparative expansion curves of typical wax and plastic materials. Wax in solid form has approximately four times the expansion that plastic has at the same temperature. This means that variations in temperature will cause much more dimensional change in wax than in plastic patterns. This points to the need for temperature control in sections where wax patterns are made, stored, or assembled for casting, since a noticeable change in room temperature may cause dimensions to be outside the tolerances before the patterns ever reach the mould.

Waxes have low melting points, about 77 deg. C., and when melted are very fluid, flow readily, and take accurate reproductions of mould detail. However, they have high volumetric shrinkage in cooling from liquid to solid state and are subject to shrinkage areas unless properly and uniformly handled. This means controlling mould temperature, wax temperature (± 2.8 deg. C.) and injection pressure (whether hand or automatic). Pattern moulds must be well lubricated to facilitate the removal of wax patterns. Wax which flows out of the mould can be reclaimed and re-used for certain purposes, such as for sprues, gates, etc., simply by remelting. It is not generally used for patterns, however, due to the fact that particles of ceramic or other foreign matter may cause bumps in the pattern, or if they fall out, they may leave pits. Due to its low melting point, wax can be easily injected into pattern moulds. In many cases of short runs, the injection may be done by hand using a bulb syringe to furnish the pressure. However, it is difficult to hold close dimensional tolerances, not only from casting to casting, but from pattern to pattern, due to shrinkage characteristics of the wax and the non-uniformity of hand injection pressure.

It is much better to use injection machines where pressure can be maintained constant. Simple machines of this sort can be bought for as low as about $200. Wax injection requires less pressure than plastic injection, usually about 400 lb. per sq. in. being adequate; therefore, the wax injection machines are much simpler and cheaper than those for plastic. Small wax-extrusion machines can be purchased for making sprue stock of a wide variety of sizes and shapes. Wax patterns can be set up or assembled by using hot needles or knives or small soldering irons. Flat or round lengths of wax can be melted as filler material if needed. Wax can also be used on short- as well as long-run jobs since soft-metal pattern moulds can be made cheaply. Moulds or dies for wax patterns can be made more cheaply than those for plastic injection. The cost of waxes is usually about three times that of polystyrene plastics.

Plastic Patterns

Recently, plastic patterns have replaced waxes for many applications. Some of the advantages and disadvantages of plastics are discussed below. The usual plastic used for this purpose is polystyrene, so that material will be discussed first. The cost is about one-third that of waxes. Polystyrene is plentiful and, since it does not require any blending or mixing, its properties are uniform. The patterns are harder and will withstand more handling and rougher usage than will wax patterns. The specific gravity of polystyrene is 1.07 and shrinkage 0.002 to 0.008 in. per in. in injection.

As shown by Fig. 1, the expansion of polystyrene is considerably less than that of wax, thus making it less sensitive to temperature variations. The softening point of polystyrene is about 93 deg. C. and it burns out at 400 deg. C. It starts to distort under heat at about 66 deg. C., and at about 82 deg. C. there is a critical point where the plastic expands

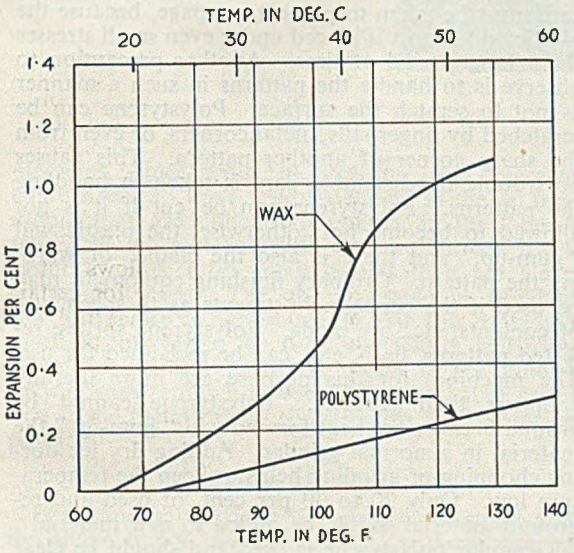

FIG. 1.—COMPARATIVE EXPANSION CURVES OF TYPICAL WAX AND PLASTIC MATERIALS.

very rapidly. At 204 deg. C. polystyrene is just soft enough to flow of its own weight, and at 316 deg. C. will run rather freely; however, it never becomes a true liquid. It is isotropic (the co-efficient of expansion is independent of direction of measurement). Polystyrene patterns can be held to very close tolerances by use of high-pressure injection and do not tend to have some of the defects that waxes have, such as flow line, misruns, etc.

Polystyrene, if marred, cannot be patched as can wax, and the joining of plastic patterns is more difficult than joining wax patterns. Although plastic patterns can be welded together by use of a small soldering iron, this does not give a smooth joint. The best results are usually obtained by using plastic cement or solvents. Plastic cement can be made by dissolving some of the polystyrene in a suitable solvent, such as benzene. This method of joining is slow, since it takes some time for the cement to set sufficiently to hold any weight, and joints tend to be rough. The best method makes use of a suitable solvent, such as benzene or carbon tetrachloride, using either a felt pad or blotter to absorb the solvent, against which the plastic parts are each touched before placing them together. The solvent may also be painted on with a brush. A few seconds are allowed for the solvent to penetrate the plastic, and then the edges are forced together with moderate pressure and held for about 5 to 10 seconds. To save time, small clamping devices could be made for this, thus freeing the worker's hand for assembling. The joined patterns may then be laid down upon a prepared surface so that there is no strain on the joint. Approximately one hour should be allowed before taking this pattern set-up to the next step.

Polystyrene is best in long production runs, and wax is best for short runs. For that reason, many investment foundries use both of these pattern materials. Steel dies are used for polystyrene patterns made in large quantities. Cost of setting up for injection of polystyrene patterns is expensive both from cost of machines (which may run up to $20,000) and from the cost of sinking the steel dies necessary to maintain the dimensional accuracy required. The minimum run for polystyrene parts is about 5,000 pieces. For short runs, bronze injection dies have been used, but die life is shorter. Use of hard steel dies makes it impossible to obtain a master mould direct from the part to be produced, as is sometimes done with soft metal master moulds. Dies must be designed and sunk using blueprints of the part to be manufactured as a starting point. Since most plastic moulding shops are not familiar with the dimensional accuracy required for such moulds, it should be pointed out to them when the order is placed that the runners are almost as important as the casting cavities. This is due to the fact that the patterns must assemble correctly in set-up. On simpler parts with liberal tolerances, it is often possible to machine a master pattern from polystyrene bar stock and then to investment cast steel cavities.[3]

Polystyrene Pattern-making

In polystyrene pattern-making, the pulverised polystyrene is loaded into a hopper from which it flows by gravity into the feed cylinder. As the injection stroke starts, a hydraulically actuated plunger forces fresh material into the heating cylinder, where it is melted, and the melted material is pushed through an orifice into the tightly locked, two-section mould cavity to form the piece. The time cycle can be set to work automatically and pressure is held as long as necessary to cool or harden the material in the mould. The plunger then moves back to allow new raw material to drop into the feed cylinder. With the pressure relieved, the mould is unlocked and a movable section moves away from a fixed section. The sprue disconnects from the melted material, taking with it hardened material in the orifice and leaving soft material at the point at which it pulls away. Ejector pins push the moulded piece completely free from the mould.

Non-ferrous Investment Casting

To maintain dimensional accuracy in the patterns, die temperature must be evenly held. Some injection machines also have a compression ram that works through the bottom platen. This is of particular advantage in the case of large patterns with one or more heavy sections. The piece can be injection moulded and then given additional pressure by this ram to help to overcome the inherent shrinkage of the plastic in the heavy sections.

Heating and cooling coils should be inserted in the die to heat thin sections or cool heavy sections to equalise cooling and to help fluidity. If the mould becomes too hot, shrinkage areas may develop in the patterns and the over-all cycle will become too long. If the mould is too cold, it will be difficult to fill cavities. Dimensional control necessitates strict mould-temperature control. The chief problem in pattern production is to set up the proper cycle on the machine and then have sufficient controls to maintain the uniformity of the pattern. It was found that on successive production runs it was possible to go into immediate and satisfactory production of the plastic machine by re-setting the control on the machine according to the operation sheet set-up during the first run. From this experience, it is apparent that once the correct operational cycle is set up for a given mould, that mould can be returned to the machine for production at any time. This factor is of great value in the production of patterns for investment casting, because it assures reproducible accuracy from one run to the next and eliminates the trial-and-error method of re-setting the machine each time a mould is replaced. In polystyrene injection, experience showed that 80 to 100 shots per hour could be produced in production, with injection pressures up to 12,000 lb. per sq. in. After a few minutes for warming up, the rejections by the operator for non-fills and other machine faults seldom exceeded 2 per cent.

Cooling of Patterns

The patterns are still slightly warm when removed from the mould and, consequently, must be laid out in such a manner as to prevent warping or distortion. If heavy sections of patterns adjoin light sections, quenching in cold water after removing from the machine tends to prevent shrinkage and distortion. The quenching of the patterns must be controlled closely or additional dimensional variations can be introduced. The chief factor to watch is that the patterns themselves are held in the die long enough to be set before putting them in water. If the pattern is not set first, the temperature of the water, length of time from the mould to the water, and any other of the human factors will cause variations in the mould-to-pattern shrinkage ratio. If this happens, then part of the efficiency of the plastic pattern is lost. The patterns should remain in the water bath for approximately five minutes. The cold water sets the outside of the plastic and prevents flow or warpage. After the patterns are cool, they may be stacked in pans or other containers. However, if storage is for a considerable period, then care must be taken to prevent warpage, because the plastic will distort if placed under even small stresses for a long period of time. Another precaution to observe is to handle the patterns in such a manner as not to scratch the surface. Polystyrene can be scratched by fingernails, metal corners, or even from the sharp corner of another pattern. This causes no trouble if reasonable care is taken in handling the patterns. Polystyrene can be cut if it is not allowed to become hot; otherwise, the plastic will "gum-up," and there is also the chance of warping the pattern. Ordinary finishing equipment may be used if the proper adjustments as to speed, use of coolants, etc., are made. Polystyrene sprues, rejected patterns, flash, etc., can be reclaimed for use. The machines for this purpose are more literally choppers than grinders. Polystyrene cannot be ground because the heat formed will "gum-up" the material in a normal grinder. Adding dry ice during chopping or grinding helps to keep the temperature low. Only 20 to 30 per cent. of used and reground material should be added to new material.

Granular polystyrene is used and should be clear and uncoloured, or coloured by dyes rather than

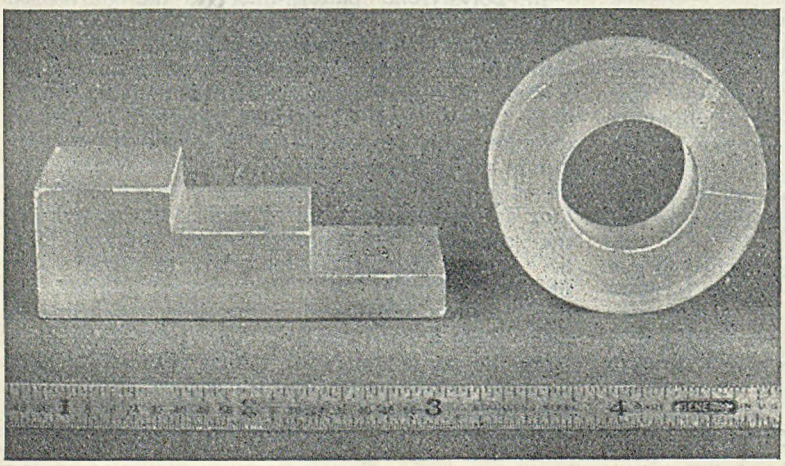

FIG. 2.—SIMPLE PATTERNS MACHINED FROM SOLID POLYSTYRENE PLASTIC.

