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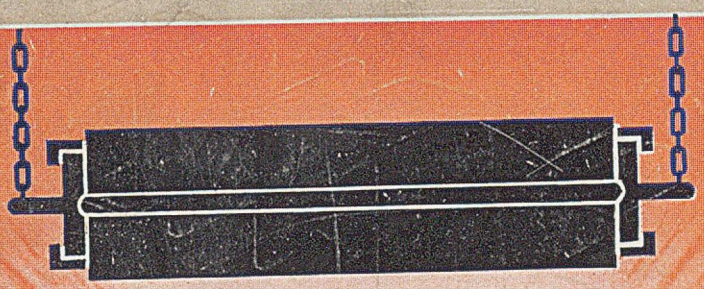

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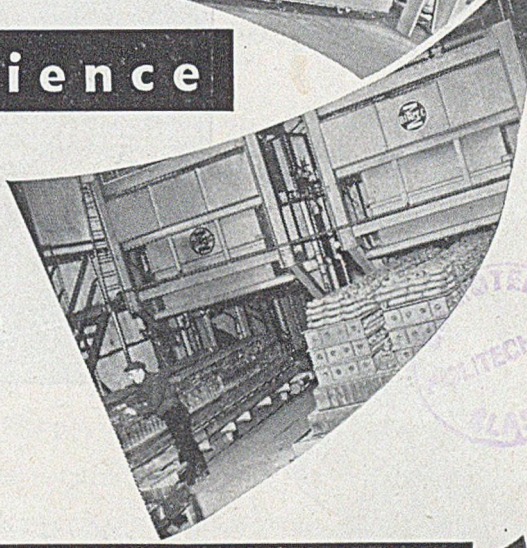
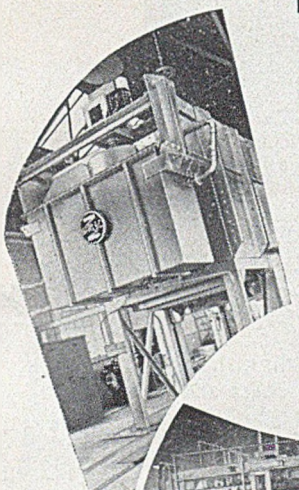
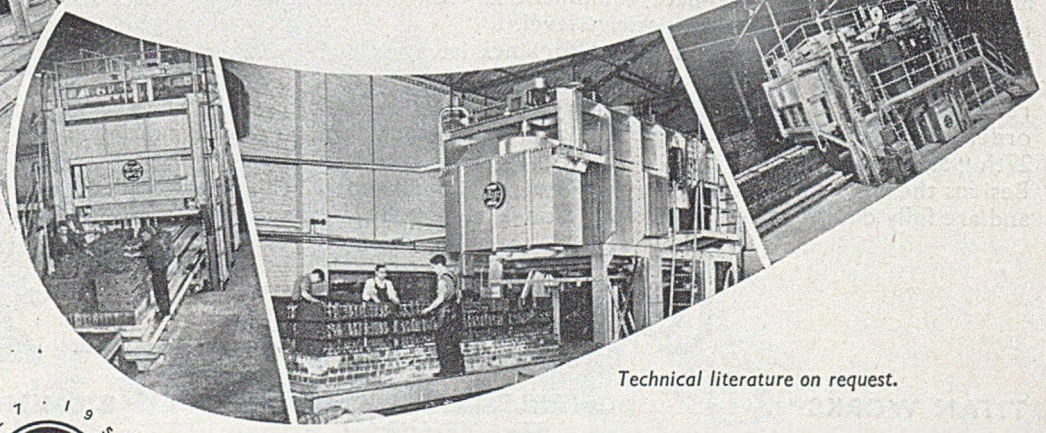




malleable annealing



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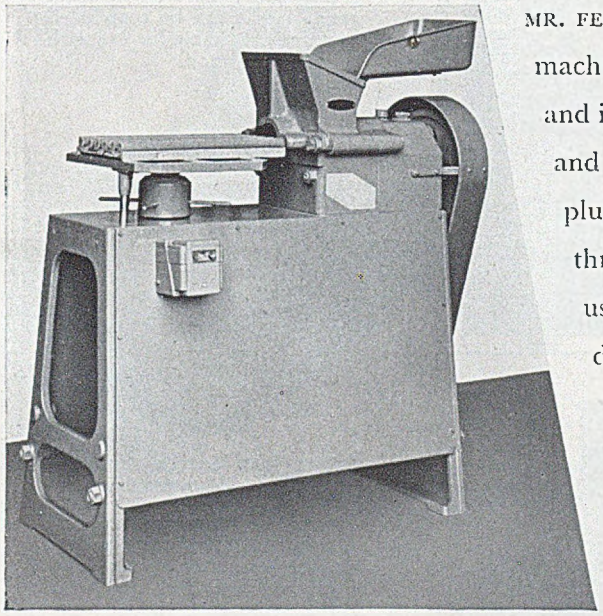

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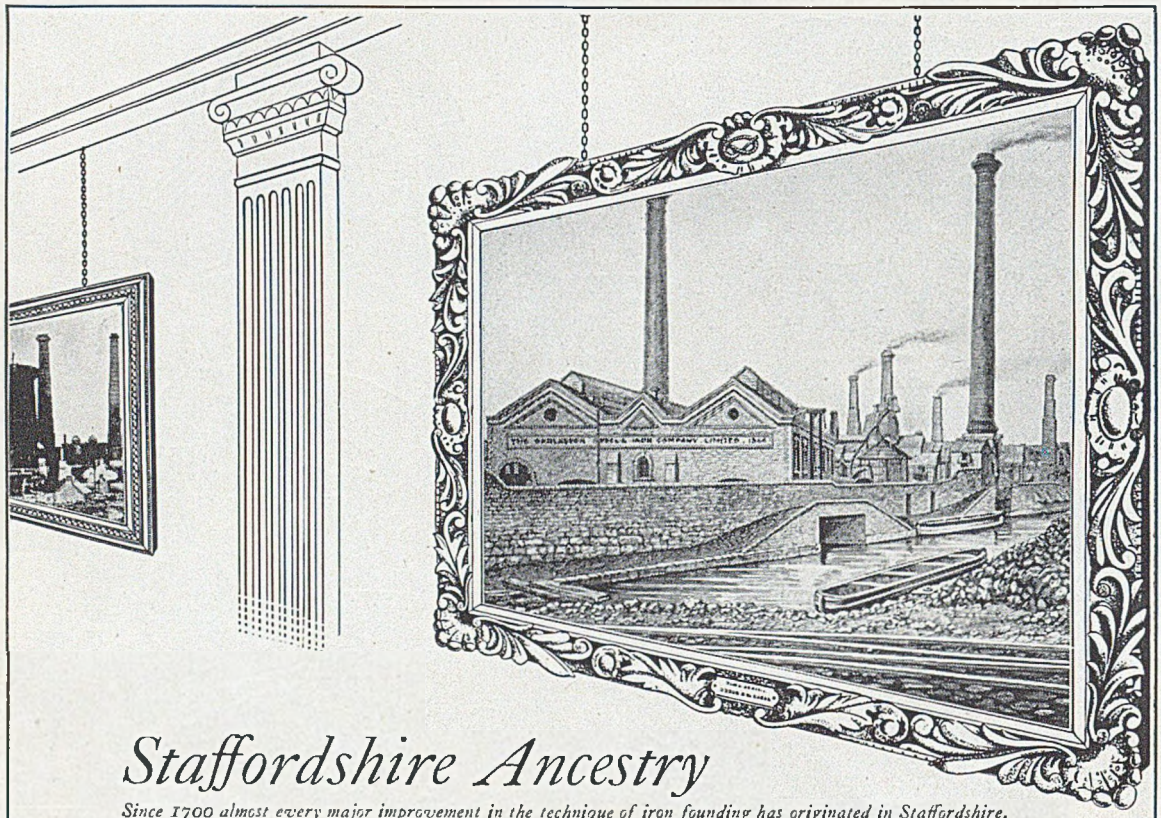

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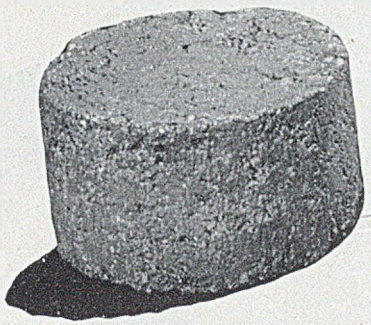

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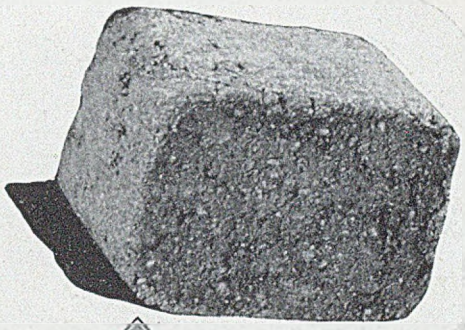

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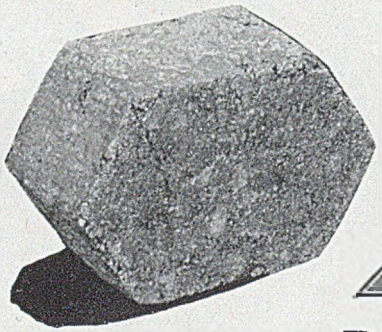

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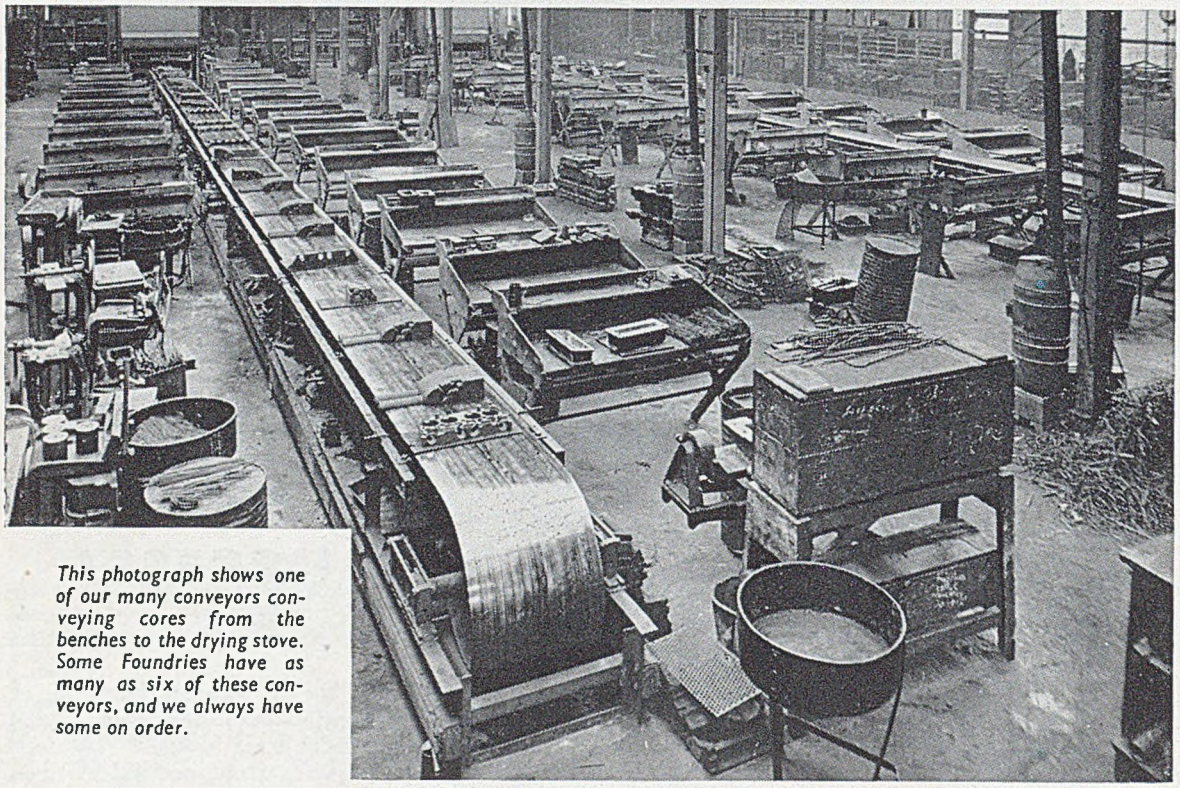

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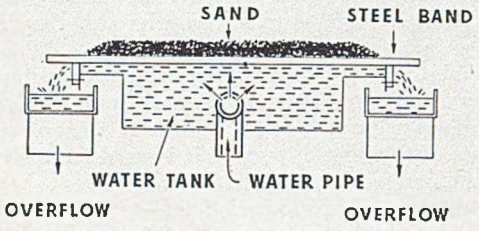