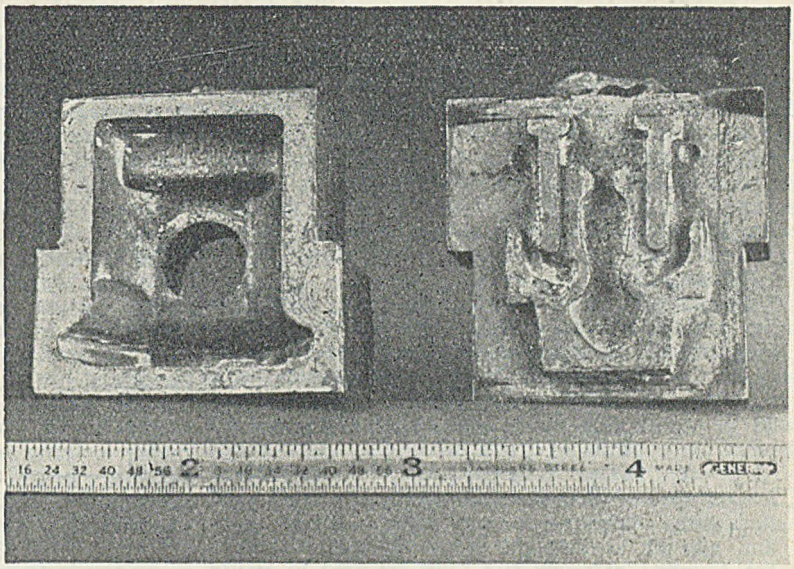

FIG. 3.—PART CAST FROM MACHINED PLASTIC PATTERN.

pigments, since evidence indicates that pigment colours tend to leave residues behind in the ceramic mould that are difficult to remove in the "burn-out." Plastic patterns with some colour are much easier to inspect for small defects than are clear, transparent ones. The plastic should be dried at low temperature before loading in the moulding machine; otherwise, the surface moisture will form steam bubbles in the pattern. Some of the bubbles may be near enough to the surface to cause rejection if the metal breaks through this bubble during pouring.

Plastic Moulds

For some parts where the quantity is small and the shape is not too intricate, the patterns can be machined from solid plastic, set up, and metal can be cast in the resulting cavity. Fig. 2 shows examples of simple patterns machined from solid plastic. Fig. 3 shows a part cast from machined patterns. In this connection, one fact should be pointed out—patterns machined from plastic should be used without too much time elapsing after machining or the parts may crack due to residual stresses. That plastic will retain residual stresses after machining is shown in Fig. 4. The photographs were made using polaroid projector and monochromatic light source (5461 Angstrom green line of a mercury arc). It is possible that a low-temperature anneal of the plastic patterns would relieve these stresses. It is of interest to note that irregular, high internal stresses in plastic patterns such as shown in Fig. 4 will alter the linear coefficient of expansion of the material.

Recently, a new type of plastic for patterns has made its appearance. It is made by using the lower-molecular-weight polystyrenes. It does not have a critical point above room temperature, so that the expansion characterisic above room temperature is a straight line. Thus, no mould cracking will result from a sudden expansion. Recommended pressure is about 1,000 lb. per sq. in. at 175 deg. C. For this reason neither expensive injection moulding machines nor steel dies are necessary, and zinc-alloy dies can be used. The material can be moulded on practically any wax machine as long as a pressure of somewhere around 1,000 lb. per sq. in. is available. However, to use it in most wax-injection machines would require some changes in pressure application. Wax melts and is injected like a die casting, with the pressure piston coming in at right angles to the flow of the wax from the holding pot. Plastic does not become truly liquid, so pressure must be exerted from top of holding pot to force the flow of plastic. There is also evidence indicating that the newer plastic moulds with much less residual stress than normal polystyrene. The cost is about three times that of polystyrene. The shrinkage is about the same as that of wax with a spread of 0.6 to 1.2 per cent. Above 150 deg. C. the new plastic will flow slowly out of the mould and is almost completely removed from the mould at 427 deg. C.

Investment Material

In general, an investment material contains two major constituents: a refractory and a binder. When mixed with water or other suitable vehicle, the satisfactory investment will become sufficiently mobile to be formed easily into a mould. It must have sufficient working time to allow for convenient handling, and then set into a hardened mass with reasonable speed. The investment must not contain impurities which would be injurious to the metal being cast, and it must not be fused by the molten metal. It must not crack during

"burn-out," or in cooling to room temperature after "burn-out," and it must withstand the heat shock of the molten metal being poured into it. It must be hard enough not to erode during pouring, yet should break up easily after the metal has solidified so that the casting can be readily removed. In general, 1,095 deg. C. is the dividing line between high- and low-temperature investments, since gypsum starts breaking down above 1,120 deg. C.[4]

Fortunately, most non-ferrous work falls into the low-temperature class. This type of investment usually contains one of the three forms of silica (to be discussed later) with gypsum as a binder. A satisfactory combination contains about 70 per cent. 200 mesh cristobalite silica and 30 per cent. gypsum. To this mixture is added about 33 per cent. water. Usually, proprietary, pre-mixed investments of this sort are readily available, and it is only necessary to add water. If the silica and gypsum are bought separately and mixed in the foundry, extreme care must be used to assure that uniform grain size and distribution is maintained, since this will greatly influence the performance of the wet mixture. A slightly stronger ceramic is needed for polystyrene patterns than for wax. This can be obtained by using the same ceramic mixture but by reducing the amount of added water.

Silica for Investment Purposes

Silica can exist in at least six crystalline forms: both high- and low-temperature modifications of quartz, tridymite, and cristobalite. These various forms of silica differ only in atomic arrangement. In changing from low- to high-temperature modification, re-arrangement of atoms occurs and expansion takes place. The amount and rate of expansion differs with the type of silica, as shown in Fig. 5. Cristobalite undergoes a rapid expansion at slightly under 260 deg. C. Quartz undergoes a rapid expansion at about 566 deg. C. Tridymite undergoes two small expansion increases at about 120 deg. C. and 163 deg. C., but the change is much less than that of quartz or cristobalite. Fused quartz undergoes the least expansion, less than 0.1 per cent. up to 870 deg. C. The volume of all forms of silica is comparatively constant higher than about 600 deg. C., so if silica were heated and cooled, but always remained above this temperature, there would be little cracking or spalling. However, when the material is cool and heat is applied, cracking is likely to occur at the point where the change from low- to high-temperature modification occurs, and, similarly, when cooling from above 600 deg. C. to a temperature below the modification change point. Fig. 6 shows a typical heating and cooling curve of a mixture of cristobalite and gypsum.

Preparation of Investments

In any investment it is important to control particle size. Finer powders are too dry with the same water content as coarser ones, because of the increased surface area which must be wet to obtain the same degree of workability. Particle size can be controlled by elutriation and hydrometer checks. The values are expressed as median particle size, which is determined by hydrometer measurement during sedimentation of water suspension. The *casa grande* hydrometer method[5] is used since the finest screen made retains only those particles larger than 37 microns (0.001443 in.). Moisture control is also important, since increasing moisture decreases strength and increases shrinkage, drying time and cost. A Braebender

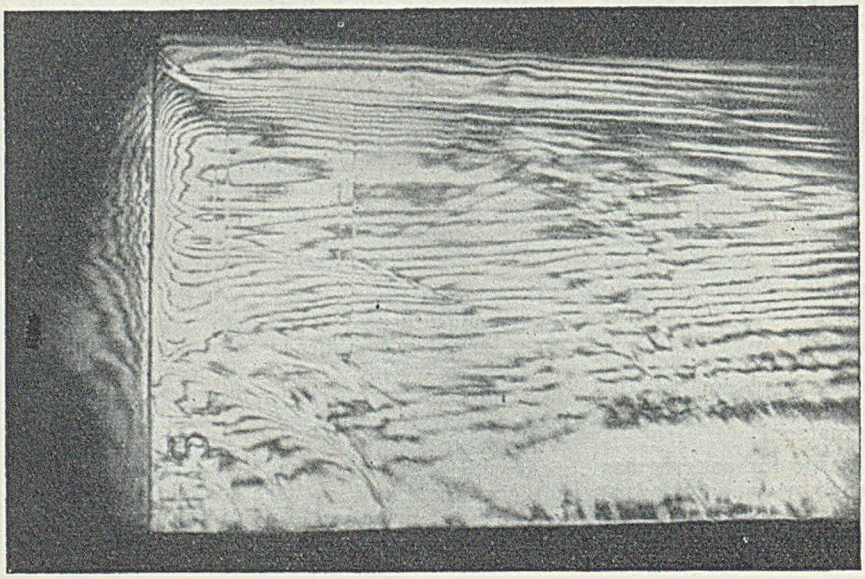

FIG. 4.—RESIDUAL STRESSES IN A PLASTIC PATTERN AFTER MACHINING.

moisture tester is excellent for this purpose. In mixing, add dry material to liquid, as this minimises sticking to the sides of the container.

After the investment is mixed, it is usually necessary to vacuum extract bubbles of air. A vacuum of 29 to 29.4 inches of mercury is necessary to complete the removal of bubbles. After being held 3 min. under vacuum, it is vibrated

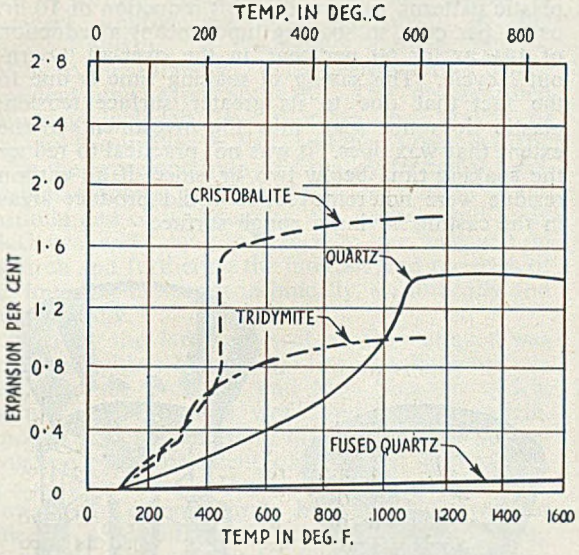

FIG. 5.—AMOUNT AND RATE OF EXPANSION OF VARIOUS FORMS OF SILICA. NOTE THAT MOST OF THE QUARTZ EXPANSION OCCURS NEAR ITS INVERSION TEMPERATURE. (APPROXIMATELY 573 DEG. C.)

on a vibratory table. When pouring the ceramic around the patterns, the flask is vibrated. The mix should be poured down the side of the flask but not directly on the patterns. The flask may be rotated during this operation to assist in removing bubbles. The flask is filled to a point just covering the patterns and is then vacuum extracted. The flask is then completely filled and allowed to stand for one or two minutes on the vibrator. After about an hour, it is hard and the base can be removed. The flask must not vibrate too long or some settling action will occur in the flask, and this would cause areas of varying strength and, subsequently, the investment would be more subject to cracking. Also, sufficient vacuum should be obtained and maintained to pull the air out of the mixture and to free any trapped air bubbles in the recessed portions of the patterns.

Drying, Elimination of Pattern, and "Burn-out"

After the investment is in the flask, there is a three-stage operation that is necessary to prepare the mould for pouring:—(1) Drying out moisture; (2) eliminating patterns, and (3) "burn-out," or baking of the ceramic.

Where wax patterns are used, steps (1) and (2) coincide. However, when polystyrene patterns are used, the first step only drives off excess moisture. The plastic patterns burn out or are eliminated at a temperature between that used for drying and that used for baking the ceramic. All moulds are placed in the drying oven bottom-side upwards, so that the pattern material can drain out as it melts. Also, the wax holding the flask on to the base, melts, and the base can be removed and used again. With wax patterns a drying-out temperature of 93 to 104 deg. C. for several days effectively dries the mould and eliminates the bulk of the pattern wax. When polystyrene patterns were used it was found that this drying temperature had a great effect on the cracking of the moulds. Castings made with polystyrene patterns developed fins due to cracked ceramic. It appeared to be connected with the expansion of the patterns during the time before the ceramic attained strength. It has previously been mentioned that polystyrene has a critical point at about 82 deg. C., at which temperature the plastic expands rapidly. At this point the ceramic is weak and the expansion of the patterns causes cracks to appear. By reducing the drying temperature to 60 to 66 deg. C., the tendency for these expansion cracks was greatly lessened.

When wax patterns were used, it was customary to load the "burn-out" oven and increase the temperature 55 deg. C. per hr. until 650 deg. C. was reached. The moulds were then held at 650 deg. C. for 12 hr. thoroughly to eliminate any wax or carbon residue. This length of time was found to be desirable if minute surface pits due to the reaction between the residue and the metal were to be avoided. The long period was made necessary by the fact that the wax soaked ½ in. or more into the investment during the drying and had to be extracted by the use of extensive heat, due to the low permeability of the ceramic. This made an over-all burning cycle of 24 hr.

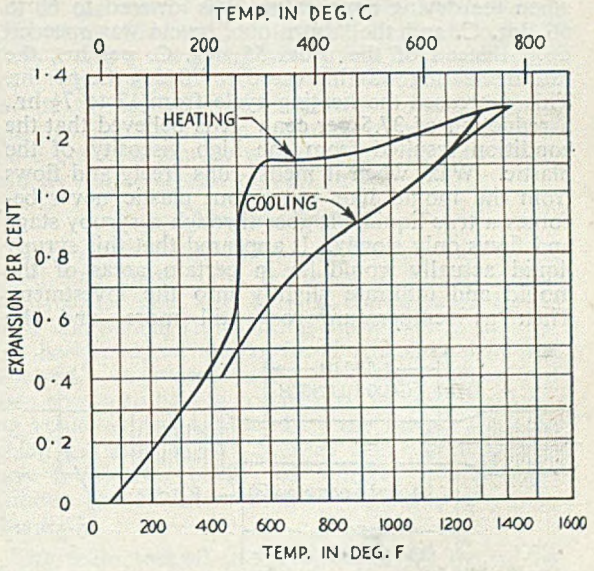

FIG. 6.—TYPICAL HEATING AND COOLING CURVE OF A CRISTOBALITE AND GYPSUM MIXTURE.

Non-ferrous Investment Casting

Precautions in Drying

When the wax "dry-out" and "burn-out" techniques were used for plastic patterns, a rough casting surface often appeared in small patches on castings. The appearance was visible as a dull finish compared with the shiny, smooth finish of the material flowed out, it took very small particles of investment with it. By increasing the heat input, the plastic apparently did not have time to lie long enough in the syrupy state to soak into the investment. So far as the experiments went, the more rapidly the plastic was removed, the better the finish of the castings.

It was further found that soaking time at 650 deg. C. could be reduced from 12 to 2 hr. when plastic patterns were used. This reduction of 10 hr. or 83 per cent. in soaking time, meant a reduction of 14½ hr. or 60 per cent. in the over-all "burn-out" cycle. The saving in soaking time is due to the fact that due to its greater surface tension, plastic does not soak into the investment to the extent that wax does. It was not practical to reduce the soaking time below two hr. since, if all carbon residue were not removed, it would produce areas in the casting having a rough surface.

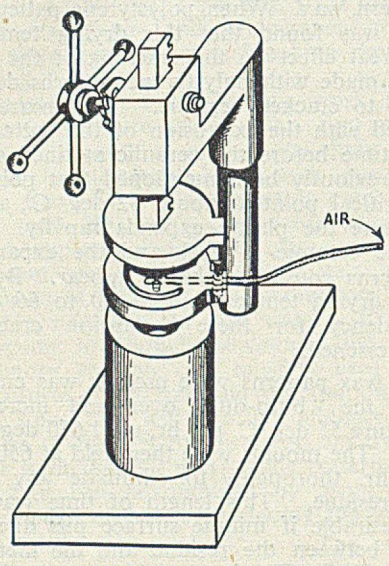

FIG. 7.—AIR-PRESSURE CASTING MACHINE FOR INVESTMENT MOULDS.

normal casting. This defect was never deep but gave bad appearance; the condition appeared only when plastic patterns were used; it disappeared when the drying temperature was lowered to 60 to 66 deg. C. and the "burn-out" cycle was speeded up. Instead of the usual 55 deg. C. per hr., the rate of heating was increased to 70 deg. C. per hr. This decreased the heating cycle from 12 to 7½ hr., a reduction of 37.5 per cent. It is believed that the condition resulted from the high viscosity of the plastic. Wax, when it melts, runs freely and flows from the mould like water, but plastic never becomes a true liquid. It goes through a syrupy stage and flows only slowly. It appeared that this syrupy liquid actually would lie in certain areas of the mould and infiltrate slightly into the investment. Then as temperature rose still more, and the

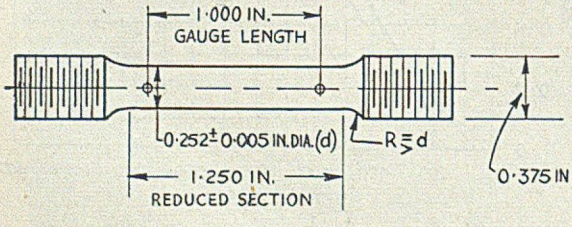

FIG. 8.—TENSILE-TEST SPECIMEN FOR INVESTMENT-CAST MATERIALS.

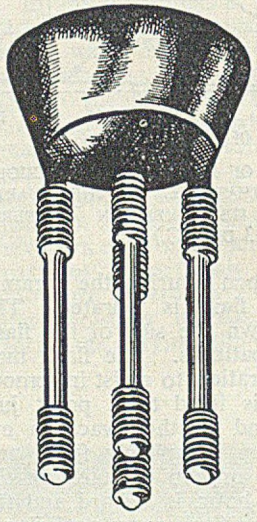

FIG. 9.—DIRECT TEST-BAR GATING SYSTEM.

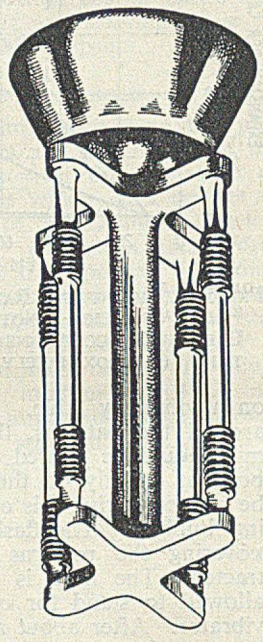

FIG. 10.—INDIRECT TEST-BAR GATING SYSTEM.

Where gypsum is used in the investment, the "burn-out" temperature should not exceed 650 deg. C. or the calcium sulphate will break down. The temperature must be at least 540 deg. C. effectively to remove carbon. In any event, the rise in temperature must be delayed at about 593 deg. C., the inversion point of the silica; otherwise, mould cracking can be expected due to the rapid expansion at this temperature. If moisture is not removed and the mould is fired too hard, the formation of steam in the ceramic may crack it or cause a spalling on the interior faces of the cavity.

(To be continued)

Institute of British Foundrymen

ANNUAL BANQUET

Premier Social Function at Buxton

A company of members and guests of the Institute of British Foundrymen, and their ladies, in numbers approaching 500, assembled at the Pavilion, Buxton, on Wednesday evening, June 7, for the Annual Banquet. They were received by the president and Mrs. Sheehan. The distinguished gathering included His Worship the Mayor of Buxton) (Councillor A. Salt) and the Mayoress (Mrs. Salt), the representatives of foundry technical associations overseas, past-presidents and officers of the Institute and of its branches, Sir Andrew and Lady McCance and many others who are engaged in research and furthering the interests and progress of the founding industries technically, scientifically and commercially.

Each of the ladies present at the banquet was presented with a box of fine linen handkerchiefs, a gift from the president and Mrs. Sheehan which, the president remarked, would indicate their origin. Another popular feature of the evening was the presentation by the president, on behalf of the Institute, of a very fine Crown Derby coffee set to Mrs. N. P. Newman to commemorate her husband's year of office as president and in tribute to the charming manner in which she had fulfilled the duties of the president's lady, which had contributed largely to the pleasure of many social functions.

Following the toasts, dancing continued until a late hour, to music provided by the Pavilion Orchestra.

The Toasts

MR. N. P. NEWMAN, J.P. (immediate past-president), after the loyal toast, proposed "The Corporation of Buxton," and coupled with the toast the name of the mayor. In a speech which was enlivened with humour, he said it was only right, when one came to a town such as Buxton and enjoyed the hospitality which was offered, that one should look into its history. Therefore, he went on to give some of the results of his researches, which has involved "a great deal of time, and considerable expense!" Buxton was well known in the time of the Romans, as was proved by the discovery of Roman remains, including the foundations of Roman baths. The earliest recorded reference to Buxton occurred in the Chorography of Ravennas, A.D. 430-5, who mentioned Aquis as one of the Roman posts from Lindum Colonia (Lincoln) to Mantio (Manchester). Roman Buxton was not very big or important, but then, as to-day, it was largely dependent on its medicinal springs for its existence.

In the time of Henry III (1216-72), Buxton was known as "Bawkestones," and by 1536, in the reign of Henry VIII, had become "Buckstones." It began to take importance when the Hall was built by George Talbot, Earl of Shrewsbury; in 1670 the Hall was enlarged by the Earl of Devonshire. From that time Buxton was visited by many famous people, often much against their inclination; letters written by them were full of complaints of hardships they had suffered, and the lack of amusements. Lord Macaulay, in his "History of England," had written:—

> The Gentry of Derbyshire and the neighbouring counties repaired to Buxton, where they were crowded into low wooden sheds and regaled with Oatcake and with a viand which the hosts called "mutton," but which the guests suspected to be "dog."

In 1780 the 5th Duke of Devonshire built the Crescent, at the foot of St. Ann's Cliff, and in addition to his building activities he did a lot of planting. Until then the neighbourhood of Buxton was treeless and somewhat dreary. A certain Mrs. Delaney wrote, in 1766:—

> You may come here from mountain to mountain without having anything like a prospect—not a tree, hardly a bush, and instead of hedges, "toad walls," as we call 'em.

In 1800, Buxton was a very small place, having a population of 760. Then, from the 'twenties to the 'sixties, the history of Buxton was one of slow expansion. In 1821, the population was 1,000, and by 1861 it had grown to 1,877. In 1871 had started the development of the gardens and the Pavilion, which had become to-day the centre of the social life of the town. Buxton became a Local Board District in 1878, and a Municipal Borough in 1917. Thus it was a town with a long and honourable history. For the past 1800 years it had been renowned for its springs and their impressive surroundings; and whatever the future might bring, one hoped that those constant factors would always help to maintain its character and reputation.

Mayor's Reply

HIS WORSHIP THE MAYOR, in his response to the toast, also made some reference to history. The Romans, he said, had derived considerable enjoyment and benefit from taking the waters at Buxton, and had rendered thanks for the healing they had received. In recent times, the waters there had been shown to have a commercial as well as a healing value, as was witnessed by the financial benefit which had accrued to a licensee who was alleged to have made two bottles of whiskey out of one, without the Excise authorities knowing anything about it!

The main festival in the town in the course of each year was that of blessing the wells, to give thanks for the healing properties of the waters.

I.B.F. Annual Banquet

Through the generosity of a Duke of Devonshire, a fountain had been provided in the high part of the town for the convenience of those taking the waters. This festival was inaugurated about 120 years ago, and the mayor himself is chairman of a voluntary committee which organises it. It is extended over a period of four days, beginning on June 24, the date of the birth of St. John the Baptist, and attracts a considerable number of people.

It would be agreed, he continued, that the amenities of the town were quite in keeping with its size, and the endeavour was gradually to develop the town as a pleasure resort as well as a health resort. His Worship extended to all attending the conference a very hearty welcome, he hoped their stay in the town would be most enjoyable, and that at some future date the Institute would hold another conference there.

The Institute

MR. E. PLAYER (managing director, Birmid Industries, Limited, and a member of the Institute over a period approaching 40 years) proposed "The Institute of British Foundrymen," coupling with the toast the name of the president. He professed to be perturbed by his responsibility—though his facility of speech belied it. He deplored that in our boosted modern civilisation we adhered so slavishly to the traditions of our barbarian ancestors in their practice of human sacrifice; an after-dinner speaker, he said, was given the run of the menu—free of charge, he hoped—but his appetite for the good things before him was entirely spoilt by the thought of the "gallows" of speech-making that awaited him.

The Institute, he continued, was becoming quite respectable. It had set itself first to disseminate knowledge relating to its art and craft, and secondly—not too far secondly, he hoped—to improve the status of those who practised that art and craft and who were leaders in the advancement of its technical and scientific discoveries and their useful applications. He was not unjust in saying even to-day that in many directions, not least in those large engineering organisations in which the foundry was a component part, the importance of the foundry manager and the technical and administrative staffs of the foundry still failed to receive due recognition in policy consultation. Admitting that that remark was in the nature of back-slapping, he urged that it was justified.

After all, who were the people who gave sum and substance to abstract thought? They were the people concerned with the foundry. An idea was conceived and was put on to paper in two dimensions; the foundrymen gave it three dimensions and tangibility. Engineering occupied a position second only to agriculture, which was paramount in the life of man to-day. The foundrymen represented the foundation of engineering; and they suffered the fate of all foundations in that they were buried in the earth and carried all the load, and yet were forgotten.