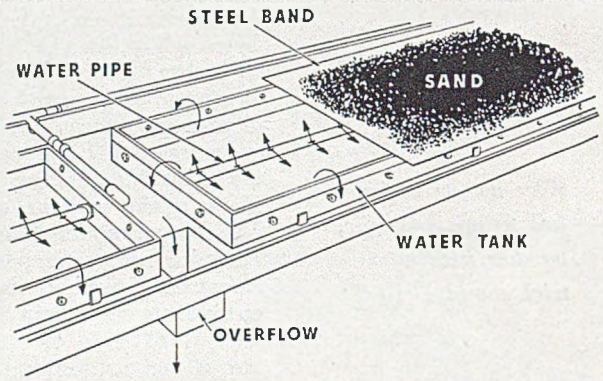

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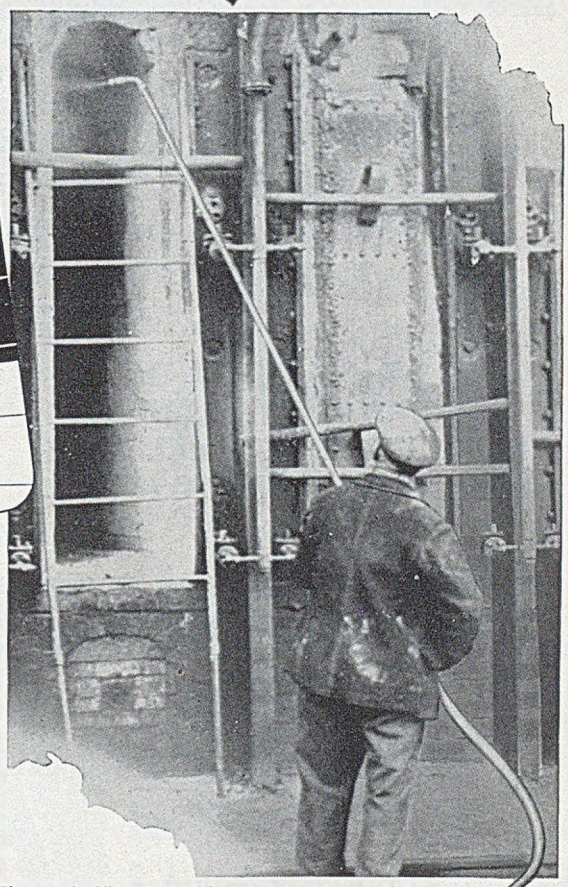

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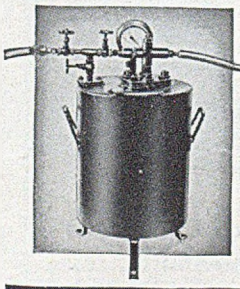

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FOUNDRY TRADE JOURNAL

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PRINCIPAL CONTENTS

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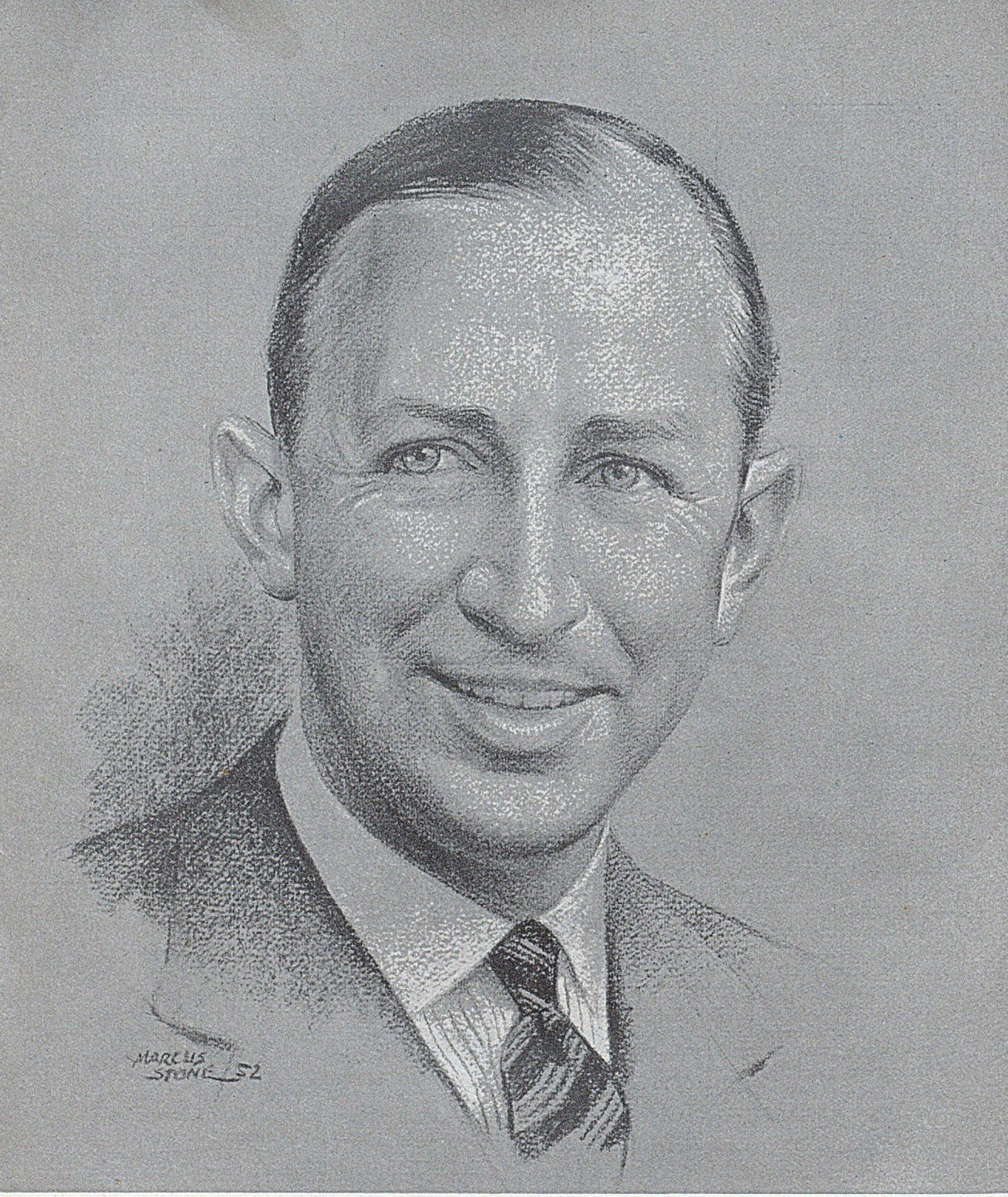
Solving the Maintenance Problem

From a perusal of "Plant Maintenance,"* a Report just issued by the Anglo-American Council on Productivity, it is clear that neither here nor in the States is the problem of plant and machine maintenance fully solved, because a full organization directed towards "preventive maintenance" would be so costly as to throw most concerns out of balance. It would involve much forecasting based on masses of paper work, which would overshadow actual production to which plant maintenance must necessarily be subservient. In the Report, the problem is in one place divided into the following five categories:—(1) maintenance controlled by production staff; (2) breakdown maintenance; (3) scheduled maintenance; (4) planned maintenance, and (5) preventive maintenance.

In the smaller concerns, maintenance often resolves itself into—"Bill, you might have a look at that end moulding machine" or "During the holidays, we will strip down the sand mill." Now, founders are notoriously weak in looking after their plant. One enterprising moulding-machine manufacturer found that it paid him to send out to his users monthly postcards reading: "When did you last lubricate our machines?" Such an action may have prevented one of his competitors being sent for during the Christmas holidays to rectify a bad breakdown due to the fact that since the moulding machine plant had been installed months earlier, it had received no kind of maintenance whatsoever. The larger concerns, operating a maintenance department, have difficulties in assessing who has first call on their services; the normal arrangement of their work; the reduction of excessive overtime, and so forth. All this points to the third factor, "scheduled maintenance," and then the problem increases as "costs" begin to loom large. The process goes on until sections (4) and (5) are embraced in the scheme. One foundry before getting into the hands of the receiver had fifty men in the service department. After the axe had fallen, the staff was reduced to seven. Intermediately an economic figure could be found.

This Report, which will well repay careful study, exposes the problem from a number of interesting angles. Obviously some effort must be made to remove the subject from the haphazard and place it on a logical basis. In the publishing business, nobody has yet solved the priority to be accorded by the art department to the demands of a group of journals, each having both editorial and advertising sides. Yet, somehow, the director does manage to keep everybody reasonably satisfied. It would appear to us that first the management must determine to the best of their ability how much they can spend on the department, place its direction in the hands of a budding diplomat, leave him to do his best for a period and then examine the results. This may appear to be a sketchy way of providing a solution, but elaborate planning may easily be equally ineffectual—however, first read the Report.

* Price 2s. 6d. from 21, Tothill Street, London, S.W.1.



MR. T. H. SUMMERSON

Chairman of the British Steel Founders' Association

Leaders of the Industry

Mr. T. H. SUMMERSON

WHEN, in 1951, the British Steel Founders' Association elected Mr. T. H. Summerson as their chairman, it was something more than a gesture of appreciation of his past services to the Association. It was, indeed, an expression of the industry's recognition of and determination to overcome the mounting problems of the future. His training, his outstanding personality and record had marked him down as a natural leader in the industry. At the age of 49, Mr. Summerson can already look back on a career of service and considerable achievement. Educated at Harrow, he joined the family firm of Thomas Summerson & Sons Limited in 1922 and to-day is chairman and joint managing director of the business founded by his grandfather over a hundred years ago.

Mr. Summerson first became generally known outside his company when he attended meetings of the old General Steel Castings Association and, in 1940, he was appointed Director for Steel Castings in the Ministry of Supply, Iron and Steel Control. Connected with the B.S.F.A. since its inception, as a member of the Townsend Committee, whose report formed the framework of the new Association, he has been a member of its executive council and chairman of the publicity committee since its formation in 1944. From 1948 to 1950 he was, in addition, chairman of the development committee and in 1949 was elected a vice-chairman of the Association. For some time he has been chairman of the North-East Coast Association of Steel Founders.

The range of Mr. Summerson's interests give some indication of the calibre of the man. He is a member of the Development Areas Treasury Advisory Committee; vice-president and chairman of the Home Affairs and Transport Division of the Association of British Chambers of Commerce as well as being a director of nine companies outside the steelfoundry industry. Essentially an individualist, Mr. Summerson is an outspoken champion of personal initiative and the small industrial unit and he can always be relied upon to state in trenchent terms his hostility to unnecessary over-centralization. As an after-dinner speaker he is much in demand, for he combines with a wide range of knowledge those rarer qualities of succinctness and a pertinent wit. A leading exponent of 20th century capitalism, he defines the capitalist of to-day as one who combines in sensible proportions the profit motive with public interest and a proper sense of his responsibilities to his employees, customers, shareholders and the world at large.

Those activities, it would be reasonable to suppose, would provide varied enough interests for any one man, yet a long list of civic appointments includes that of chairman of the Darlington County Bench and Sheriff of the County Palatine of Durham. For good measure, Mr. Summerson is also an enthusiastic and successful farmer who, for recreation during the summer, when he is unable to shoot and hunt, plays an excellent game of tennis. It is not too much to say that Mr. Summerson embodies the qualities of the industry he represents; a wide measure of knowledge combined with practical experience; a sturdy individualism tempered by a sense of responsibility to others and, above all, the ideal of service to the community.

Correspondence

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

IRON AND STEEL BILL

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—Mr. Newman's letter in your issue of December 11 seems to indicate that he has been living for some time with "his head in the sand" and he is not aware of the changes of opinion which have taken place since the Iron and Steel Bill was published. It also appears that he does not realize the indignation of the vast majority of ironfounders in this country at being committed to the White Paper without reference or consultation.

Mr. Newman's statement that there is a minority of members and non-members opposed to the Bill is misleading. The whole of the firms covered by the C.F.A. represent some 1,202 foundries, leaving something over 1,000 concerns unaccounted for. Up to recently, Mr. Newman claimed the support of the I.N.C. which has some 250 members. This support has been transferred to the opposition and giving the C.F.A. the whole of the balance it only leaves 950 foundries to support the Bill. Again of these 950 foundries there are at least half of them who, instead of supporting Mr. Newman, are bitterly opposed to his action and are strenuously fighting the Bill. Those who are opposing this Bill have invited the C.F.A. to test the matter by taking a vote, each foundry to have only one vote, but so far this invitation has not been accepted. However, it is believed that a plebiscite will be taking place in the course of the next two to three weeks when this issue, at least, will be made clear.

Mr. Newman's letter, despite its length, says very little to justify the fact that foundries should accept the position of being brought in under the Bill. The only benefit that can accrue to foundries being brought in under this Bill is that it is supposed to ensure a supply of raw material. This is just a nonsensical claim. No Bill enacted to de-nationalize the steel industry should create such conditions that would jeopardize the future of an industry which was not previously nationalized. Furthermore, it is wrong to create legislation with the idea of dealing with a shortage; if control is taken away there will be no shortage. In any case, if there be control, the small ironfounder should always remember that he is the one that suffers, for the larger firms or organizations usually get what they want.

If foundries are brought in under this Bill it is idle to suggest that they will not be subject to bureaucratic control. It is not safe to suggest that the powers granted will be very lightly used. If you create a department and give it powers, that department will use its powers, and, finding little to do, will irritate the industry by all the little pinpricks and pettyfogging actions which are the natural acts of bureaucracy, especially when provision is made for enforcement officers.

The integrated firms possessing their tied foundries have the natural fear that if this Bill is passed a future Socialist Government can, without further legislation, nationalize not only the foundries, but also the much larger units to which they are attached. It is idle to reply to this fear, that if the Socialist Government want to nationalize the engineering industry, they will do it anyway—that may be—but let them fight for and create the powers themselves. The present anti-Socialist Government have no right to create shackles which can be used by a Socialist Government.

Finally, this Act will undoubtedly impair the efficiency of the industry with serious effect to the engineering industry whose exporting capacity is of such enormous value to the nation. The plain facts are that Mr. Newman and his associates committed themselves and the whole of the foundry industry to the provisions of a White Paper and later to a Bill and for 8 months the industry was kept completely in the dark. Eventually, meetings were hurriedly convened and held without proper agenda being published and members of associations, large and small, were told there was no other alternative but to come in under the Bill, and by that means Mr. Newman claims to have support. Let him be big enough to realize that he has made a mistake and that the opposition is stronger than he thought it was and he has no right to try to maintain his position at the cost of the industry.

At any rate the industry should let him and everybody else know that if they are going to speak with one voice, that voice shall "*demand the complete exclusion of iron and steel foundries from the Bill.*"—Yours, etc.,

CHARLES H. CRABTREE,
Chairman and Managing Director,
Crabtree Foundry Company,
Limited.

December 23, 1952.

SPHEROIDAL-GRAPHITE CAST IRON

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—With reference to the letter signed on behalf of the International Mechanite Metal Company, Limited, under the heading "Nodular Iron Patents," which appeared on page 694 of your issue of December 18 last, we have the following comments to make.

The grant of the Mond Nickel Company's patent No. 630,070 was opposed by the Mechanite Metal Corporation of the U.S.A. on the grounds of prior publication and that the invention was not sufficiently and fairly described and ascertained. The decision of the Hearing Officer, acting for the Comptroller General of the Patent Office, was that a Patent should be granted to Mond Nickel, subject to appropriate amendments to the specification. Mechanite appealed to the Patents Appeal Tribunal against the decision to grant a Patent at all, and their appeal was dismissed. Mond Nickel, at the same time, cross-appealed against that part of the decision of the Patent Office which required a reference by number to two Mechanite U.S. patent specifications and one Mechanite British specification. The Patents Appeal Tribunal allowed the cross-appeal of Mond Nickel, and directed that the Patent be granted without any such reference by number. The decisions of the Patents Appeal Tribunal were announced in the *Official Journal* (*Patents*) of December 3, 1952.

The letter you published refers to recent changes in British patent law. It is true that now, as previously, a granted Patent is open at any time during its life to revocation proceedings in the High Court on grounds wider than those available in the Patent Office. In the present case, however, the main question was whether or not the Mechanite publications cited, disclosed the production of spheroidal graphite in cast iron by means of retained magnesium. This question of prior publication is one available to opponents, under the old law as well as the new law, and was fully fought out. One need do no more than draw attention to a sentence in the Mond Nickel specification, approved by the Patents Appeal Tribunal, where it refers to prior proposals for the use of magnesium

(*Continued on page* 23, *col.* 2)

Surface Finish and Facing Sands*

By Roy Pell

The object of this Paper is to relate some personal experiences when the staff at Hayward-Tyler's foundry set out to improve the sand practice. The castings made by this Company are entirely for the parent Company's use, and for this reason the quality of work depends upon the requirements of the firm's engineers. In general, the standard of work is rather high. Castings in iron and gunmetal are produced, ranging from a few ounces in weight to about 5 tons. This Paper only deals with the ironfoundry department, which has been established for well over a century. It is engaged on the production of castings to be used for pumping and for mineral-water machinery. The number of castings of different design is very great, and the size of batches quite small.

Over a number of years, the Company's machine-shops had been re-equipped with the most modern machinery and were capable of much higher output than previously. The foundry suddenly became the centre of attraction, because an increased output became imperative. The obvious answer was to enlarge the foundry and employ more workers, but the moulders and core-makers at that time were a fine team of highly-skilled men, with many years of experience on the highly-specialized work in question, and an acquisition of additional staff of their calibre was virtually impossible. Thus increased output had to be achieved by greater efficiency, resulting from higher output per man, through the perfecting of techniques, re-planning, mechanization where possible, and, of course, minimizing scrap.

Sand-practice Potentialities

Just what part sand practice was to play was not known. Those tackling the foundry problem were not expert in any one field and the foundry executives were fully occupied in producing castings under the existing set-up. At about this time, a director of the Company visited America in the company of a few other foundrymen from various parts of the country. This was not one of the productivity teams, who came later, but the purpose of the visit was much the same. This tour proved invaluable in subsequent work. Much more important than the technical knowledge gained was the inspiration. Undoubtedly there were and are many foundries in this country doing just what the Americans were doing, but, by and large, these foundries are quite different, and are not producing the same type of work. In America, there were many who were producing work of a type and in batches very similar to that done at Luton, and yet were achieving higher outputs per man with labour not as skilled as those at Hayward-Tyler's. Sand technique was one of the most important factors which made these high outputs possible.

It was learnt that by the use of synthetic sands:—

(1) Larger work than the firm had been in the habit of doing could be cast "green," provided that a high permeability be maintained.

(2) Less skill was necessary in ramming; castings could be rammed harder than with the naturally-bonded sands being used, with less fear of scabbing or blowing.

(3) With larger green-sand moulds, less mould reinforcement was necessary.

(4) Machine moulding and sand-slinging would be more advantageously employed.

(5) Less venting of the mould was required.

(6) A more consistent material would be supplied to the moulder, due to easier sand control.

The first point was of immediate interest. The possibility of producing larger jobs in green-sand would free stove-space, and in a host of ways speed-up production. It was decided to carry out a few experiments during one of the firm's holiday weeks. This would not interfere with production, and at the same time the experiments could be completed with the minimum of hold-up.

Initial Experiments

A casting weighing about 16 cwt. was selected for the test. This was a steam cylinder for a reciprocating pump, a difficult casting to make, which had to stand hydraulic test, and the bore of which, when machined, had to be completely free from blowholes, inclusions, or any suspicion of porosity. The port-core assembly was quite tricky, and all in all one would not say that it was an easy casting to make in a green-sand mould. Bentonite-bonded silica sand, with coal-dust added, was used. It had a permeability of 250, which is obviously very high. The green-strength was 12 lb. per sq. in. and the moisture about 3.5 per cent. The mould was made without the use of lifters, and was devoid of venting. The first mould did not reach

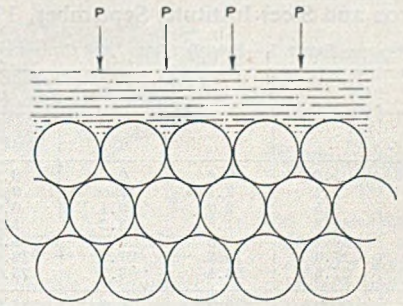


FIG. 1.—*Diagram of Contact between Molten Metal and Sand Grains.*

* Paper presented to the London branch of the Institute of British Foundrymen. The Author, at the time of writing the Paper, was attached to the foundry of Hayward-Tyler & Company, Limited, Luton.

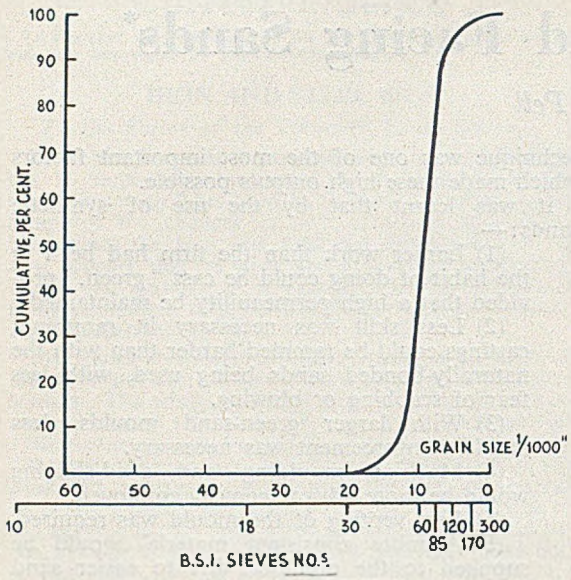


FIG. 2.—*Grading of the Erith White Silica Sand Selected.*

the casting stage, for when the heavy barrel-core was inserted the prints collapsed. The few wise foundrymen who were really doing the work, shook their heads and said, "What did you expect?" The print was reinforced and the next mould was successfully "cored-up" and cast.

On knocking-out, the casting was not exactly a masterpiece, for there was severe metal penetration. The bore looked perfect after machinining and the casting passed the hydraulic test. It is regrettable that no photograph was taken of the metal penetration. This trial provided some valuable information. It confirmed the opinion that much of the work upon which the firm were engaged could be cast in green-sand moulds, and that venting and lifters could be completely dispensed with in many cases, and in others considerably reduced.

Metal Penetration

Other workers, notably T. P. Hoar and D. V. Atterton, have provided much information on metal penetration. For a fuller and more accurate picture reference should be made to the Journal of the Iron and Steel Institute, September, 1950.

In Fig. 1, the effect of a mould-coat has not been considered, but interpreting this, the important factors are:—(1) Permeability of the sand, its grain shape, size and grading, and (2) the rate of gas evolution and the pressure produced. These two factors must be adjusted to give the desired results, but, in general, metal penetration must be attacked by decreasing the void size as far as possible. On the one hand, then, a large void space is desirable to enable a high permeability to be attained. On the other, a low permeability or small void space is necessary to resist metal penetration. Somewhere in between the two, the moisture content and the gas evolved from coal-dust must be adjusted. During the freezing period, it is desirable that this be as low as possible to prevent "blows" in the casting, and yet as high as possible to resist metal penetration. Furthermore, from a practical angle the man behind the rammer has as big an influence as either of these, and again, each casting presents a slightly different set of conditions.

Sand Selection

With these thoughts in mind, it was clear that a different silica sand was necessary, one which would give a smaller void space and lower permeability. Was it to be a sand with an angular or a round grain shape? This was uncertain, but the Author favoured a rounded grain. Numerous samples of sand were examined, and being optimistic and confident that the work was going to be successful, the Author looked for the following properties:—(1) Well-rounded grains, base permeability 100 to 150; (2) sand of high purity, reasonably free from clay and other contaminants; (3) a grading which showed the majority of grains to be on three adjacent sieves. In other words, the bulk of the sand was to be of about the same grain size. A high percentage of fines was undesirable; (4) a material that would be consistent, and (5) availability and distance from the works were to be reasonable. The sand which most completely fulfilled these requirements, was Erith white silica sand. Events have proved that this is a very consistent material, its grading is shown in Fig. 2.