The Institute, however, offered a channel through which ideas and ambitions for foundrymen, for industry and the nation in general, could pass. It offered a means of learning from each other, and it fulfilled that function particularly well. It had numerous branches throughout the country, it maintained close correspondence with other nations and exchanged ideas freely, although still not so freely as he would like to see; it stood for something very valuable in the life of our country, and he hoped it would become still better in the future. He was anxious that membership of the Institute should be regarded as the sign-manual, a cachet, a first-class indication of the possession of knowledge and the ability to transmit that knowledge into practice, similar in importance to membership of the senior scientific and engineering institutions; the time should come when the qualification "M.I.B.F." should be equivalent to a science degree in a university, a prize greatly to be cherished.

The Institute continued to grow; and if growth was a symptom of life, then it was really alive. One of its most important activities was the work of the Technical Council, proving, if proof were needed, that scientific methods were being applied more and more in the foundry.

In tribute to Mr. Sheehan's pioneer work in the development of foundry sands, Mr. Player said we were getting back to Baconian principles which, expressed in the vulgar, simply meant "suck it and see," but which in scientific language meant analysis first and synthesis afterwards. Nowadays we did not ask always for a sand identified by a place name, for example, but we asked for one containing definite proportions of silica, colloidal clay, and so on. Thus we knew what we had got; whether or not it did what we wanted was another matter.

That reference led him to urge the cultivation of the spirit of frankness, because no one learned more quickly than when trying to teach somebody else, and on that selfish ground alone it was very well worth while. Wherein he had given, so he had gained more than in any other way. In the Institute members should set the standard of a band of brothers, ready to help each other in every way they knew, within the limitations imposed by financial considerations. Mr. Sheehan had shown how that could be done. He had given to the world much valuable information, particularly on sand matters, which were vital to foundrymen. We never made progress by keeping everything to ourselves; one could rest assured that the other fellow knew something that one did not know oneself.

Having known Mr. Sheehan for a considerable time, Mr. Player's admiration and respect for him were such as to make it difficult to state in public. As president, Mr. Sheehan was a very worthy successor of a very illustrious line of predecessors.

President's Response

THE PRESIDENT, on rising to respond, first expressed his very sincere thanks to head-office staff, and particularly to Mr. Tom Makemson (general secretary) and Mr. George Lambert (assistant secretary) for the excellent arrangements they had made for the conference; and also to the members of the Conference Committee, who had supported head office and himself so staunchly.

Speaking of the growth of the Institute, an expansion to which Mr. Player had contributed so largely throughout his very long period of membership, he gave the following figures:—

1904, approximately	100
1914	923
1924	1,556
1934	1,832
1944	2,946
1950	4,588

The members of the Institute, he continued, were important people and they deserved some of the things Mr. Player had said about them. Their importance and their influence was increasing. That increased influence arose out of their importance, and their importance arose out of the efficient working of all the activities of the Institute. But with that acquisition of influence they acquired also the moral obligation to use it for the good of the industry and of the community generally. At present foundrymen had little effect upon the nationalised industries. What representation had they on the governing bodies of such industries? Could they influence the quality of the raw materials supplied by those industries? Could they influence the policies that governed quality? To meet the non-technical and often ill-informed wishes of a voting public, short-term decisions might be arrived at and operated, much to the detriment of the considered long-term good of the foundry industry and of the country. Decisions arrived at by authority familiar with and governed by producers' requirements only could not always be for the general good, but must too often be for the ease and comfort of the producing monopoly, whatever that monopoly might be. It could be the nationalised industries. The ease and comfort of a larger Civil Service was not for the general good, and certainly was not an end in itself.

The Institute was in a very considerable way worthy of the sentiments expressed so ably by Mr. Player. It was growing, it was important, it was becoming increasingly aware of its importance and of the strength of its influence, and it was beginning to realise the need to use that influence wisely for the general good in a world of constantly changing conditions. He believed he was interpreting the spirit of the Institute correctly in saying that in all its manifestations it was more conscious of its duty than of its needs; and surely to know one's duty was to do it.

The Guests

MR. COLIN GRESTY (senior vice-president) proposed the health of and welcomed the many guests of the Institute at its chief social function of the year.

It was particularly pleasing, he said, that the Mayor and Mayoress of Buxton were good enough to attend; their presence indeed confirmed the civic welcome they had given to the Institute. Sir Andrew and Lady McCance were also very welcome guests. In spite of the fact that Sir Andrew was a member of the Institute, he had been an honoured guest at the Annual Banquet for two years in succession. In 1949, he was present in his capacity of president of the Iron and Steel Institute, and he had responded to a toast; in 1950, he was the Edward Williams Lecturer. Mr. Player was a member of very long standing; like Sir Andrew and perhaps Tommy Tucker, he also had had to sing for his supper!

Altogether, ten nations were represented on the occasion, and among those representatives Mr. Gresty paid tribute particularly to Mr. F. W. E. Spies, the president of the Dutch Foundry Association and vice-president of the International Committee of Foundry Technical Associations, whose name he coupled with the toast.

A very special welcome was offered also to personal guests of the president—Mr. E. P. Major, the chairman of the company of which the president was managing director, and the president's brother, Mr. P. J. Sheehan, a past-president of the Institute of Gas Engineers of Ireland.

Of the representatives of research associations, kindred technical institutes and trade associations, he mentioned particularly Dr. J. E. Hurst, a past-president of the I.B.F., and president-elect of the Institute of Vitreous Enamellers. Although he had certainly been enamelled, one had not yet seen any signs of vitrification!

Welcoming all the ladies, Mr. Gresty said that one could not conceive an Annual Conference without the colour and charm which they gave it; and he offered a special welcome to Mrs. W. Maloney, the wife of the secretary of the American Foundrymen's Society, expressing the hope that she would enjoy the whole period of her first visit to this country, and particularly that part of it which she was spending with the Institute at Buxton.

Reply by Mr. F. W. E. Spies

MR. F. W. E. SPIES, in his response, proved himself a master of the English language. He was taking the place, he said, of a good old friend of all foundrymen, Professor Pisek, of Czechoslovakia, who was unable to attend the conference, although all his friends knew that he was there in spirit. He had been good enough to write a letter to his old friends. The guests from foreign countries, he said, were very happy to be present. They remembered with pleasure having renewed old friendships and made new ones at the international conference in Amsterdam last year, and it was with equal pleasure they resumed that process in Buxton.

There had been a lot of visitors to good old England from time to time, he continued. Many hundreds of years ago the Italians—then called Romans—had paid a visit. After they had retired (according to plan!) the Germans had come to see what was happening in Great Britain, and their visit was recalled by the Anglo-Saxon laws and churches still existing. Later had come the Danes and Norsemen; they had given us four kings, and now every week we could recall the visit of the Vikings by the words "Wednesday" and "Thursday." Then the Frenchmen had come over, and we had a blend of their language and the Anglo-Saxon in the English language. In the Shetland Islands we could find the evidence of the Spanish attack. Then had come

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the Dutch, and they had given us one king. Their Admiral de Ruyter had closed the Thames and had destroyed our ships on the Medway. Recently, said Mr. Spies, he had been told by an Englishman that Admiral de Ruyter had arrived on a Saturday afternoon, when all our seamen and other citizens were playing cricket! One concluded from that that Admiral de Ruyter was a wise man; he had come here in 1667 with 80 vessels, and had worried us for some time. To-day, however, there had been a different kind of invasion by foreign guests, who came for more peaceful purposes, and were happy to be present. To attend the conference they had come from Italy, France, Belgium, Sweden and Holland; and there was also the charming representative of the United States.

Mr. Spies took the opportunity to thank the Institute, on behalf of the International Committee of Foundry Technical Associations, for having enabled the secretary, Mr. Tom Makemson, and his staff to give the Committee valued help over a period of nearly 24 years. There were many abroad who were proud to call them friends. International collaboration helped us so much to understand each other, and thus laid the foundations for a better future, when he hoped the battle for peace would be won. That battle would be won by people who were willing to work hard and honestly.

Presentation to Mrs. Newman

At the conclusion of the formal speeches, the president presented to Mrs. N. P. Newman the Crown Derby coffee service already referred to, and which he asked her to accept as a token of appreciation of her service to the Institute, from members in all parts of the country.

Mrs. Newman, in a few neat sentences, expressed her very sincere thanks for a really beautiful gift. She assured the gathering that she had thoroughly enjoyed all the social functions she had attended with her husband; and in the future, when enjoying her coffee, she would be reminded of many happy evenings and of the many good friends she had met through the Institute.

Board Changes

REVO ELECTRIC COMPANY, LIMITED—Mr. G. H. Gunson and Mr. H. H. Wainwright have been appointed directors. Mr. F. H. Reeves has resigned.

PEARSON & KNOWLES COAL & IRON COMPANY, LIMITED—Mr. H. M. Jones has been appointed to the board as a representative director for the holders of the income debenture stock in place of the late Mr. M. S. Gibb.

NORTH BRITISH LOCOMOTIVE COMPANY, LIMITED—Mr. Iain M. Stewart, chairman and managing director of Thermotank, Limited, and Mr. D. M. Semple, chairman and managing director of the Mirrlees Watson Company, Limited, have joined the board.

IRON TRADES EMPLOYERS' INSURANCE ASSOCIATION, LIMITED—Mr. Denis Rebbeck, a director of Harland & Wolff, Limited, has been appointed to the board, and also to the board of the Association's subsidiary concern, the Iron Trades Mutual Insurance Company, Limited.

Obituary

A. W. GREGG

By cable we learn of the death following an operation, of Mr. A. W. Gregg, consulting engineer on the staff of the Whiting Corporation, of Harvey, Illinois, U.S.A. Mr. Gregg was a very prominent member of the American Foundrymen's Society and was a prolific writer on foundry topics. Last year, he made his first trip to Europe when he attended the Amsterdam international foundry conference, where he was the writer's constant companion. He was encyclopædic on the American foundry industry, where it was obvious he had a host of friends. The passing of this great American gentleman will be mourned on both sides of the Atlantic.

MR. JAMES BELL, late of Stewarts and Lloyds, Limited, died suddenly in a Glasgow hospital on Saturday.

MR. ARTHUR BOLTON, managing director of A. Bolton & Company (Engineers), Limited, Shotley Bridge (Co. Durham), has died at the age of 59.

MR. JOHN PERCY IBBOTSON, for many years manager of the Sheffield sales office of the United Steel Companies, Limited, died on May 29. He was 64.

MR. E. B. CHRISTMAS, managing director of Christmas & Walters, Limited, engineers and contractors, etc., of Streatham High Road, London, S.W.16, died on May 31. He was 76.

MR. JAMES COUPER, of Stratheden, Denny, well known in the ironfounding industry, died suddenly on May 31, when being taken to hospital to undergo an operation. He was junior partner in the firm of A. Couper & Company, Dunipace Foundry, and was 42 years of age.

MR. BENJAMIN PEACH, civil engineer for the British Aluminium Company, Limited, at Lochaber (Inverness-shire), died on June 4 at the age of 59. Prior to joining the company in 1935 Mr. Peach was resident engineer for the firm of consultant engineers which carried through the Lochaber power scheme, involving the construction of a 15-mile tunnel through Ben Nevis from Fort William to Lock Treig.

Publications Received

Nimonic Series of Alloys. Published by Henry Wiggin & Company, Limited, Birmingham.

Three more publications have been issued on the important Nimonic series of alloys. They give details of methods for annealing and pickling, hot-working and machining these alloys. The publication on machining was compiled as a result of a survey of current practice in the machining of these materials by a number of prominent aircraft-engine manufacturers. These publications will be of considerable interest to the growing number of firms who fabricate these materials for high-temperature service, giving as they do valuable data on the most satisfactory method of manipulation. Any of these publications may be obtained, free of charge, on application to Henry Wiggin & Company, Limited, Wiggin Street, Birmingham, 16.

Wage Incentive Schemes. Published by the British Institute of Management, 8, Hill Street, London, W.1. Price 2s. 6d.

Inasmuch as it gives "potted" descriptions of the various wage incentive schemes used and their selection for various types of production, this pamphlet is useful. For the rest the enlightened works manager should be quite familiar by this time with the precepts enunciated.

MR. H. HAYDEN, assistant hon. secretary of the East Midlands branch of the Institute of British Foundrymen has changed his address from 230, Harrington Street, Derby, to 11, Mortimer Street, Derby.

Birthday Honours

The Birthday Honours List published last Thursday contained awards to many people associated with the foundry, iron and steel, and allied industries. Brief notes on some of the awards are given below.

BARONS

MR. ERNEST WALTER HIVES, managing director of Rolls-Royce, Limited, and a director of Renfrew Foundries, Limited.