Second Series of Tests

The initial experiments had been carried out on the steam cylinder casting. Further experiments were not possible as these castings were urgently required and production could not be held up. A

TABLE I.—*Volatile Matter, Ash Content and Sieve Grading of Various Samples of Coal-dust (all per cent.).*

Grade ..	1	2	3	4	5	6	7	8	9	10
Retained by sieve No.										
10	1.9	0.6	0	0.2	0	trace	trace	trace	trace	trace
18	2.4	2.1	trace	0.3	trace	0.7	12.8	,,	,,	,,
30	8.5	3.0	0.1	0.6	0.8	40.0	41.0	,,	1.6	13.5
60	31.3	11.3	3.2	5.5	20.7	41.0	32.9	3.4	3.3	32.2
85	10.9	8.3	5.1	6.2	14.5	5.9	2.8	3.4	9.8	13.5
120	17.0	14.2	27.7	12.4	16.3	3.4	1.4	6.8	16.4	10.2
PAN	27.5	60.5	63.7	75.0	47.6	9.3	9.1	80.5	69.0	30.5
Volatile ..	35.0	35.0	36.0	35.0	34.7	33.0	36.0	34.5	34.7	34.0
Ash	21.5	13.5	7.0	8.0	11.0	22.4	14.5	6.0	8.5	8.0

more complex casting, namely a vertical-pump body, was considered suitable for further work. The purist would claim that the same job should have been made in each case, everything being held constant except the sand but, as explained, this could not be. The pump body, however, possessed admirable features. Its weight and wall thickness were comparable with the steam cylinder, and its complexity was a good criterion in determining whether the much lower permeability of the sand was harmful. The casting turned out a first-rate job. It should be remembered that previously it had been made as a dry-sand casting and to have cast this in the naturally-bonded green-sand in use at that time, which had a permeability of 15 to 20, and a moisture content of between 5 to 7 per cent. would have been impossible. Skin drying would have also been very risky. It should also be noticed that with the synthetic sand there was to be used no facing sand. The same prepared sand was used from the face of the mould to the back.

It looked as though the sand had good possibilities but a thorough test was needed. The scheme was to instal it in the green-sand bay, use it for the normal run of work, and then gradually transfer to green-sand jobs which were being cast in dry-sand moulds. A particular moulder's ground was cleared, and he was supplied with the new sand for a period of a fortnight. As far as possible, a wide variety of work was given to him, and at the end of the fortnight it was agreed to transfer the entire green-sand bay to this synthetic sand, as it had been so successful. Many practical difficulties had to be overcome. Fortunately the sand-milling capacity was adequate, although backing sand had been dispensed with, and all sand used had to be reconditioned.

Coal-dust Quality

The finish of the castings, however, left much to be desired, and it was felt that the coal-dust in use was at fault. Numerous laboratory tests were then carried out on samples of coal-dust, great importance being attached to the percentage of volatile material, ash content and grading. Table I shows some results on various samples of coal-dust. Whether or not other factors should have been considered in selecting coal-dust did not create much concern. Many authorities in the field of sand technology attach a great deal of importance to the rate at which the volatiles are evolved on heating. Undoubtedly they are right, but if the Author had considered this aspect in testing the samples available, he would really have been attempting tests for which the laboratory was not equipped. The decision as to which coal-dust to use would have been even more difficult. Good results with the castings were required, not merely tables of results in the laboratory notebooks.

In selecting the material to be used, a high-volatile and low-ash coal was considered essential, and it was felt that the grading or particle size would be an important factor in controlling the rate of gas evolution. Clearly, smaller particles would reach the required temperature more quickly. Within limits, therefore, sand containing a fine coal dust should commence gas evolution more rapidly than the same

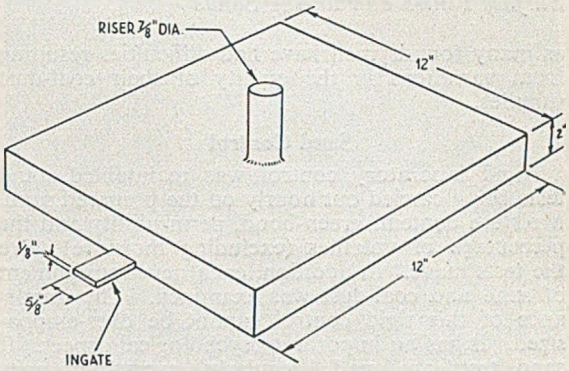


FIG. 3.—*Thick Plate Casting selected for Testing Liability to Scabbing.*

sand containing a coarser coal-dust, assuming other factors to be equal. Just what action coal-dust has is not clear, and this topic is constantly under discussion. However, it can safely be assumed that it has two important functions:—

(1) To help to resist metal penetration as already outlined—but to what extent is not known.

(2) To prevent adhesion of sand particles to the surface of the casting. Under atmospheric conditions the surface of the casting rapidly oxidizes, forming a silicate with the sand grains. This cements the sand grains very efficiently to the surface of the casting. If oxygen be excluded—as when coal gas is present—oxidation of the casting is avoided, and hence the silicate (ferrous silicate) cannot form.

The importance of selecting the right grade of coal dust has been stressed. Looking back on those first few weeks during which the synthetic sand was being used, it is true to say that the whole scheme would certainly have been abandoned had not the correct coal-dust been found. It is so important that, for work of this type, synthetic moulding sand of such high permeability would be useless without the right type of coal-dust. When the contract for coal-dust was placed, the supplier who would guarantee to supply material to specification received the order. The firm specified grading, volatile and ash content, and each consignment was carefully sampled and tested in the laboratory. From many subsequent consignments, there has been no cause for complaint. This is worth noting.

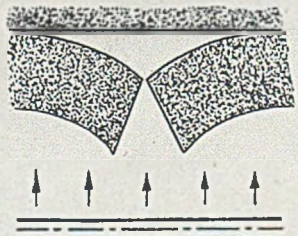


FIG. 4.—*Buckle produced in the Top Surface of the Mould by Running the Plate very slowly.*

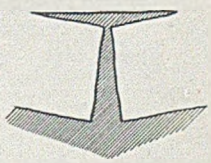


FIG. 5.—*Sectional Diagram showing the Type of Defect produced on the Test Casting by the Mould Buckle.*

as many foundrymen have had difficulties resulting from variations in the quality of their coal-dust supplies.

Sand Control

Rigid laboratory control was maintained, sand tests being carried out hourly on the prepared sand. Moisture content, green-bond, permeability and the percentage of volatiles (excluding moisture) were the tests made. In addition, each new consignment of sand and coal-dust was examined. The imporance of this rigid control cannot be over-emphasized. It has an important psychological aspect. If sand tests are made regularly, everything goes well, and adjustments are hardly necessary. If the vigil is relaxed, everything goes wrong due to people becoming careless. At the outset, there was much doubt in the minds of the moulders as to the value of sand testing, and, in any case, the word permeability did not mean much to them. To overcome this, the results of the tests were put on a board so that everyone could see them. The operator on the sand mill was very keen about it, and the moulders were always found to study the board, especially if they doubted the quality of a particular batch of sand.

Scabbing

The moulding sand developed, suffered from susceptibility to scabbing when flat plates or covers were cast, and it was not surprising, therefore, that attention was turned to the use of wood-flour, the Productivity Reports being partly responsible for calling attention to this material. It was clear that wood-flour derived from hard woods was the answer. This was not easily obtained, but wood-flour from soft varieties was being marketed in this country, but it was conjectured whether this would be so satisfactory. The Author was against introducing this material into the system without very careful testing. It was therefore decided to subject samples of the material to very exacting checks, to determine whether or not it was effective in reducing the incidence of scabbing and what is often termed "rat tailing." The method of testing was easily decided upon. In practice the defect was most prevalent on flat plates, and clearly this was the way to test the material. Sheehan and other workers used cast 12-in. square by 2-in. thick plates (Fig. 3). It was decided to do likewise, so that results using the soft variety of wood-flour would be compared with the other investigators' results. By running the casting very slowly, the results shown in Figs. 4, 5 and 6 were obtained with the ordinary sand without coal-dust. Fig. 7 shows a plate casting poured at 1,290 deg. C. (running time 60 seconds) for which the sand contained 2.5 per cent. coal-dust, a slight improvement was registered. Fig. 8 is a plate casting for which the sand contained 1.0 per cent wood-flour, but no coal-dust; pouring conditions were otherwise similar to those previous. In the same way, Figs. 9 and 10 show the effect with 2.0 and 4.0 per cent. of wood-flour, respectively. The latter was repeated many times and it was established that under this set of conditions, 4.0 per cent. wood-flour would eliminate this sort of surface defect. The sand was, however, unsuitable for general moulding, as the high wood-flour content made the sand extremely friable.

Fig. 11 shows the surface of a plate casting for which the normal sand containing 2.5 per cent. coal-dust and 1 per cent. wood-flour was used. This is quite a convenient amount of wood-flour

FIG. 6.—*Top Surface of Thick Test-plate (see Fig. 3) cast in Ordinary Sand without Coal-dust.*

FIG. 7.—*Test-plate cast in 60 secs. at 1,290 deg. C., in Sand containing 2.5 per cent. Coal-dust.*

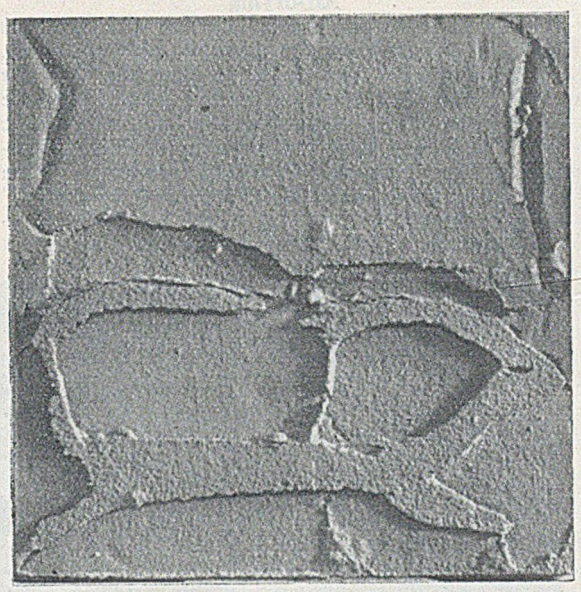


FIG. 8.—*Surface of Test-plate when cast in Sand containing* 1.0 *per cent. of Wood-flour and No Coal-dust.*

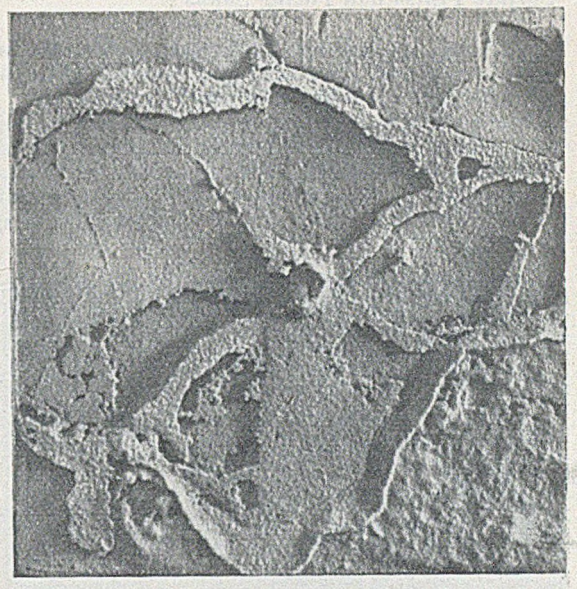


FIG. 9.—*Similar Test-plate Casting to Fig.* 8, *but made in Sand with* 2.0 *per cent. Wood-flour.*

to use, as it is hardly noticeable from a moulding point of view. Its effect on green-strength is negligible, but the sand does require a slightly higher moisture content.

Parallel experiments were conducted with pelleted pitch, and Fig. 12 shows the result for conditions as before, with no coal-dust, but 1 per cent. pelleted pitch instead. For the plates shown in Figs. 13 and 14, 2.0 and 4.0 per cent. of pelleted pitch were used in the sand. Although this last sand would present difficulties at the "knock-out," it will be seen from the illustration that pelleted pitch was not as successful as "soft" wood-flour.

Practical Incorporation

Having carried out these very simple tests, it was apparent that 1 per cent. of wood-flour added to the foundry's existing sand would overcome the type of surface defect shown. This proved to be so in practice and the heavy covers that were being cast had a beautiful surface finish when 1 per cent. wood-flour was added to the sand. The formation of "finning"—those thin webs of metal which appear in corners on all types of castings—is due to factors very similar to those outlined as causing scabs and "rat-tails." It is not surprising, therefore, that wood-flour cured this defect also.

It was clearly desirable to add wood-flour at the mill to all the synthetic moulding sand. The management was still a little hesitant, however, as apart from the one fault, the sand was otherwise giving excellent results. Furthermore, the laboratory tests were enabling the quality of the sand to be held within very close limits. The addition of wood-flour, it was expected, would upset some of the test results. For example, at this time a test for volatiles was enabling the coal-dust content of

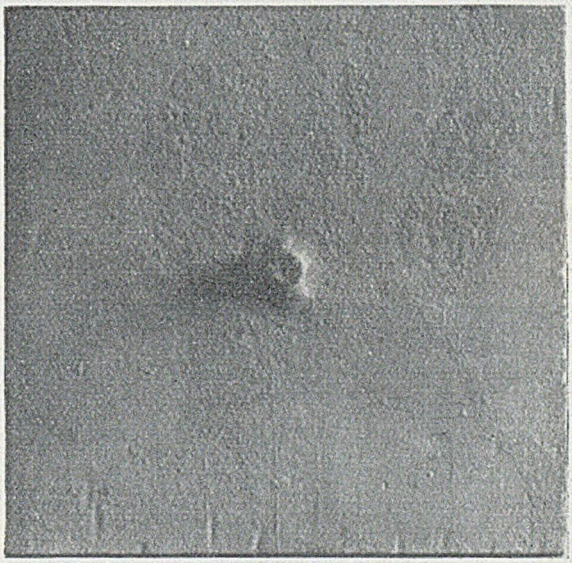


FIG. 10.—*As in Fig.* 9 *but Sand containing* 4.0 *per cent. Wood-flour.*

the sand to be kept constant. As soon as wood-flour was added, this test became of little value, as the percentage volatiles determined included those due to wood-flour as well as those due to coal-dust. In addition, the bentonite content was controlled by the green-compressive strength test. Wood-flour also affected this reading, as did coal-dust. Again, both wood-flour and coal-dust affected the permeability. Without wood-flour, the coal-dust content could easily be checked, as also could the clay content. As soon as wood-flour was introduced, however, the cause of any variation could not easily

be detected. After some deliberation a compromise was reached and wood-flour was only added to the sand for those castings that really required it.

More work was necessary and it is thought that the " shatter-test " might provide the answer. Small variations in wood-flour content affect the shatter index of the sand quite considerably. Perhaps additional information on this matter will be forthcoming in due course.

Air-drying

There are, as was expected, certain disadvantages in putting synthetic sand into the production system. Of these, rapid " air-drying " is perhaps the one which comes first to mind, and is usually the one factor which turns so many people against synthetic sand. Certainly those foundrymen who always resist the introduction of ideas and techniques which are new to them, have exploited the " air-drying " bogey to the full.

The answer to the problem is duplex. In the first

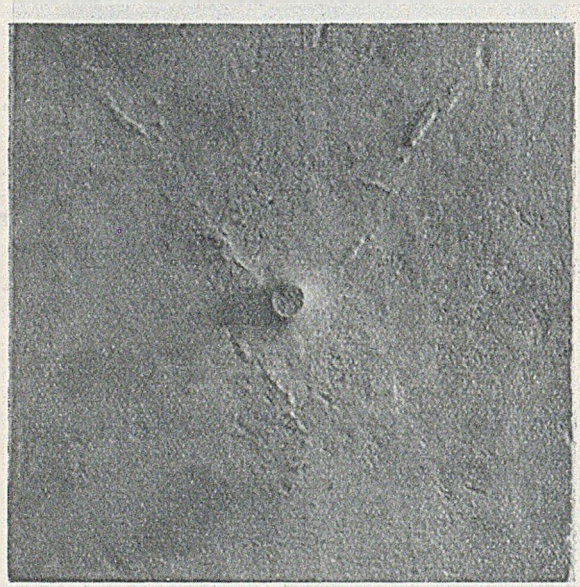


FIG. 11.—*Surface of a Test-plate Casting made in Sand with 2.5 per cent. Coal-dust as well as 1.0 per cent. Wood-flour.*

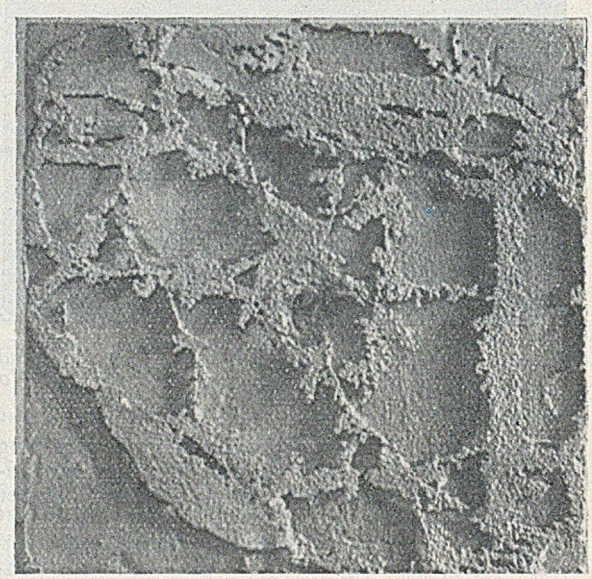
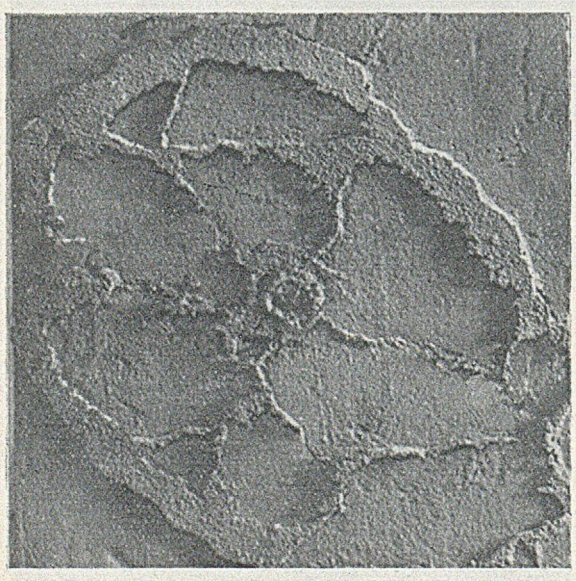
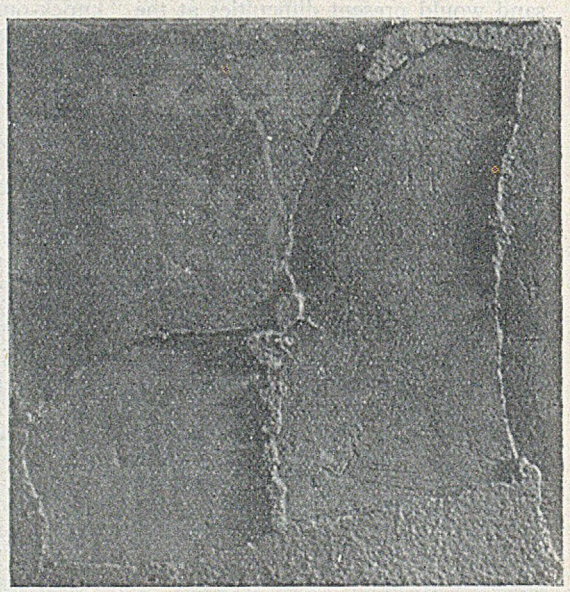


FIG. 12.—*Surface of a Test-plate Casting produced with the addition of 1.0 per cent. Pelleted Pitch but no Coal-dust in the Sand.*





FIGS. 13 *and* 14.—*Test-plate Casting Surfaces with 2.0 and 4.0 per cent. respectively of Pelleted Pitch in the Moulding Sand.*

place, a little care is required in storing the prepared sand. Steel bins are ideal, but it is best to cover heaps of sand with damp sacks, and the sand has thus remained in first-class condition for several days. From the moulder's point of view, a little time is required to get accustomed to the feel of the material. Furthermore, good pattern-equipment is essential. If a moulder is given a pattern which is in very bad condition, then he will be in trouble with synthetic-sand moulding. This is the fault of the pattern, not the sand, and surely if production is important, the moulder is entitled to patterns that are in good condition.

Core Sands

Core sands constitute perhaps a larger topic than moulding sands, and certainly present very many problems. Having standardized the green-sand-bay moulding sand, the management did not want it ruined by the breakdown sand from cores at the "knock-out." Up to this stage, the core sand had contained a high proportion of naturally-bonded sand, and the breakdown of this would gradually lower the permeability of the moulding sand. The logical step was to introduce a core sand which consisted basically of the same material as the moulding sand. Preliminary experiments with Erith silica sand and core-binders were very promising. Many of the cores, being complicated, presented difficult problems. The foundry was not equipped with many core carriers and it was not much use suddenly asking for a few hundred. For this reason, the core sand needed to possess good green-strength and stiffness. There are many types of binder available for achieving this. Once the core-making properties were obtained, little trouble was experienced on small and medium-size work. On larger work, however, it was found necessary to lower the permeability by the addition of naturally-bonded sand. Much work still remains to be done on this subject, especially with certain special cores, before everyone is happy.

Courses in Liquid Fuels and Thermodynamics

The department of applied chemistry of Northampton Polytechnic, St. John Street, London, E.C.1, announce two forthcoming special lecture courses on "Liquid Fuels, their Properties and Utilization," and "Chemical and Metallurgical Thermodynamics." The first will be delivered by Mr. G. F. J. Murray, B.Sc., A.M.Inst.C.E., A.M.I.Mech.E., on Tuesday evenings at 7 p.m., commencing on January 6. The second course will be delivered by Dr. O. Kubaschewski, Wednesday evenings at 7.30 p.m., commencing January 7.

The fee for each course is £1, but a student enrolled in a Polytechnic course may also attend these courses for an additional fee of 10s. Enrolment is normally effected by personal attendance at the Polytechnic between December 30, 1952, and January 6, from 10 a.m. to 4.30 p.m. However, persons unable to attend personally may enrol by post provided they supply the following information: (i) name and address (ii) name of employers, (iii) qualifications, e.g., B.Sc., Higher National Certificate, etc., and enclose the fee and a stamped, addressed envelope.

Iron and Steel Institute

Iron and Steel Engineers Groups

A meeting of the Iron and Steel Engineers Group of the Iron and Steel Institute is to be held on January 21, at the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1. It will be devoted to the presentation and discussion of four papers on the maintenance and repair of open-hearth furnaces. Dr. T. P. Colclough, C.B.E., chairman of the steelmaking divisional panel of the British Iron and Steel Research Association will be in the chair for the morning session and Mr. J. F. R. Jones, chairman of the plant engineering divisional panel during the afternoon session. A buffet luncheon (6s.) will be held at the Institution of Mechanical Engineers in connection with the meeting. The morning session, starting at 9.30, will be devoted to discussion of two papers: "Cold-metal Practice: fixed 80 to 100-ton Furnaces," by J. E. Pluck (Steel Peech & Tozer) and "Hot-metal Practice: 80-ton fixed and 250-ton tilting Furnaces." by S. G. Williams (Guest Keen Baldwins Iron and Steel Company, Limited). The afternoon will be given over to further discussion on "Repair and Maintenance of Open-hearth Furnaces in U.S.A.," by R. W. Evans and I. S. Scott-Maxwell (Steel Company of Wales, Limited) and "Repair and Maintenance of Open-hearth Furnaces in Germany," by Dr. Ing. C. Kreutzer and Dr. Ing. A. Mund (Maerz Ofenbau G.m.b.H., Krefeld, Germany).

Views on the B.I.F.

Speaking at the annual dinner of the Birmingham branch of the Incorporated Sales Managers' Association, Mr. A. B. Waring, president of the Birmingham Chamber of Commerce, said that the 1953 British Industries Fair in Birmingham would be an outstanding occasion. The problem of the financial failure of the B.I.F. in London might be solved by its transfer to Birmingham so that there could be "one magnificent Fair." Sir Basil R. J. Tangye, president of the Birmingham branch, urged an early reduction in taxation. He said that many firms found it impossible to buy new plant, and trading with goods produced by obsolete machinery was a grave handicap for the salesman. If Great Britain and the Western world were to flourish, Sir Basil said it was necessary that the American market should be opened wider to foreign goods than at present. The most "pernicious of all obstacles to international trade, 'quantitative import licences'," should be abolished, he insisted.

Lower Prices

There is every indication that prices at next year's B.I.F. will be lower, and that manufacturers will be offering much faster delivery of goods than at any Fair since 1947. Analysis of replies to a questionnaire sent to more than 2,000 exhibitors at the Fair, which is being held from April 27 to May 8, reveal optimism, based on confidence on the part of the 80 industries covered, as regards next year's prospects. At Castle Bromwich, 96 per cent. of all space indoors has already been sold, and bookings for the outdoor section are piling up.

THE THIRTY-THIRD AWARD for service of over 30 years with the company was awarded at the annual dinner of Follsain-Wycliffe Foundries, Limited, bringing the aggregate years of service to over 1,000. One of the three recipients this year was Mrs. H. Shipman, a coremaker, the first woman to achieve such long service with the Company.

Crucible Graphite

A recent investigation by the U.S. National Bureau of Standards indicates that, for making the crucibles used in non-ferrous foundries, domestic graphites from Alabama and Pennsylvania are fully as good as the traditional imported Madagascar graphite. Furthermore, it appears from the present study that small-flake graphite can be used instead of the generally preferred large-flake graphite without impairing the service life of "carbon-bonded" graphite crucibles. The work also indicates that the carbon-bonded type of crucible has about twice the average service life of the "clay-bonded" type. The study was conducted by R. A. Heindl of the Bureau's refractories laboratory in co-operation with certain crucible manufacturers and non-ferrous foundries.