SIR CYRIL WILLIAM HURCOMB, chairman of the British Transport Commission.

KNIGHTS

MR. ARCHIBALD JOHN BOYD, chairman of the Railway Carriage and Wagon Builders' Association, managing director of the Metropolitan-Cammell Carriage & Wagon Company, Limited, and a director of Associated Electrical Industries, Limited, and other companies.

MR. CHARLES BLAMPIED COLSTON, chairman and managing director of Hoover, Limited.

MR. HERBERT HENRY HARLEY, chairman of the Coventry Gauge & Tool Company, Limited, and a director of the Coventry Precision Engineering & Repetition Company, Limited.

MR. JOHN KEAY, chairman and managing director of English China Clays, Limited, and a director of the Charlestown Engineering Company, Limited, and other companies.

ORDER OF THE BATH
K.C.B.

SIR BEN LOCKSPEISER, secretary of the Department of Scientific and Industrial Research.

ORDER OF THE BRITISH EMPIRE
C.B.E.

MR. FRANCIS TROUNSON HEARLE, a director of the De Havilland Aircraft Company, Limited, and De Havilland Forge, Limited, and chairman of the Hearle Whitley Engineering Company, Limited.

MR. CHARLES MURDOCH, chairman of the Scottish Regional Board for Industry.

O.B.E.

MR. GEORGE IVOR RUSHTON, a director and general works manager of the Whitehead Iron & Steel Company, Limited, Newport (Mon).

MR. SETH SMITH SOMERS, chairman of Walter Somers, Limited.

Use of Labour-saving Devices

The need for patience by employers to overcome workers' prejudices against extensive use of labour-saving devices was emphasised by Sir John Anderson last Tuesday. Speaking at a luncheon in connection with the opening of the Mechanical Handling Exhibition at Olympia, Sir John said that higher pay, shorter hours, holidays with pay, and all kinds of amenities were desirable in themselves, but had to be paid for. This could be achieved only by increased productive efficiency, which entailed the extensive use of mechanical-handling aids.

Linseed Oil Decontrolled

The Ministry of Food announces that as a result of the improvement of supplies, the present allocation scheme for linseed oil will be discontinued from July 2. From that date, the Ministry will make supplies of raw oil available to processors and other direct buyers. Manufacturers requiring supplies of processed oil should place their orders direct with a processor in the ordinary way of business. No permit will be needed to buy processed oil.

Processors and other direct buyers of raw oil should apply to the Ministry of Food, Oils and Fats Division, London Road, Stanmore, at least one week before the end of each month (beginning with June) for the quantity of raw oil they require during the following month, including oil to be shipped with paste paint. The proportion of oil which may be shipped with paste paint will continue at the present rate of one part of oil to two parts by weight of paste paint. A sales contract for the quantity of raw oil released to each applicant will be issued by the Ministry of Food's agents, the National Association of United Kingdom Oil and Oilseed Brokers, Limited. Applications for linseed oil for export (other than with paste paint) should still be sent direct to the Ministry of Food.

New Liner Equipment

All the fresh-water requirements of the new P. & O. liner Chusan, will be supplied by distillation from sea water at a lower cost than shore water. Evaporating and distilling plant, comprising three single-effect salt-water evaporators and one fresh-water evaporator, was supplied by G. & J. Weir, of Cathcart, Glasgow.

G. & J. Weir have supplied numerous other items of equipment for the new liner, which will arrive on the Clyde soon for speed trials. Among the features are Weir regenerative condensers and turbine and electrically-driven feed pumps. The firm also supplied H.P. heaters, pumps for various uses, drain coolers, air ejectors, gland steam condensers, and other heat exchangers.

An anti-roll device for the Chusan has been supplied by William Denny & Bros. Limited, Dumbarton, and Brown Bros. & Company, Limited, Edinburgh. This equipment, known as Denny-Brown stabilisers, reduces rolling of the ship in heavy seas.

Ministry of Supply Auction Sales

The following are among forthcoming auction sales announced by the Ministry of Supply. Names and addresses of the auctioneers are given in parentheses; catalogues (price 6d. each) may be had on application to them.

JUNE 28—Miscellaneous electrical equipment, etc., at R.A.F. Maintenance Unit No. 16, Sandon Road, Stafford. (South & Stubbs, Bank Passage, Stafford.)

JUNE 29-30—Cable, hand tools, etc., at Ministry of Supply Depot 1, Royal Arsenal, Woolwich. (Fuller, Horsey, Son & Cassell, 10, Billiter Square, London, E.C.3.)

Pneumoconiosis Experts to Meet

The convening of an international conference of experts on pneumoconiosis has been approved in principle by the governing body of the International Labour Organisation. The meeting will consider measures for preventing pneumoconiosis from the viewpoint of the physicist, chemist, and engineer. It will enlarge on the work accomplished by the Third International Conference of Experts on Pneumoconiosis held by the I.L.O. at Sydney, Australia, in March.

News in Brief

THE BICETENARY celebrations of M. & W. Grazebrook, Limited, of Dudley, are being held to-day.

TO MARK THE 50th anniversary of the firm of Smith & Fawcett, Limited, ironfounders, Horton Ironworks, Bradford, a special train took some 200 employees and friends on a visit to Blackpool.

THE ANNUAL GENERAL MEETING of the British Standards Institution will be held on Tuesday, July 11, at 3 p.m., in the Council Room of the Institution at 24, Victoria Street, London, S.W.1.

SPECIAL CLASSES in engineering are to be run for Latvian students by Bradford Education Committee, although most of the students are having to take a preliminary course to learn English first.

A ROTHERHAM SECTION of the Institute of Industrial Supervisors has been formed, with Mr. F. Harper, chairman of the Foremen's Association at Steel, Peech & Tozer, Limited, as acting chairman.

A REFRIGERATED CARGO LINER of 7,500 tons has been ordered by the Port Line, Limited, from Swan, Hunter & Wigham Richardson, Limited. The Wallsend Slipway & Engineering Company, Limited, will supply and fit Wallsend-Doxford single-screw oil engines.

THE WEST RIDING DISTRICT COMMITTEE of the Amalgamated Union of Foundry Workers have selected Mr. H. Hodgson, of Keighley, to represent them at the annual national conference of the union at Bridlington this month. Mr. Hodgson is secretary of Keighley branch of the union and also a member of Keighley Council.

A NEW BLOCK containing air-heated lockers for 1,250 men, shower baths, etc., is to be opened shortly at the Templeborough melting shop of the Steel, Peech & Tozer Branch of the United Steel Companies, Limited. Similar buildings in other parts of the firm's premises are either under construction or being designed.

A NEW DIESEL-ELECTRIC LOCOMOTIVE built by the North British Locomotive Company, Limited, Glasgow, may be adopted by British Railways for medium passenger and fast goods traffic. The electrical gear is supplied by the British Thomson-Houston Company, Limited, Rugby, and the Diesel equipment by Davey, Paxman & Company, Colchester (Essex).

TWO DOUBLE-BOGIE 915 bhp Diesel-electric mixed-traffic freight locomotives with complete power and transmission equipment supplied by Sulzer Bros. (London), Limited, have just been introduced by G.I.E. (Irish National Transport Company). They embody the special type of railway oil engine now being built at the Barrow works of Vickers, Limited, to the requirements of Sulzer Bros.

AT THE SECOND annual conference of the National Trades Technical Societies, Mr. John Gardom of Ripley was elected the national president. The retiring president, Dr. J. E. Hurst, F.I.M., M.I.Mech.E., J.P., was elected a permanent member of the national executive committee. Other elected officers were:—Mr. H. W. Hodson and Mr. A. G. B. Owen, vice-presidents; Mr. W. H. Davies, hon. treasurer; and W. H. Bolton, secretary.

AFTER A THREE-DAY TOUR of industry in the West Riding of Yorkshire, Mr. George R. Strauss, Minister of Supply, expressed the opinion that the only troubles of engineering firms in that area were troubles of prosperity and suggested that the shortage of labour had stimulated engineering managements to put more thought into the organisation of their production so as to secure the required output with fewer men. He had visited undertakings in Otley, Bradford, Rodley, Leeds and Huddersfield.

More New Foundry Baths

An entirely new building containing shower baths and cloakrooms has been erected by the Forth & Clyde & Sunnyside Iron Company, Limited (a constituent of Allied Ironfounders, Limited), Falkirk, for the benefit of their moulders and other workers. The building has been erected and equipped with all the latest hygienic apparatus at a cost of between £5,000 and £6,000. The formal opening ceremony was performed on May 31 by Mr. W. Ure, of the Amalgamated Union of Foundry Workers, Falkirk, in the presence of a large number of the firm's employees, and representatives of the trade unions concerned. Mr. John Brown, managing director, and director of Allied Ironfounders, presided.

Others present included Mr. A. D. Brown, director; Mr. W. B. Brown; Mr. A. Fair, J.P. (Iron Fitters' Union); Mr. A. Turnbull and Mr. Duncan Scott (organisers, A.U.F.W.); Miss Brand, H.M. Inspector of Factories; and Mr. Henry Wilson, architect.

Introducing Mr. Ure, the chairman said that on behalf of the management, he had to express pleasure that they had at last reached the completion of the baths. It was true that the baths had been a long time on the way, but all present would agree that a good job had been made of them, and that they were a credit to the architect and to the contractors. It was the earnest hope of the management that the baths would be taken full advantage of by all workmen, young and old alike.

Declaring the baths open, Mr. Ure said it was, indeed, most gratifying to find that most of the foundry employers in the Falkirk district had provided, or would very soon provide bath facilities for the foundry workers, and in this respect he must pay tribute to the Allied Ironfounders' concern and its various constituent firms in the area for what had been accomplished.

As a nation, the British had long appreciated the benefits of a shower bath, particularly in athletic pursuits. It was rather disturbing to find that there had not been paid the same attention to persons engaged in arduous and dirty occupations. To-day, however, they did not need to be so greatly concerned as in the past, for the future held out much more hope that conditions would, as time passed, become better and better. The Foundry Workers' Union was concerned with the health and amenities of foundry workers. He hoped and was confident that members of the unions concerned, especially the blackest of the black squad, would appreciate the convenience now provided.

Mr. Ure then turned the key of the door, and invited all to enter and inspect the building. On behalf of the firm, Mr. A. D. Brown presented Mr. Ure with a leather wallet as a memento of the occasion.

Exhibition of Flash Photography

The outstanding advances which have been made in the field of electronic flash photography during recent years are shown at an exhibition which opened on June 7 at the Holborn Gallery of Ilford, Limited, 101, High Holborn, W.C.1. This exhibition, which has been organised in conjunction with Mullard Electronic Products, Limited, will remain open for about six weeks.

Of particular interest among the exhibits is a large selection of photographs illustrating the manner in which electronic flash tubes are now being used in various branches of science, medicine and industry. Pictures are displayed illustrating their use in such research investigations as the cavitation of ships' propellers and the flow of gases in steel furnaces.

Company News

The information under this heading has been extracted from statements circulated to shareholders, speeches made at annual meetings, and other announcements.

Lancashire Steel Corporation, Limited:—Pointing out that the Corporation's liability for taxation amounts to £1,050,000, the chairman, SIR JOHN JAMES, says that the effect of this heavy taxation on the prices the Corporation has to ask for its goods is one of grave concern, particularly in view of the fact that, due to the increased production in which the Corporation played its part, the steel consumption of this country has been overtaken in bulk if not altogether in kind. "In short, we are presenting to the home market too much of one kind and not enough of another—*i.e.*, tubes, sheets, and tinplates are still in short supply, whereas we are finding increasing difficulty in disposing of our wire, particularly rods, as well as re-rolled products, due to the higher rate of production, and now that more steel is available in our own particular manufactures we are looking to the export market to keep us fully employed.

"With the completion of the industry's early planning which I estimate will come into full effect by the end of 1951, we should by that time have completely returned to a buyer's market for all our products either for home or abroad, and with it healthy world competition," says Sir John. "At this stage our heavy taxation may prove a severe handicap, particularly in the export market."

Australian Iron & Steel, Limited:—The company, which is the largest subsidiary of Broken Hill Pty., Limited, has increased its authorised capital from £A.8½ million to £A.20 million to finance the large-scale expansion programme recently outlined by the chairman. This plan, estimated to require several years, is designed to double Australia's steel output and to overcome her long-felt deficiency in tinplate production. Broken Hill Pty. is expected to take up the new shares in Australian Iron & Steel, Limited, but will require to make further issues of its own shares to finance expansion.