Graphite crucibles are used by several hundred non-ferrous metal foundries throughout the United States to melt metal for casting parts indispensable for both civilian and military purposes. These crucibles are made from graphite flakes, bonded either with clay or with organic binders such as tar or pitch; the latter type is known as carbon-bonded. Graphite is similarly used in the manufacture of ladle stopper-heads required by the steel industry. Until now, large-flake graphite imported from Madagascar has been used for these purposes almost to the exclusion of other graphites. Because of the strategic importance of crucible graphites, now being stockpiled, the U.S. Army-Navy Munitions Board suggested that the National Bureau of Standards should undertake the present study. As a result of the findings, a Pennsylvania graphite mine is being opened so as to ensure the availability of domestic graphite if the supply of lower-cost Madagascar graphite should be cut off.

FIG. 1.—*Cross-section of a Graphite Crucible which failed because of Thinning where the Furnace Flames impinged; the wall has spalled and is now only a Small Fraction of its Original Thickness.*

Types Compared

The American Crucible Company and the National Crucible Company co-operated with the Bureau in manufacturing the crucibles used for the study. Graphites from the three sources — Madagascar, Alabama, and Pennsylvania—were furnished by the Bureau to the manufacturers in various combinations of flake sizes. To prevent identification of the source by anyone other than the investigators, each batch of graphite was designated only by a key letter. Except for the use of the special raw material, the manufacturers followed their regular procedure in manufacturing the test crucibles. Each crucible was permanently identified by number and also by a secret mark. After inspection for defects, one finished crucible of each type was taken to the Bureau for laboratory determination of moduli of rupture and elasticity, and the others were shipped to brass-melting foundries for tests of their service life.

Six foundries co-operated in service-testing the crucibles. The selection of foundries was limited to those melting brass and having enough furnaces in operation to ensure rapid progress of the tests. Each foundry received crucibles of sizes to which it was accustomed, these ranged from No. 50 to No. 150 (melting capacities from approximately 180 to 470 lb. of brass). Every effort was made not to upset the routine melting practices of the foundries. Carbon-bonded or clay-bonded crucibles were furnished to each foundry according to the type with which the particular foundry was accustomed. Fuels used for heating the furnaces were coke, gas, and oil. Records of each heat and other pertinent information were kept on log sheets supplied by the Bureau.

Service life of the crucibles made from the Alabama and Pennsylvania graphites turned out fully as good as that of crucibles made from Madagascar graphite. Carbon-bonded crucibles in general gave about twice as many heats as did clay-bonded crucibles. The number of heats before failure of carbon-bonded crucibles averaged 81.3, 107.7, and 76.0 for the Alabama, Pennsylvania, and Madagascar graphites, respectively; for the clay-bonded crucibles the corresponding figures were 40.6, 36.7, and 37.6. Graphite flakes smaller in size than those preferred by some manufacturers of carbon-bonded crucibles apparently did not impair the service life.

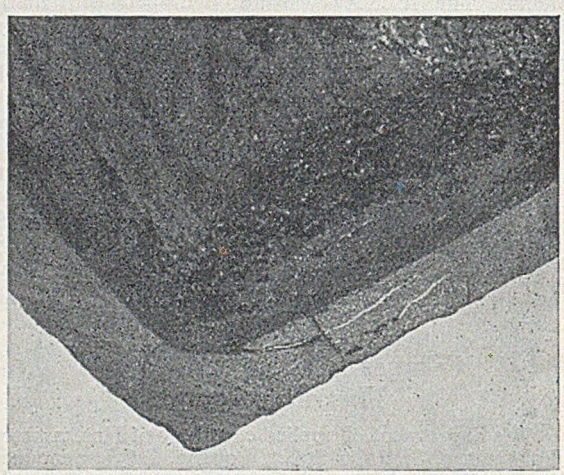


FIG. 2.—*White lines in the Section of a Crucible which failed in Service indicate a Layer Separation in the Material, which permitted Metal Leakage.*

Fig. 1 shows a cross-section of a crucible that has reached the point of failure. Where the furnace flames impinged (left), the wall has spalled and only a small fraction of the original thickness is left. Though most of the crucibles in the investigation failed because the walls had been "thinned," some were rendered unfit for further service because of leaks in the bottom. This phenomenon occurred frequently at one foundry. It appeared that the crucibles adhered to the block at the bottom of the furnace on which they rested and their removal from this block resulted in slight layer-like separations in the crucible material (Fig. 2) which permitted leakage.

Fettling of Mass-production Castings*

By R. P. Hendricks

The fettling and cleaning of castings is a subject which, generally speaking, receives insufficient attention. Too often one finds a fettling department pushed into some odd corner of the plant because this phase of the manufacture of the casting is looked upon as being of secondary importance. Admittedly this criticism mainly applies to small plants and not to large and well-equipped foundries whose primary interest is quality and appearance. If one bears in mind that the first impressions of a customer is the appearance of the job, one can readily appreciate the importance of the fettling and cleaning sections.

At first sight the provision of improved fettling-shop facilities may seem to be simple and straightforward, and indeed this may be so where the production lines are very similar. However, when the range and type of castings varies markedly, the subject becomes more complex. In the foundry in which the writer is engaged, the castings produced vary from two or three ozs. to 350 lb. in weight, and from simple jobs to large complicated multi-cored castings. As the production runs on these castings may run into many thousands, it can readily be seen that a wide range of fettling equipment is necessary and that a careful selection of the fettling procedure may well result in saving of time and costs in the long run.

This Paper has been written to outline the uses of the various fettling equipment and to give some idea of how the appearance of the casting may be improved by using modern practice. It is proposed to take the reader through each stage of the fettling-shop from the time the casting leaves the inspection department until it is finally dispatched to stores or machine-shop.

In the main, four types of grinders are used: fixed pedestal grinders; swing-frame grinders; air grinders and small pneumatic grinders.

Pedestal Grinders

The type and size of grinders varies enormously depending on the type of casting being fettled, but for castings within the range previously specified the variety is more limited.

Fixed pedestal grinders are used for all easily handled castings, where ingates, flashes, broken risers, roughness, etc., have to be ground away. An even steady pressure with a slight to and fro movement across the stone should be placed on the job. If necessary, a pressure bar can be used to speed up the grinding rate. To use a pressure bar the grinding rest is drilled at regular intervals with $\frac{5}{8}$-inch holes and the pressure bar is shouldered to fit these holes. Care should be taken to see that the use of the pressure bar is not abused, as very high pressure on small stones can cause breakage. It is usual to vary the size of the bar to suit the size of the stone or, better still, it is safer to use the pressure bar only on fixed grinders from 18 in. upwards. All types of stones have a given speed in revs. per min. stated on the "blotter" and at no time should this speed be exceeded. Numerous accidents have happened where the stated speeds have been exceeded and serious injury, and in a few cases death, have been caused by stones disintegrating under abnormal speeds. Recent developments in bonding the grit used in a grinding stone have considerably increased the speed at which grinding wheels can be used. Resin-bonded stones are an example of this.

Many types of pedestal grinders are double-ended and it is important to watch carefully the rate of wear on the stones at either end, since large variations in the diameters of the wheels will put the shaft out of balance and lead to excessive wear on the bearings. If one wheel does become badly worn down, it is better to replace both wheels with new ones or to match up one with others which are partially worn. In large fettling-shops it is often found that some Natives work at faster rates than others, and it is advisable to match the labour accordingly. Attention to this point will considerably decrease the change of wheels in the shop. In general, on fixed grinders, as on all other types of grinders, the most economical size of stone is chosen to suit the particular job.

It should, however, be remembered that as the stone wears down its peripheral speed (and hence its efficiency) decreases and the type of work ground on the stone must be varied to suit. This decrease in peripheral speed as the stone wears can be countered on many machines by moving the belts so maintaining a reasonable speed and efficiency.

Swing Frame Grinders

The swing-frame grinder is extensively used on castings which are too large or too awkward to be handled easily on large pedestal grinders. The grinder is usually suspended from a roof truss or a small jib, the latter being more suitable, as it enables the operator to move the machine at will. The stone, cover, and handle, counter-balance the weight of the motor and pressure is applied to the stone by the operator by means of the handle and his weight on the handle.

Air grinders are hand-operated portable tools which can be used for a wide variety of work in a fettling-shop. In general, they are used for the surface dressing of castings and interior work, though their flexible nature allows them to be used for a large variety of other jobs. They have the advantage of taking various sizes and shapes of

* Paper read before the South African branch of the Institute of British Foundrymen.

stones and can therefore be used to dress intricate and multi-cored castings. These grinders are light and easy to handle and can be used for semi-precision work, and it is not unusual to use this grinder to prepare castings to template sizes. Of the various stones used on air grinders, the cone stone is particularly useful for many hollow and large-cored castings. Its shape permits it to be used in many places and in a wide variety of dimensions. All curves which cannot be dressed by a flat-faced stone can be successfully handled by the cone.

Small Pneumatic Grinders

Although small pneumatic grinders are mainly used on such work as fitting, jig-making, cleaning-up, templates, etc., they have certain applications in the fettling shop. In mass-production work, there are often large sums of castings requiring very close tolerances, which can possibly be obtained in the fettling shop instead of by using the more costly machine-shop method. In this type of work, the small pneumatic hand-tool with its wide range of replaceable stones of various shapes and sizes has a very definite application. Some examples of this can be found in agricultural castings where fittings have to be made on the implement to tolerances of approximately $\frac{1}{32}$ in. Surface roughness in holes and slots on this class of work can be cleaned rapidly with this tool.

Dressing of Grinding Wheels

The maintenance of full grinding efficiency is, among other things, a function of the surface condition of the wheel. A stone in continuous use becomes worn and grooved and possibly glazed and its effective cutting area and efficiency is reduced. To overcome this tendency, all stones should be regularly dressed to bring the shape back to the original. This is done with a wheel-dresser, which consists of a considerable number of very hard, flat, metal stars, mounted loosely on a spindle, which in turn is mounted in a strong handle. To dress the wheel, the protruding lip on the handle under the stars is slipped over the grinding wheel side of the rest on the grinding machine and pressure is applied to the stars by raising the handle of the dresser. On wheels having a width smaller than the total width of the stars, the dresser is kept stationary and the pressure maintained until the wheel has been worn flat. On stones having a width greater that the total width of the stars, it is necessary to move the dresser to and fro across the stone. The writer cannot stress too greatly the importance of the regular use of the dresser in the fettling shop and it has been his practice to have the supervisor dress all stones before each shift commences and after the lunch break during the shift. When the stars on the wheel-dresser have been worn down, they can be replaced in a few seconds by first disconnecting the spindle carrying them.

On occasions, with certain types of castings, it may be found that a stone becomes excessively worn on one side, and the writer has found that in such cases the dressing of the stone can be accomplished more quickly by grinding the end of a piece of 2-in. pipe across the high side of the stone. Any piece of scrap piping can be used for this purpose. If a stone requires very frequent dressing, the type of grit used in the stone is invariably too hard, and in such cases it is advisable to change the stone to one of a softer grit.

Fettling Other than Grinding

The grinding section of a fettling-shop is by no means the only means of preparing a casting for the machine-shop. At least as much time is taken up by chipping, hand-fettling, cleaning, etc.; and in mass-production work it pays handsomely to give close attention to the application of modern tools to this side of the fettling-shop work. A brief outline is given below of some of these tools and also of the essential handwork which has to be performed on castings.

The pneumatic chipper is used to-day to take away a great deal of the hard work previously performed with the cold chisel and hammer. One of the great advantages of this tool is the easy and rapid replacement of the various shapes of chisels which are needed to fettle completely an intricate casting. The pneumatic chipper is held with the right hand while the chisel is kept in place with the left. Changing the chisel is merely a matter of sliding it out of the chuck and replacing with a new one. Most of these chippers are air-operated and the starting lever is incorporated into the handle. While a steady pressure should be maintained on the chipper, it is more important that the left hand should keep the chisel firmly in place in the chuck. This hand also guides the chisel over the part to be fettled. The successful continuous operation of this class of chipper depends mainly on a regular supply of clean dry air. Any moisture or oil coming into the chipper can block up the small holes in the steel discs controlling the piston. The writer had considerable trouble in this respect until a filter was introduced into the air line. From then onwards no trouble was encountered.

Chippers are used regularly for many purposes other than their name implies. If a sharp keen edge is kept on the chisel, roughness, flashing, protrusions, and lumps can be cleanly and rapidly removed. The chipper is particularly useful for removing flash at the joint-line on a casting and the interior flash caused by joint-lines on large cores. It is often possible to clean out slots in castings to a given dimension, by making a chisel to size, and driving this through with the chipper. The use of sized chisels for this class of work has been widely developed by the writer with large savings in time and cost.

In one case the time taken to fettle the slots in a casting was reduced from an average of 22 mins. each when hand-fettled to 4 mins. each using the chipper. Many other examples of a similar nature could be given. The use of sized chisels is purely a matter of development by the fettling-shop foreman. In all cases of slots, grooves,

elongated holes, given radii, etc., the foreman should first attempt to produce the dimensions required by fettling as previously described, before assigning the work to the machine-shop. Co-operation between the customer and the fettling department will often show that machined finishes can be replaced by fettling.

Hand Fettling on Benches

Although large developments have been made in the use of mechanically-operated tools, there will always be some type of work which has to be performed by hand tools on a fettling bench. This type of work will include filing, chipping with cold chisel, punching, etc., and it is this section of the shop which is often sadly neglected. It is not at all uncommon to find rough benches placed in a dark corner of the shop and equipped with broken-down vices, a few worn-out files and a hammer head and a piece of scrap piping.

In mass-production work, a customer who has placed large orders worth, sometimes, thousands of pounds, expects to receive a continuous supply of castings, not only of good quality material but of pleasing appearance. Incompetent hand fettling on the bench can often spoil what would otherwise be a satisfactory casting.

Fettling benches should be strongly and rigidly constructed and should be of a suitable height to allow comfortable working with a minimum strain on the arm and shoulder muscles. They should be situated in such a position that the light falls strongly on the bench throughout the hours of daylight and be well lighted artificially if they are in use during the night. All vices should receive regular attention to maintain the hardened steel grips in correct alignment and with flat tops. Particular attention should be paid to the quick release which should be a feature of all of them.

It appears to be common practice to use old files as chisels and punches, but the writer has found that these are often too hard to be used as received. There is always a danger of the ground edge of the file breaking up when it is used for chiselling. The splinters which fly off at high speed are very sharp and jagged and can cause serious injury. All files, before being used as chisels and punches, should be re-tempered at a temperature of about 250 to 275 deg. C. to soften them slightly. In this condition they are suitable for use. Chiselling on the fettling bench is only used where it is difficult or impossible to use a pneumatic chipper and the same applies for the use of punches.

Hand filing will always have a place in the fettling-shop and a wide variety of sizes, shapes and types of cut are used. It is basically the class of material being filed which decides the type of cut to be used on a file. The shape is always selected with reference to the contour or area to be filed. It is a good practice for the shop supervisor to fit a handle to all files received from stores before passing over to the operator and to issue new files only when an old one is surrendered. Files are very useful tools in the home as well as in the fettling-shop, and a considerable number of them are apt to walk away if this rule is not enforced!

While on the subject of files, it may be of interest to point out that worn files can now be re-cut by a chemical process at something less than half the price of a new one and the writer has found that a re-cut file will give almost the same service as a new one. A few of these files have been found to be cracked after the re-cutting treatment but it is considered that the process does lead to a reduction in file costs in a fettling-shop.

Too much attention cannot be paid to the correct training of operators in the use of the file. A great deal of hard work with very little result from it is the usual story from unskilled labour and nothing discourages a native more than too much hard work. The native should be trained to file with a fairly slow cutting motion, applying the pressure with the right hand while the left keeps the file flat, and also applies the downward pressure. The return motion does not involve pressure by either hand.

Some punching and drifting is also performed on the fettling bench, but wherever possible the Author prefers to use a fly-press or drilling machine for cleaning-out holes, since both of these operations are somewhat faster than hand methods.

Where hammers are in continuous use on this sort of work, regular attention should be paid to them as a loose hammer-head is a continuous source of danger. All chisels and punches should be regularly ground to prevent the formation of mushroom heads.

Straightening of Malleable Castings

The company with which the writer is employed specializes in the manufacture of malleable-iron and grey-iron castings, and, as is well known, the former are subjected to a lengthy heat-treatment to bring them to a soft condition. This heat-treatment often produces distortion, particularly if the section is thin. The straightening of distorted castings is an operation which is performed in the fettling-shop, and a number of different methods is employed depending on the size and section of the job. Hand straightening with a vice and hammer is only used as a last resort. In the main, the fly-press and the air-operated drop-hammer are used.

The fly press is extensively employed for straightening sections up to $\frac{1}{2}$ in. thick and it has been found that this tool, with the aid of suitable jigs, and supports, can be used for a wide variety of work. The heavy, air-operated hammer is only used on the larger thick-sectioned jobs, and even then the operator must be carefully trained in the control of the stroke. It has also been found that the drop-hammer is particularly useful for driving large punches through cored holes, where a particularly smooth finish is desired by the customer.

Rumbling and Cleaning

All castings before leaving the fettling-shop are cleaned by either "Wheelabrating" alone or by "Wheelabrating" followed by rumbling. Grey-iron castings are always "Wheelabrated" before fettling, while malleable-iron castings are fettled

first, and then "Wheelabrated" and rumbled. Probably everybody is familiar with this process, which in mass-production work is probably the fastest and most efficient form of cleaning. A few minutes only in the Wheelabrator is sufficient to free the casting from all traces of moulding sand and surface scale. The castings are placed in the cleaning compartment of the Wheelabrator which is closed on the outside by a thick reinforced rubber flap. The cleaning is carried out by white-iron grit, which is thrown with high velocity into the revolving compartment. The continuous turning presents all surfaces of the casting to the flying grit and hence cleans uniformly. After a period of operation, the grit becomes broken and blunted and the time required to clean becomes abnormally long. When this stage is reached, fresh grit is introduced.

Rumbling is used to obtain a polished effect and a soft material such as malleable iron is particularly susceptible to this treatment. The rumblers consist of horizontal cylinders suitably mounted and equipped to be revolved at a fairly slow speed (40 r.p.m.). The cylinder has a movable door for loading and unloading. Castings are loaded into the rumbler until it is about half full and hard, white-iron ovals are added to produce a large rubbing surface. The door is then bolted on and the cylinder allowed to revolve for a period of 30 min. For very small hollow castings it is advisable to use white-iron stars in place of the ovals, as these have a more penetrating effect in the cored holes.

Safety Precautions

In this country, Native labour is used for all forms of fettling and the selection and training of suitable operators is a matter of the utmost importance. The writer makes it a practice to select Natives who have spent considerable periods of time in other places of employment, as these in general have been found to be the most reliable and consistent workers. The very young and the elderly Natives are never used on grindstones, as it has been found that these age groups are very prone to accidents of all kinds. It is usual to place the new Native in the hands of an experienced operator (usually a "boss boy") whose duty it is to teach him the rudiments of the job and the elementary safety precautions. The new recruit is closely watched over a period of a week to test his aptitude for this type of work. If unsuitable, he is put on to other fettling operations. From the moment of entering the fettling shop, the newcomer is made to be safety conscious and is induced to make use of all safety appliances available for the particular job. A note is kept of the habits of the newcomer and if there is any indication of heavy drinking or dagga smoking, he is immediately discharged, as such a "boy" is very prone to accidents. Wherever possible, the Author does not allow much overtime to be worked on the stones, for it has been found that the accident rate rises steeply and the production rate falls rapidly during overtime.

Too much stress cannot be placed on safety precautions and the use of safety appliances. Precautions should begin when the new wheel is mounted on the shaft. The two flanges on either side of the stone should be of the same diameter and preferably be made of steel. Washers made of blotting paper or rubber, not more than $\frac{1}{16}$ in. thick, should be placed between the wheel and the flange plates. The bolts holding the flanges in place should be tightened evenly for 30 in. dia. and smaller wheels for which a wrench pull of 15 ft.-lb. is recommended. A somewhat greater pull may be required in the case of wheels larger than 30 in. dia. but in no case should it exceed 25 ft.-lb. All flanges should be checked for distortion when replacing a stone and if they are not exactly true, should be scrapped and replaced with new ones. Flange plates are distorted by applying excessive pressure on the flange bolts and this condition often leads to a broken wheel.

The rest plate should be adjusted to within $\frac{1}{8}$ in. of the stone face, and its horizontal line should come in line with the radius of the stone. These adjustments should be made when the stone is not in motion. All grinding wheels on stationary machines should be fitted with an exhaust system to take away all flying particles from the stone and the casting. Admittedly, exhaust systems are not widely used on air-grinders and swing-frame grinders, though the present tendency is to have an exhaust system on the bench where the air-grinder is being used, while the very latest types of swing-frame grinders have exhaust systems fitted.

Eye Accidents

By far the highest proportion of accidents in the fettling-shop are foreign bodies in the eye and many different types of eye protectors have been tried to reduce these casualties. The complete face protector was used for some time and while protecting the operator from sparks caused by his own grinding, it was eventually discarded, as this type of protector allowed sparks coming from behind to get in between it and the face. Goggles are now being used by all grindstone operators. The most suitable goggles are those with a replaceable lens which can be changed when it has become badly pitted by sparks. This type of goggle is also used by operators of pneumatic chippers, as the complete face shield can be dislodged easily by the shoulder if the head is turned away from the front. Each Native is made to return his goggles at the end of the shift. The issue of goggles is done by the European supervisor only. By introducing this system, the number of goggles purchased each month dropped rapidly.

On occasions, foreign bodies in the eye have been reported from operators who were wearing these close-fitting protectors, and it was eventually realized that these could be caused by flying particles coming from the side and passing through the small ventilation holes in the side pieces of the goggles. To overcome this difficulty, a sheet of $\frac{1}{16}$-in. steel was set up in between the two operators working on the same machine. Since introducing

this shield, the number of "foreign bodies in the eye" has dropped considerably. In spite of all these precautions, there are still a few cases, but it is thought that this is more likely to occur when the operator is walking around the shop without his goggles on. All employees in the fettling-shop are warned that in no case must they attempt to remove a foreign body from an eye. This must always be reported to the first-aid department.

General Measures

Mention has already been made of the use of old files and the dangers in connection with them. The grinding of chisel heads to minimize the dangers of chips flying from a mushroom tool and blows on the finger from hammers used with these tools will no doubt be considered elementary, but it is surprising how often one comes across such cases in the fettling-shop. Loose hammer-heads are another case in point. Guards should always be replaced on air-grinders when renewing stones, and fitted to those which are without them. For grinding very small castings, various types of handles and tongs can be made to hold the job, and the Author has found that not only do these decrease the accident rate, but very often increase production. Safety guards must always be placed around the rumblers to protect from serious injury the idiot who walks around with his eyes closed! In mass-production plants, where large numbers of castings are handled, the ordinary fork is commonly used for loading and unloading and users of these should be trained to put them down with the points on the ground if they have to leave them lying around. It is not unusual to see a black-eye caused by somebody standing on the upturned prongs of a fork. General neatness and tidiness around the fettling-shop, as of course around any type of shop, is a great aid to the avoidance of accidents and to the general maintenance of good housekeeping.

While it may seem that the writer has dealt at length with safety precautions, the few elementary points raised above cannot be too greatly stressed and the continual attention of fettling-shop foremen and supervisors will reduce the amount of lost time caused by accidents.

In conclusion, the writer wishes to thank Mr. P. L. Ward for the use of photographs to illustrate the Paper, and to the management of African Malleable Foundries for their kind permission to publish.

Forty Years Ago

In our issue of January, 1913, the Editor, discussing the inappropriateness of the expression "chills" and "chillers," put forward the sensible suggestion that the word should be changed to "denseners." Later issues show that in general this advice was taken. This issue contains articles and speeches by many of the "big noises" of the period: Hatfield, Longmuir, Cook, Rosenhain, and Primrose. The use of steel mixes in the cupola was the centre of much discussion, and the man who dealt most sanely with the subject was McNair, who happened to make a living out of teaching people how to use steel properly.

Huddersfield Protest at Inclusion of Foundries

It was announced at a meeting, in late December, that the Council of Huddersfield Chamber of Commerce had written to the secretary general of the Association of British Chambers of Commerce to protest against the inclusion of engineering foundries in the new Iron and Steel Bill. Mr. Harold Fisher, president, stated that in its letter the Chamber had declared it most necessary for very forcible representations to be made to the Minister of Supply to exclude engineering foundries, both iron and steel, from the "third reading" of the Bill. The letter stated: "To place iron and steel foundries, part of individual and highly integrated engineering undertakings, within the authority of the Iron and Steel Board will lead to serious handicaps in production and expansion. It is vital that no impediment or controls as are contained in the Bill should be introduced into the engineering industry, especially when every effort is being called for by that industry to develop its trade in all markets both home and abroad."