William Beardmore & Company, Limited:—During the year 1949 the demand for the company's main products, steel forgings and castings, has been satisfactory, says MR. ALEXANDER WILLIAMSON, the chairman. The heavy general engineering department has been further developed and several contracts for steelworks plant have been completed. Satisfactory progress has been made in the production of work rolls and sleeved back-up rolls for the new wide strip mills which are being installed in this country. The company is now developing the production of cast-steel back-up rolls, for which it foresees a substantial demand.

AN EXHIBITION organised by the Institution of Metallurgists under the title of "Metals in the Service of Mankind," will be held at the Science Museum, South Kensington, London, S.W.7, from July 7 to September 30. The exhibition, which is to be opened by H.R.H. Princess Margaret, will illustrate by the aid of charts, photographs, samples, apparatus and models, the story of the extraction, refining, fabrication, testing and uses of the common industrial metals, the rarer metals and the precious metals. Sections will be devoted to processes such as welding, metal surface finishing and electrodeposition. The exhibition is to be open on weekdays from 9.30 a.m. to 6.30 p.m., and Sundays, from 2.30 p.m. to 6.30 p.m. Admission is free.

Company Results

(Figures for previous year in brackets.)

HALE & HALE (TIPTON)—Interim dividend of 5% (same).

MASON & BURNS—Dividend of 10% and bonus of 10% (same).

A.P.V. COMPANY—Consolidated net profit on trading for 1949, £423,401 (£320,092); dividend of 50% (same); forward, £478,107 (£377,966).

WEYBURN ENGINEERING COMPANY—Interim dividend of 7½% (5%). It is stated that the increased payment should not be taken as indicating an increase for the year.

PARK GATE IRON & STEEL COMPANY—Trading profit for the year ended March 31, £483,897 (£208,820); balance, £126,786 (£152,094); dividend of 10% (same); forward, £306,576 (£234,790).

KAY & COMPANY (ENGINEERS)—Interim dividend of 20% in place of the anticipated final dividend. (Last year no interim dividend was paid, but a dividend of 20% was paid in September.)

HALLAMSHIRE STEEL & FILE COMPANY—Trading profit and other income for the year to March 31, £101,160 (£155,786); net profit, £31,423 (£46,549); to general reserve, £805 (£15,000); deferred repairs reserve, £9,195 (£5,000); final dividend of 35% and bonus of 10%, making 70% (same); forward, £18,208 (£22,772).

LOVERING CHINA CLAYS—Balance for the year ended March 31, £28,867 (£29,066); to debenture interest, £14,688 (£14,790); income tax, £6,483 (£6,481); available, £13,139 (£7,205); to debenture redemption sinking fund, £1,759 (£1,762); discount on issue of debentures written off, £9,381 (nil); forward, £1,999 (£5,443).

ROBEY & COMPANY—Trading profit for 1949, £89,016 (£85,417); net profit, £33,445 (£51,902); to debenture interest, £1,908 (£1,938); sinking fund, £258 (same); over-provision for taxation in previous years, £24,066 (£13,928); to general reserve, £40,000 (same); benevolent reserve, £6,000 (£10,000); dividend of 10% (same); forward, £35,927 (£32,537).

VENT-AXIA—Profit to March 31, £71,688 (£75,848); balance, £66,312 (£70,259); tax overprovision in previous years, £3,127 (nil); to taxation, £37,218 (£39,506); expenses of share marketing, nil (£2,407); expenses of bonus issue, £499 (nil); to general reserve, £10,000 (£11,678); final dividend of 37½%, making 62½% on larger capital (250%); forward, £8,217 (£7,120).

TUNGSTEN MANUFACTURING COMPANY—Consolidated trading profit for the year to September 30, 1949, £16,115 (£28,178); net profit, £11,112 (£19,291); tax provision not required, £954 (nil); to tax, £6,269 (£11,081); general reserve, nil (£5,000); special contingency reserve, nil (£5,000); dividend reserve fund, £5,000 (nil); preference dividend for nine months, £939 net (nil); forward, £7,509 (£7,651).

PEGLERS—Trading profit for the year ended March 31, £396,233 (£375,354); net profit, £147,373 (£136,150); interest on tax reserve certificates, nil (£9,405); provision for taxation unrequired, £15,000 (nil); to general reserve, £46,044 (£80,000); stock reserve, £30,000 (nil); dividend equalisation reserve, £20,000 (£10,000); pensions reserve, £505 (nil); dividend of 20% on enlarged capital (45%); forward, £57,852 (£40,413).

ALLEN WEST & COMPANY—Consolidated trading profit for the year ended January 31, £722,728 (£714,267); balance, after tax, etc., £279,466 (£243,582); to capital reserve of Allen West & Company, £77,431 (nil); general reserve of Allen West & Company, £150,000 (£200,000); subsidiary general reserve, £30,000 (nil); dividend of 7½% and bonus of 2½% on enlarged capital (same), £53,625 (£33,516); forward, £119,223 (£150,813).

BARROW HEMATITE STEEL COMPANY—Consolidated trading profit for 1949, £224,411 (£212,146); profit retained by subsidiary companies, £14,501 (£28,365); balance dealt with in accounts of Barrow Hematite Steel Company, £51,114 (£138,727); parent company's available balance, £94,565 (£167,074); dividend of 12½% (same); to general reserve, nil (£75,000); forward, £45,942 (£43,451).

SMITH & McLEAN—Group trading profit for 1949, £484,787 (£350,273); net profit, £213,085 (£165,371); to replacements reserve, £97,780 (£47,220); stock reserve, nil (£30,000); loose tools reserve, nil (£10,000); written off Metal Gas Company licence £2,400 (nil); investment account, £6,800 (nil); general reserve, £40,000 (£30,000); contingency reserve, £11,000 (nil); dividend of 15% and bonus of 10% (same); forward, £230,255 (£206,088).

COLVILLES—Consolidated group trading profit for 1949, £3,900,467 (£3,598,237); net profit, after depreciation, taxation, etc., £1,247,156 (£1,306,927); provisions restored, after tax, £45,704 (£657,750); income relating to previous years, £12,120 (£12,906); to reserves: special £9,200 (nil), replacements £480,589 (£742,220), general £90,000 (£550,000), contingencies £275,750 (nil); dividend of 13% (same); forward, £1,671,043 (£1,574,864).

RANSOMES, SIMS & JEFFERIES—Trading balance for 1949, £383,321 (£394,891); net profit, £126,151 (£166,825); profits retained in subsidiaries' accounts, £8,333 (£21,474); to debenture sinking fund, £12,000 (nil); capital issue expenses, nil (£20,235); stock contingencies reserve, £20,000 (£25,000); plant replacement reserve, £35,000 (£20,000); dividend of 7½% on increased capital (7½% on £750,000 and 3⅜% on £250,000 new ordinary); forward, £83,887 (£80,369).

Raw Material Markets

Iron and Steel

The demand for castings from the engineering foundries is sustained and production is maintained at recent high levels. The largest consumers continue to be the motor, tractor, and agricultural implement trades; in addition, the gas and electrical industries are calling for castings, while the foundries are also supplying castings for plant and machinery for both home and export. They have sufficient work on hand to warrant present outputs for many months. Most of the engineering foundries would readily accept additional tonnages of low- and medium-phosphorus pig-iron, but they can invariably make up the shortage of these grades by substituting either hematite or refined iron. Some of the engineering foundries have found it necessary to take up parcels of Scotch medium-phosphorus pig-iron, although this, of course, involves them in additional expense.

Hematite producers are usually able to meet demands made upon them, but it is not always easy promptly to supply the desired analyses, particularly in the higher silicon grades. The refined-iron makers are sending good supplies to the foundries, but current home and oversea commitments account for present outputs.

The light and jobbing foundries are steadily employed, but are able to add to their commitments. It is hoped that the removal of some restrictions and the intensification of the building programme will benefit the light foundries. Their type of pig-iron—high-phosphorus—is available in larger quantities than have for some time been required by these foundries, and the furnaces would be able to meet any normal expansion in trade.

Foundry coke is being taken up generally in scheduled tonnages. The ovens are maintaining regular deliveries both of foundry coke and of furnace coke for heating purposes, although occasional delays occur on account of the prior claims of exports. Ganister, limestone, and firebricks are coming forward quite readily, while foundries in need of ferro-alloys can usually obtain their requirements without much difficulty.

Difficulty continues to be experienced by the re-rollers in finding sufficient business to provide for maximum production. The heavy re-rollers are particularly affected. The re-rollers of sheets are in an entirely different position, their maximum outputs being fully covered for many months ahead.

Non-ferrous Metals

Whether or not we have attained the pinnacle of the rise in prices it is perhaps too early as yet to say, but it can hardly be doubted that, so far as buyers in this country are concerned, last week's events came as rather a damper on buying enthusiasm. Following a rise of 1½ cents in the U.S. zinc price to 14½ cents the Ministry of Supply advanced its selling limit to £123 10s. The following day copper, not to be outdone, jumped by 2 cents to 22½ cents, bringing the U.K. price to £186. On Monday a further £4 was added to the price of zinc. These changes necessitated some drastic adjustments in the current quotations for brass and copper semis, which have been "on the march" for many months. Now the copper and zinc look decidedly strong in the U.S.A. and it would certainly be wrong to presume that the top has necessarily been reached. Of all the non-ferrous metals, lead, perhaps, appears to be the one most likely to suffer some setback, but of that there is not at present any immediate likelihood. The copper situation across the Atlantic is complicated by the wrangle that is going on over whether the import duty on foreign copper entering the U.S.A. should be reimposed. This question must be settled soon, but, in the meanwhile, much uncertainty prevails and in metal circles people are wondering what effect, if any, reimposition of the duty would have on the sterling quotation.

Generally speaking, the tone of the tin market has been decidedly firm and, temporarily at any rate, the large stocks of the metal which are on hand are being ignored.

Metal Exchange tin quotations were as follow:—

Cash—Thursday, £611 to £611 10s.; Friday, £612 to £612 5s.; Monday, £605 10s. to £606; Tuesday, £602 10s. to £603 10s.; Wednesday, £605 to £605 10s.

Three Months—Thursday, £612 to £612 5s.; Friday, £613 to £613 5s.; Monday, £606 15s. to £607; Tuesday, £604 to £604 10s.; Wednesday, £606 to £606 10s.

On the occasion of the last increase in copper and zinc, scrap values have not risen so sharply as on previous upward revisions in the quotations of the virgin metals. True, in expectation of this coming appreciation in copper and zinc, secondary metals had already moved up quite considerably and, therefore, it was not perhaps to be expected that a further rise would occur. The truth is probably that dealers are rather of the opinion that if the peak has not yet been reached, then we are very close to it.

British Standard for Safety Gloves

British Standard B.S. 1651: 1950 deals with safety gloves, mittens and hand-guards for protection against common hazards in all industries. It is based on practical trials lasting several years and is designed to restrict the demand for safety gloves from more than two hundred different types now commonly supplied (each type in several sizes) into a range of seventeen preferred types, each supplied in a minimum range of sizes. This standardisation will facilitate economic production as well as the ordering and stocking. The gloves specified are designed to provide adequate protection, but also to overcome weak points existing in the past and thus to provide the greatest possible economy in use.

There are five groups: leather, plastics, rubber, felt, and cotton. The standard includes a list of hazards and recommends the appropriate types of gloves for each hazard. Requirements are given for materials, sizes, manufactures and methods of test; recommendations on the storage and preservation of rubber gloves are included, and on the information to be given when ordering gloves. Copies of this standard may be obtained from the British Standards Institution, Sales Department, 24, Victoria Street, London, S.W.1 (price 4s. post free).

Award of Diplomas

The Council of the Institute of British Foundrymen have awarded Diplomas for 1950 to the following Authors of Papers read before the branches.

MR. E. S. RENSHAW and MR. S. J. SARGOOD for the Paper "Some Modifications in Cupola Design," read before the London branch.

MR. W. WILSON and MR. A. TALBOT for "The Casting of a Large Pulley in Aluminium," given to both the London and Bristol branches.

MR. J. CAVEN and MR. H. W. KEEBLE for the Paper "Making Special-duty Castings in Aluminium Alloys," presented to the Birmingham branch.

MR. L. W. BOLTON for the Paper "Modernising an Iron Foundry" (of which he is joint Author) read before the London branch.

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

(Delivered, unless otherwise stated)

June 14, 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. 6¾d. 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, £605 to £605 10s.; three months, £606 to £606 10s.; settlement, £605 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, 17⅞d. per lb.; rods, drawn, 23¾d.; sheets to 10 w.g., 22½d.; wire, 22⅝d.; rolled metal, 20⅝d.

Copper Tubes, etc.—Solid-drawn tubes, 17¾d. per lb.; wire, 191s. 3d. 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), £176 to £239; Admiralty GM (88/10/2), virgin quality, £190 to £220, per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £208-£228; L.P.Bl, £128-£144 per ton.

Phosphor Bronze.—Strip, 29½d. per lb.; sheets to 10 w.g., 31⅝d.; wire, 31⅛d.; rods, 29d.; tubes, 32¼d.; chill cast bars: solids, 29¼d., cored, 30¼d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 2s. 1¾d. per lb. (7%) to 3s. 1¼d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 2s. 7¾d. (7%) to 3s. 7¼d. (30%); to 12 in. wide, × .056, 2s. 8d. to 3s. 7¼d.; to 25 in. wide × .056, 2s. 10d. to 3s. 9½d. Spoon and fork metal, unsheared, 2s. 6¼d. to 3s. 5¾d. Wire, 10g., in coils, 3s. 1¼d. (10%) to 4s. 0¾d.; (30%). Special quality turning rod, 10%, 3s. 0¼d.; 15%, 3s. 5d.; 18%, 3s. 9½d.

Personal

MR. JAMES H. LITTLE has been appointed secretary of Hadfields, Limited, Sheffield.

MR. I. PUGH-BEVAN has taken up his duties as melting-shop manager at the Albion Steel Works of the Briton Ferry Steel Company, Limited.

MR. J. EDMUND GAMAGE and MR. DONALD L. CAMPBELL have been appointed joint sales managers for the Electric Furnace Company, Limited.

MR. EDGAR WARD, managing director of Ward (Metal Details), Limited, Darlaston (Staffs), has been elected chairman of the local council.

MR. C. H. M. HOLDEN, managing director of the Hall Street Metal Rolling Company, Limited, has been elected president of Birmingham Metallurgical Society.

MR. PERCY WARDROBE, director of Wardrobe & Smith, Limited, Arley Street, Sheffield, 2, has been re-elected president of the Crucible Steel Makers' Association for the third time.

MR. O. INMAN, a director and chief engineer of Samuel Fox & Company, Limited, steelmakers and rollers, of Stocksbridge, near Sheffield, is the new chairman of Stocksbridge Urban Council.

MR. W. O. GASCOIGNE, of 28, Priory Road, Kenilworth (Warwickshire), has been appointed resident engineer in the Midlands area for Renfrew Foundries, Limited, Hillington, Glasgow, S.W.2.

MR. PETER ROCHS (Austin Crompton Parkinson Electric Vehicles, Limited, Birmingham) has been re-elected chairman of the Electric Vehicle Association of Great Britain for the third year in succession.

DR. D. F. GALLOWAY, Wh.Sch., M.I.Mech.E., A.M.I.E.E., B.Sc.Hons., director of research of the Production Engineering Research Association, was recently elected a member of council of the Institution of Mechanical Engineers.

MR. L. J. HAYNES, of W. A. Tyzack & Company, Limited, steel manufacturers, etc., of Hereford Street, Sheffield, 1, succeeds MR. WALLACE DIGGLE as secretary of the Sheffield branch of the Incorporated Sales Managers' Association. Mr. Diggle is leaving the district.

MR. W. G. MOCHRIE, secretary of the London branch of the Institute of British Foundrymen delivered a Paper on Tuesday of this week to the Southall Chamber of Commerce, Industrial Section, at a luncheon meeting. He dealt with the present-day use of non-ferrous metals, redundancy, segregation of scrap and re-use of the metals in industry.

MR. J. S. BROUGH, who has been appointed manager of engineering to Monsanto Chemicals, Limited, has been acting as assistant manager of engineering since January 1 last. MR. W. M. COOPER, who has been manager of engineering since 1946, becomes assistant to the managing director, to advise generally on engineering problems and to handle external engineering works.

MR. H. T. BAGGOTT, works director of the Albion Foundry, Tipton, on attaining his 50th birthday, has been presented with a gold wristlet watch by the staff and workpeople of the firm. The custom of giving a present to each director on reaching 50 years of age, was started some years ago when a presentation was made to the founder of the concern, Colonel J. Izon Cheshire. Mr. W. H. Thursfield, the present managing director, was the second recipient and Mr. Baggott the third. Mr. Baggott joined the firm, which was originally known as the Bengal Foundry, in 1914.

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.

FOUNDRY MANAGER (age 35) desires join established concern. Thorough practical, technical knowledge moulding, metallurgy; mechanised, jobbing (green, dry loam up to 15 tons); iron, steel; sound organising ability. Preference for being responsible to managing director.—Box 586, 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 Steel-Foundry METALLURGIST, M.I.B.F., seeks further experience, home or abroad. 5 years' control of basic-electric furnaces, heat-treatment, laboratory, plain carbon, alloy, manganese and heat-resisting steels. Particularly keen on study of controlled directional solidification in steel castings.—Box 602, 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.

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

FOUNDRY in Falkirk area requires METALLURGIST, preferably with experience in Light Castings, to take charge of Lab. and Cupola Control. Salary £400 to £600 per annum, depending on qualifications. State age, experience, etc.—Box 598, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

A PROGRESSIVE and expanding Engineering Business will shortly require the services of a first-class FOUNDRY FOREMAN, to take complete charge of a Jobbing Iron Foundry in the North Midlands. Applicants should have modern foundry experience in floor moulding up to 5/6 tons and be keen disciplinarians. Position offers scope, good salary, and ideal working conditions to the successful applicant.—Write, giving full details, to Box 600, 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 METALLURGIST required for Works situated 20 miles west of London. Good practical knowledge of Non-ferrous Melting and Foundry Work essential, and some experience of Steel Foundry Work an advantage. State standard of education, experience, and salary required. All applications will be acknowledged. — Write Box A.770, WILLINGS 362, Grays Inn Road, W.C.1.

FOUNDRY SUPERINTENDENT desires join reputable firm Foundry Suppliers; preferably south-west England and Wales. Expert knowledge founding in steel, iron, non-ferrous metals for all branches engineering. Age 35.—Box 588, 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.

MODERN Factory requires SUPERINTENDENT, who must have thorough technical and practical knowledge of vitreous enamelling, spray painting, and electroplating, and must have wide experience in control of male and female labour. Assistance with housing accommodation if necessary.—Applications should state age, experience, and salary required, to Box 562, FOUNDRY TRADE JOURNAL.

MOULDER required; experience in non-ferrous jobbing and odd-side work; South London area.—Box 592, FOUNDRY TRADE JOURNAL.

MOULDERS required for Iron FOUNDRY. Top rates and good conditions in modern jobbing shop. 18 miles from London and 2½ from Windsor. Good accommodation can be found for single men, but housing is a problem.—Apply MACHINE PATTERN CO., Trading Estate, Slough.

SITUATIONS VACANT—*Contd*

SENIOR GRAVITY DIE DESIGNER required. Experienced die designer, to take charge design office, large light alloy permanent mould foundry. General engineering apprenticeship preferred, but comprehensive experience of design and tooling of gravity dies essential. Permanent pensionable post to successful applicant.—Applications, which will be treated in strict confidence, should give full details of experience in chronological order, and state salary required, Box 5034, SCOTTS, 9, Arundel Street, Strand, W.C.2.

STEEL FOUNDRY FOREMAN, north country, for modern mechanised plant. Light greensand work. Experience of modern methods and sand control required. Pension Fund. First-class man required.—Box 612, FOUNDRY TRADE JOURNAL.

WANTED.—FOUNDRY FOREMAN, to take charge of Mechanised Section of large Iron Foundry in West Riding of Yorkshire. Applicants should be between 25 and 35 years of age, and capable of controlling and training semi-skilled and unskilled labour. Also able to set out pattern plates and tackle for mass production of small repetition castings made on power-driven moulding machines. House available.—Please reply, stating full particulars of age, experience, qualifications and salary required, to Box 596,

FOREMAN required for Iron and Non-ferrous Foundry in South-West London area; must be fully experienced with all types of castings up to 2 tons; only men with drive and initiative need apply; good remuneration.—Box 580, FOUNDRY TRADE JOURNAL.

PATTERNMAKERS required for Wood and Metal patterns by highly mechanised Foundry in Doncaster area, producing castings for agriculture, textile, and mining machinery. Top rates of pay. Good prospects for young and ambitious men.—JOHN FOWLER & CO. (LEEDS), LTD., Sprotborough Works, Doncaster.

PATTERN SHOP FOREMAN wanted for West London district. Familiar with design and manufacture of large matched metal patterns. Experience in manufacture of large metal dies would be an advantage, but not essential. Must be capable of controlling personnel and organising pattern maintenance system.—Box 568, FOUNDRY TRADE JOURNAL.

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.

BUSINESS OPPORTUNITIES

INDUSTRIAL Engineering Syndicate, with substantial financial resources, desire to acquire whole or part interest in an engineering concern or allied industry. A transaction involving from £50/£200,000 is envisaged.—Write PRINCIPAL, Box 514, FOUNDRY TRADE JOURNAL.

SMALL Non-Ferrous Sand and Die-Casting Foundry in Berkshire seeks PARTNER. Engineering connections an advantage. Moderate capital investment required. This is an outstanding opportunity for the right person.—Box 574, FOUNDRY TRADE JOURNAL.

PARTNERSHIP available in well-established Iron and Non-ferrous Foundry situated 50 miles south London. Full order book, with scope for expansion. Modern Building, on long lease. Commercial Partner preferred. Capital required £1,500-£2,000.—Box 590, FOUNDRY TRADE JOURNAL.

FINANCIAL

FOUNDRY, with capacity for 50 tons per month of Blackheart Malleable Castings and 80 tons per month of Grey Iron Castings, requires £15,000 additional Capital. Mortgage or Debentures.—Box 594, FOUNDRY TRADE JOURNAL.

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.

BUSINESS FOR SALE.—Small established iron and non-ferrous foundry company, with modern foundry premises adjacent to railway station 35 miles from London. Premises owned on 99 year lease, and equipment, stocks and goodwill included. Very reasonable price and substantial mortgage if required.—Box 538, FOUNDRY TRADE JOURNAL.

MACHINERY WANTED

WANTED

CUPOLAS of all sizes, also Cupolettes; cash waiting.

FRANK SALT & CO.,LTD.,
Station Road, Blackheath, Birmingham.
BLA. 1635.

WANTED

MODERN FOUNDRY PLANT, of all descriptions. WE WILL PAY CASH.

FRANK SALT & CO., LTD.,
Station Road, Blackheath, Birmingham.
BLA. 1635.

URGENTLY WANTED.—All types of Foundry Plant, including Sand Mills, Cupolas, Blowing Fans, Hand and Pneumatic Moulding Machines, Sand Mixers.

S. C. BILSBY, A.M.I.C.E., A.M.I.E.E.,
Cresswells Engineering Works, Langley Green, nr. Birmingham. Broadwell 1359

MACHINERY WANTED—*Contd*

WANTED. — E.M.B.12 Diecasting Machine. Particulars of condition and price required.—Box 560, FOUNDRY TRADE JOURNAL.

WANTED.—New or secondhand Cupola, in first-class condition. Capable of melting at the rate of 4 tons per hr. Complete with Mechanical Charger, Fan or Blower, etc., for delivery within 10 miles of Birmingham.—REPTON FOUNDRY, LTD., Britannia Street, Tividale, Tipton, Staffs.

WANTED

ONE Coke-fired Tilting Furnace, 220/250 lbs. aluminium capacity, suitable for 346 volts, 3-phase, 50 cycles. Must be in good condition.

SLOAN & DAVIDSON, LTD.,
Stanningley, Leeds.

MACHINERY FOR SALE

FOR SALE.—New 4-ton Enclosed Worm Geared Foundry Ladle. Surplus to requirements. Price £185.—A. BARTON (ENGINEERS), LTD., St. Helens Junction, Lancs.

60 G.E.C. Mercury Vapour Fittings. Complete with Lamps, Chokes and Condensers for sale. Perfect condition.—Box No. 515, L.P.E., 110, St. Martin's Lane, W.C.2.

METAL BANDSAW for Sale. 30 in. table, 30 in. wheels. Pulley drive. Good working condition. Offers wanted.—Box 604, FOUNDRY TRADE JOURNAL.

PAN MILLS, 4 ft. and 5 ft. dia. underdriven, stationary pans, self-discharging new, for delivery from stock.—W. & A. A. BREALEY (MACHINERY), LTD., Ecclesfield, Sheffield.

FOR SALE.—1-Ton Sklenar Coke-fired Furnace; new 1944; very little used; price £800.—Box 542, FOUNDRY TRADE JOURNAL.

FOR SALE.—Two Coleman No. 24A, Davenport type, Moulding Machines: jarr roll over; pattern draw 12 in.; 1,100 lbs. working capacity; suitable for boxes up to 40 in. by 24 in.; price £400 each.—Box 288, FOUNDRY TRADE JOURNAL.

MISCELLANEOUS.

FORDATH Sand Mixer, Type B., 10-cwt. capacity.
Coleman "Prosama" Sand Disintegrator and Aerator.
Holmes Type "VSK" Sand Mixer and Aerator.
Pneulec Royer Sand Thrower, Size No. 1.
"Finex" Shaker Type Sieve.
"Steel-Shaw" Paint Shaking Machine.
Mathieson Gas-fired Mould Dryer, 6 ft. 0 in. by 4 ft. 6 in.
Mathieson Gas-fired Mould Dryer, with 3/50/400-volt Blower.
All above for 3/50/400 Volts.
Foundry Equipment Coke-fired Sand Dryers.
Pneumatic Moulding Box Knockout.

S. C. BILSBY, A.M.I.C.E., A.M.I.E.E.,
Cresswells Engineering Works, Langley Green, near Birmingham. Broadwell 1359.

MACHINERY FOR SALE—*Contd.*

SURPLUS TO REQUIREMENTS

NEW and unused large Sloping Hearth Oil-fired Furnace Equipment, size of master Furnace 6 ft. 6 in. long by 3 ft. 8 in. by 3 ft. 8 in., for the smelting and refining of large bulky and small contaminated Aircraft and other Aluminium Scrap, Lead, Zinc, Cable Stripping, etc.; complete with Burners, Pressure Blowers, and 250/350 lb. New-Way Refining Crucible Bale Out Furnace, extremely low smelting costs, capacity 3 tons per day. Price £850, erected and working on site. Similar equipment can be seen working on site by appointment.

COWLEY METALS,
3 Blackfriars Road, Salford, 3
Phone: Blackfriars 7577

IN STOCK AT SLOUGH FOR IMMEDIATE DELIVERY

FORDATH ROTARY CORE MACHINE; motorised; £32.
SANDMILL, 5 ft. dia.; as new; £125.
SANDMILL; 4 ft. dia.; vee drive; £48.
FORDATH OIL SAND MIXER; £48.
SPERMOLIN ditto; large size; £45.
ALFRED HERBERT LARGE SIZE SAND WHIZZER; £70.
PROSAMA SAND THROWER, a.c.; as new; £95.
GOOD HEAVY DOUBLE-ENDED GRINDERS; £15 each.
TWO MAGNETIC SEPARATORS.
LARGE DOUBLE DISC SANDER; £45.
TRAYCOR DOUBLE CORE-STOVE UNIT, with fan and motor for coke firing; £175; as new.
COKE-FIRED CORE OVEN; AS NEW; £35.
"HILLTOP" HAND MOULDING MACHINES; £25 each.
CUMMINGS & MORGAN FURNACES; over 100 in stock from 150 lbs. to 1 ton capacity; all types.
1,000 new a.c. Motors from ½ h.p. to 30 h.p.; cheap.
Keith Blackman Cupola Fans (new) and Compressors.

Immediate attention to all enquiries.

ELECTROGENERATORS, LTD.,
Australia Road, Slough.
Telephone: Slough 22877.

DELIVERY EX STOCK

New shot blast cabinets complete with Dust Extractors, etc., size 5ft. x 3ft.
Also new 8ft. cube room Plants
Low prices.

Illustrated catalogues free on request from:—

ELECTROGENERATORS

LTD.
14 AUSTRALIA RD., SLOUGH
Telephone: SLOUGH 22377
BUY FROM US AND SAVE MONEY

MACHINERY FOR SALE—*Contd.*

FOR SALE

INCLINED Troughed Rubber Belt Conveyor, 44 ft. long by 18 in. belt.

Sand Distribution Conveyor, inclined troughed section 72 ft. long, horizontal flat belt section 108 ft. long by 18 in. belt, fitted with six ploughs, walkway and supports.

10-ton Sand Hopper, with Belt Feeder and supporting structure. All motors 440/3/50.

8 Sand Hoppers with gates, approx. cap. 10-12 cwt.

"Sterling" Steel Moulding Boxes, 20 in. by 20 in. and 8 in. by 3 in., about 120 available.

All the above now in 1949 and in excellent condition.

Box 528, FOUNDRY TRADE JOURNAL.

MISCELLANEOUS

ROCKINGHAM Coke-fired Ladle Heater.

Coleman Abrasive Cutting-off Machine.

August Borrman Core Blower, Size 3A.

All above for 3/50/400 Volts.

"Steele-shaw" two-unit Paint Shaking Machine, 3/50/500 Volts.

15-lb. capacity "Rocket" Core Blower.

"Rocket" Venting Machine.

Gas and Coke-fired Core Stoves.

Morgan and Green Tilting Furnaces.

1-cwt. ungeared, 10-cwt. geared, UNUSED Ladles.

Single and double handle Ladle Carriers.

S. C. BILSBY, A.M.I.C.E., A.M.I.E.E., Cresswells Engineering Works, Langley Green, near Birmingham. Broadwell 1359

600

OVERHEAD TRAVELLING CRANES

15-TON CLYDE, span 47 ft. 6 in., height of lift approx. 28 ft. Motorised, 400/3/50.

10-ton CLYDE, span 47 ft. 6 in., height of lift approx. 28 ft. Motorised, 400/3/50.

5-ton CLYDE, span 47 ft. 6 in., height of lift approx. 28 ft. Motorised, 400/3/50.

2-ton MIDDLETON, span 18 ft. 5 in., height of lift approx 10 ft. 6 in. Motorised, 400/3/50.

CRANES

Several unused 6-ton STOTHERT & PITT Electric Portal Cranes, 63 ft. centre jibs, 60 ft. max. radius. Power travelling, 15 ft. rail gauge. 86-h.p., 460/480 volts, d.c. Motors driving 57-kW. Generator supplying 220 volts d.c. to Crane Motors. Generator mounted in special housing on portal frame.

15-ton BUTTERS Electric Derrick Crane, 120 ft. jib, to lift 15-tons at 90 ft. radius.

10-ton BUTTERS Electric Derrick Crane, 80 ft. jib, to lift 10-tons at 60 ft. radius.

10-ton BUTTERS Steam Derrick Crane, 70 ft. jib, to lift 10-ton at 50 ft. radius.

New RUSHWORTH Hand and Electric Derrick Cranes.

GEORGE COHEN

SONS & CO., LTD.

WOOD LANE, LONDON, W.12

Tel: Shepherds Bush 2070

and STANNINGLEY nr. LEEDS

Tel: Pudsey 2241

MACHINERY FOR SALE—*Contd.*

OVERHEAD RUNWAY

COMPLETE KING, 10-cwt. capacity, Runway Installation, at present erected in building 100 ft. long by 50 ft. wide. The installation is complete with roof suspension brackets, points and crossings to provide a complete installation. Spares are available. Inspection invited.

SHEPHARD & SONS, LTD., Bridgend.

ALBION WORKS

FOUNDRY PLANT & EQUIPMENT—GENERAL

MOULDING MACHINES:

FIVE UNUSED JOLT SQUEEZE MECHANICAL PATTERN DRAW MOULDING MACHINES, suitable for accommodating boxes 26 in. long by 18 in. wide by 6 in. deep; max. load at 100 lbs. p.s.i. pressure 500 lbs.; type B maker MacNab & Co., together with set of valve controls, including jolt and squeeze control valve, vibrating and pattern draw valve, pipe stand with hose connections, pressure gauge, etc.

TWO HAND SQUEEZE MOULDING MACHINES by Foundry Equipment Co., accommodate boxes 15⅜ in. square, mould drawing stroke 6½ in., pressing stroke 2⅜ in.

HAND SQUEEZE STRAIGHT DRAW MOULDING MACHINE by British Moulding Co., accommodate boxes 15 in. by 14 in. Pattern table 24 in. by 18 in. Pattern draw 16 in.

SHOT BLAST AND DUST EXTRACTION PLANT:

TILGHMAN CIRCULAR TYPE SHOT BLAST CABINET, 30 in. dia. by 2 ft. 3 in. deep. With Belt Driven Extraction Fan.

ST. GEORGE'S SHOT BLAST PLANTS—combined Dust Extraction Cabinet. 4 ft square blast chamber by 4 ft. high. Integral Dust Extraction Cabinet.

TILGHMAN DUST EXTRACTION CABINET—44 in. by 34 in. by 68 in. deep. Motor Driven Dust Extraction Fan, 400-440/3/50.

RUMBLING BARRELS:

NEW MOTOR DRIVEN HEXAGONAL RUMBLING BARRELS, 36 in. long by 18 in. across flats, ¼ in. plate; driven by 3 h.p. motor, and complete with starter.

NEW BELT DRIVEN DITTO, size 36 in. long by 30 in. across flats; driven through fast and loose pulleys with belt striking gear.

BELT DRIVEN GEARED HEXAGONAL RUMBLING BARREL, 18 in. long by 16 in. across flats. Fast and loose pulleys.

FOUNDRY SAND RIDDLE "FORWARD."—5 tons per hr. cap., complete with tripod and 22 in. dia. sieve. Motorised.

GEARED FOUNDRY CRANE LADLES—NEW. 3-ton, 50-cwt., 2-ton, 30-cwt., 1-ton, 10-cwt.

ALL THE AFOREMENTIONED ITEMS AVAILABLE FOR IMMEDIATE DELIVERY.

THOS W. WARD LTD.

ALBION WORKS : SHEFFIELD

Phone 26311 'Grams: "Forward."

Remember - Wards might have it!

CAPACITY WANTED

MACHINE Moulded and Loose Pattern capacity required, up to 10 tons weekly, for High Duty Iron Castings to specification.—Box 546, FOUNDRY TRADE JOURNAL.

VITREOUS ENAMELLING.—West of Scotland Ironfounders have orders to place for three tons of castings weekly to be Vitreous Enamelled.—Address 2959, WM. PORTEOUS & Co., Glasgow.

CAPACITY AVAILABLE

A. P. HOLLINGS & SONS, Engineers, Pattern and Model Makers; quick deliveries.—2, Nelson Mews, Southend-on-Sea. Tel. 46863.

CAPACITY, substantial, available immediately, fully mechanised Foundry; high quality Grey Iron and Malleable Castings; boxes up to 28 in. by 16 in. by 5 in.; Patternmaking facilities if required. —E. J. WALLACE, 50, Wellington Street, Glasgow, C.2.

CAPACITY available for castings weighing from 1 lb. to 8 tons, including Quasi-Bessemised ingot moulds up to 10,000 tons per annum.—THE CROSS FOUNDRY & ENGINEERING CO., LTD., Gorseinon, near Swansea.

PATTERNMAKING Capacity available; accurate first-class patterns for machine or hand moulding; keenest prices; quick delivery.—D. C. POOLE, 27, Priory Avenue, Taunton.

MALLEABLE IRON FOUNDRY has considerable capacity available for all types of small work; quick delivery guaranteed.—Box 230, FOUNDRY TRADE JOURNAL.

NON-FERROUS FOUNDRY capacity available, good quality castings. Wood and Metal Pattern Making facilities if required.—MITCHELL & JENKINSON BROS., Denholmegate Road, Hipperholme, near Halifax.

WOOD and Metal Pattern Making capacity available; keen prices.—FRANCIS & BAXTER, Quarry Lane, Mansfield. 'Phone 2273.

THE PATTERN EQUIPMENT CO. has immediate capacity for all types of Wood and Metal Patterns; Equipment for Mechanised Foundries a speciality.—Mount Avenue, Prospect Road, Leicester. 'Phone 23773.

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

SUNDERLAND PATTERN & WOOD WORKING CO., Peacock Street, Sunderland. — Patternmaking; capacity available; plate, light and heavy patterns; keen prices and quick delivery. 'Phone 3979.

OWING to re-arrangement of our Foundries we now have limited capacity for medium size MACHINE TOOL CASTINGS (up to 2 tons) or Castings of similar nature; high quality castings made to customer's own specifications; full pattern shop and machine shop facilities also available.—Reply in first instance to Box 482, FOUNDRY TRADE JOURNAL.