George Kent's Canadian Company

A company has been formed and has commenced operations in Canada under the title of Kent-Norlantic, Limited, at Horner Avenue, Toronto 14. This organization takes over from the parent company, George Kent, Limited, the responsibility of marketing throughout Canada, Kent industrial instruments, certain other products, and the Norlantic range of domestic and industrial water and steam meters. Arrangements are being made for the manufacture and assembly in Toronto of the Norlantic range and other products, and for stocks to be held to meet Canadian delivery requirements both of new equipment and spares. The Company will operate a comprehensive organization to cover after-sales service. The present staff, Canadian and British, includes production, research and development engineers who will be responsible for the design of equipment to Canadian standards under the supervision of Mr. Kenneth R. Wells—who was previously manager of the Canadian Branch Office of George Kent, Limited. Other directors are Mr. W. G. C. Howland and Mr. Rodney G. Kent.

Combating Underground Corrosion

The Department of Scientific and Industrial Research announced on December 17 that the discovery at York of iron implements 2,000 years old may lead to a new method of protecting underground pipes from corrosion. The iron articles, ranging from hob-nails to knives, were found during excavations by the Inspectorate of Ancient Monuments, Ministry of Works, on a site at Hungate. Normally, on such a waterlogged site, they would corrode in a very short time. Because of their excellent state of preservation, samples of the soil in which they had been buried were examined by the Chemical Research Laboratory. Cultures were made of sulphate-reducing bacteria and inoculated with soil from the site. Their activity ceased if more than 5 per cent. was added. Later work showed that tannic acid stopped the action of the bacteria. It is believed that tannin got into the ground at Hungate from a leather industry which once flourished in the area.

Midland Outlook

That "scores of firms" were likely to benefit from the order for Centurion tanks for the defence of N.A.T.O. countries, placed by the United States with Britain, was the opinion expressed by members of the Midland Regional Board for Industry on December 16. Major C. R. Dibben, chairman of the Board, said "The Midland area will reap the benefit of its flexibility and adaptability." Mr. S. A. Davis, Regional Controller for the Ministry of Supply, said that in the last month of a difficult year he was unable to find evidence to justify the gloomy prophecies freely expressed about the immediate future of the engineering industries in the Midlands. Though some order books had shrunk, he still felt that so far the process had been healthy and its effect had been to induce a realistic approach to costs of production and the task of selling goods.

Referring to industries sponsored by the Board of Trade, Mr. Barry Kay, Regional Controller for the Board of Trade, said that employment in the Midlands was still being maintained at a higher level than in most areas of the country. As to employment statistics, it was stated that on November 10 registered unemployed in Birmingham and district were 8,165; in Coventry 2,460; in Wolverhampton and the Black Country 4,300; in North Staffordshire 3,300 and in the remainder of the region 2,494.

Iron-ore Imports

Imports of iron ore in November and the total for the 11 months of the year to date, with comparative figures for 1951, are shown below.

Country of origin.	Month ended November 30.		Eleven months ended November 30.	
	1951.	1952.	1951.	1952
	Tons	Tons.	Tons.	Tons.
Sierra Leone	70,295	54,040	562,174	713,092
Canada	94,840	9,680	624,192	613,198
Other Commonwealth countries and the Irish Republic ..	11,972	32,428	49,388	82,608
Sweden	342,564	319,935	3,195,592	3,350,198
Netherlands	2,174	2,640	42,587	39,302
France	33,268	26,663	329,703	381,545
Spain	50,935	29,561	729,356	619,495
Algeria	107,227	131,383	1,310,149	1,566,696
Tunis	32,720	35,320	454,478	523,484
Spanish ports in North Africa	19,830	12,850	304,831	237,513
Morocco	33,355	23,820	264,662	282,220
Other foreign countries	28,857	76,447	196,201	518,710
TOTAL	828,037	754,767	8,063,313	8,928,061

Early Four-stroke Engine

One of the first four-stroke engines made by the firm has recently returned to the Villiers Engineering Company, Limited, Wolverhampton. Forty years ago, it was exported to Australia and for many years drove a circular saw. Later it lay unused for nearly twenty years, when the owners heard that the Midland firm were looking for specimens of their earliest engines, and presented it to the company. Now an interesting historic relic, it has many features of note. Aluminium castings were used extensively; there was a two-speed gear box, enclosed primary drive chain, and cone type of clutch, built in unit with the engine, and a kick starter in place of the "run and jump" methods mainly in use at the time it was made.

Nickel Production

The free world's output of nickel this year would total about 315,000,000 lb., estimated Dr. John F. Thompson, chairman of the International Nickel Company of Canada, Limited, when he reviewed the year's activities in the industry. Canadian production would be approximately 280,000,000 lb., or about 90 per cent. of the total. The free world production of nickel was believed to be over five times that of the rest of the world, said Dr. Thompson.

Throughout the world the search for new deposits of nickel was being pushed at an unprecedented rate, he continued. This exploration work was being carried on by interests new to the industry as well as by the established producers. The International Nickel Company of Canada was pushing towards completion its major programme of underground mining expansion at its operation in the Sudbury district of northern Ontario. The $150,000,000 programme, financed entirely by the company, was scheduled for completion next year. This would give International Nickel an annual capacity of 13,000,000 tons of ore entirely from underground operations, thus assuring maintenance of its current yearly rate of approximately 250,000,000 lb. of refined nickel, Dr. Thompson added.

Hadfields' Training Scheme for Foremen

Hadfields, Limited, have announced that the company is introducing a new scheme for the further intensive training of their foremen. Tuition will be given on such subjects as work study, productivity, quality control, the conservation of man-power, materials and of machine-tools. The further object of this innovation is to make their foremen more familiar with the overall activities of the company and of departments other than those which they themselves control. The foremen will attend residential courses at the Hecla Works, commencing on Monday, January 12, 1953, and will later attend a continuation course at the company's East Hecla Works. Local directors and other senior officials of the company will give the lectures and time has been set aside for discussions and visits to operating departments.

Latest Foundry Statistics

According to the British Iron and Steel Federation's November Bulletin, employment in iron foundries was less in October than in September. The overall reduction was 585 and this was despite a slight increase in the number of female employees. The steelfoundry industry, where the total now stands at 20,476, shows a slight gain of 30. The average weekly tonnage of steel to be poured into castings was increased in October to 11,700, as against 11,500 in September and 10,300 in October, 1951.

Foundryman Loses Claim

A case before Halifax County Court in which a foundry workman, Arthur Taylor, claimed £200 damages against his employers, Drakes, Limited, constructional gas engineers, Ovenden, resulted in judgment for the defendants. Taylor's case was that he was struck in the eye with a flying piece of metal while working in the foundry, but the Judge held that the accident was quite outside what any reasonable employer should be expected to foresee.

First Steel Development Plan

Iron and Steel Federation's Review

The steel industry's first post-war development plan, which was drawn up in 1945, is reviewed in the current issue of the British Iron and Steel Federation's "Monthly Statistical Bulletin." It is pointed out that although progress in some directions has been more rapid than anticipated and in others slower, it is already possible to assess the results achieved and to regard the position at the end of this year as the jumping-off ground for a second development plan, which has been prepared in its main outlines, and, as such, has been submitted to the Government.

The general objective of the first plan was to modernize and increase steel capacity to 16,000,000 tons a year. It was assumed that output would average 94 per cent. of capacity, or 15,000,000 tons, although a higher output of, say, 15,500,000 tons might be achieved if required.

In addition, 500,000 tons of imported steel was assumed, this figure having been agreed following discussions with the Government. The total supply of steel was, therefore, to be from 15,500,000 tons to 16,000,000 tons.

Pig-iron Production

Production has exceeded the planned rate except in Flintshire—where the big step forward will come in the New Year, when the Shotton blast furnace is completed—and in Northants and Scotland, where the conditions referred to previously in connection with steel applied also in connection with the associated blast-furnace plant. A 38 per cent. increase in basic and hematite pig-iron production has been assisted by the great progress made since the war with ore preparation and sintering—*e.g.*, at the Dorman, Long, Appleby-Frodingham, and Corby plants. Sinter production, for example, has risen from 2,500,000 tons in 1946 to over 4,000,000 tons this year. Besides economizing coke, ore preparation in its various forms has the effect of increasing the output of iron from a given blast furnace capacity.

The new Shotton furnace—the largest in Europe—will come into operation later this month. The full effect of the furnace construction under the original plan should, therefore, be seen in 1953, when pig-iron output is expected to exceed the 1952 rate by approximately 1,000,000 tons.

The production of finished steel products actually achieved is appreciably in excess of the capacity figure in the plan. The only exception is sheets and tinplate, where the new plant of the Steel Company of Wales has been coming progressively into operation during 1952, so that the results are only reflected to a limited extent in this year's total production figure. Currently the output of sheets and tinplate is running at an annual rate of 2,750,000 tons, and is in excess of the production target, as will be shown even more decisively during 1953.

Raw Materials

It is difficult to compare the raw material estimates given in the plan with the actual outcome without taking account of the iron castings position, because the raw materials are jointly used by the two industries.

It may be recalled that the fall in imported scrap supplies, which occurred at the end of 1950, was foreseen when the plan was written in 1945. The plan commented: "At present it appears improbable that over a period of years more than the estimated import of 250,000 tons could be secured from abroad, but temporarily large imports of war scrap might be obtained from the Continent and would greatly assist in the transition period until the additional pig-iron facilities are created."

This proved to be an accurate assessment of the position. As was foreseen, it was possible, in 1950, for example, to secure a high level of steel production before the completion of the plan with the help of temporary imports of scrap from the Continent. These, as anticipated, have now fallen away, but the extra blast furnaces, which have taken three to four years to build, are coming in, thus ensuring the expansion of steel production on the basis of a considerably higher pig-iron ratio than prevailed in 1945 and 1946. The percentage of scrap used in steelmaking was expected to fall to 55 per cent. on completion of the plan, as compared with an average of 60.2 in 1946. The 1952 average is likely to work out at 55½ per cent. and it has been down to 55 per cent. in some recent weeks.

An important objective of the plan was to raise efficiency and labour productivity. A measure of the progress achieved in this respect is given by the index of productivity in steel melting and rolling, regularly compiled by the federation. This shows that output per man-year rose by 25 per cent. from 115 in 1946 (1938=100) to an estimated 144 this year.

In assessing the rate of progress achieved under the plan it has to be borne in mind that the amount of work entailed was broadly up to the maximum that could be undertaken by the plant makers.

Perhaps the main limitation in respect of the resources available to the plant manufacturers has been the competition with the electricity supply programme. It has been in the supply of boilers, turbo-blowers, and electrical equipment that this competition has been mainly felt; and it is the long delivery period for these items which has been largely responsible for the fact that it has taken almost four years to complete a blast furnace with its ancillary equipment.

Cost of the Plan

Over 90 per cent. of the cost of the work carried out has been incurred in the United Kingdom. The total estimated cost of the plan at 1945 prices was £168,000,000. The actual expenditure has amounted to just over £300,000,000. The total expenditure to the end of this year is approximately £400,000,000 at 1952 prices, whereas the original £168,000,000 would represent about £340,000,000 at present prices. Measured at constant prices, therefore, the actual expenditure under the plan has exceeded the original estimate by some 18 per cent. The excess is partly accounted for by the fact that in some of the schemes—*e.g.*, the new Abbey Works, the developments at Shotton and Consett, the ore preparation plant at Appleby-Frodingham, etc.—the increased capacity actually achieved has been very substantially greater than was originally envisaged.

It is interesting to note that the peak rate of expenditure, when measured in real terms, was reached in 1950. This point is of some importance: from now onwards

First Steel Development Plan

the new sites and plant units established under the first development plan will enable further expansion and modernization of the industry to be carried out at a relatively lower real cost per ton of additional output. In other words, the big increases in output expected to be achieved both this year and in the next few years are likely to be secured with relatively lower annual capital expenditure than in recent years.

Industry/Government Co-operation

The building programme for the next few years has been determined by the agreement reached in 1948 with the Government to carry the plan forward in order to ensure a supply of 18,000,000 tons of steel by the middle 1950s, including some 500,000 tons of imported steel. It is estimated that in fact production will rise to 17,500,000 tons in 1953. This carrying forward of the schemes under the first plan has not obviated the need to produce a second five-year development plan which will at least signpost the industry's course up to 1957-58. As already mentioned, the outline of such a plan was forwarded to the Government during November.

An important feature of iron and steel development planning has been that at each stage of review it has been possible to agree production targets with the Government of the day; in turn it has been possible to work out with the various firms in the industry a practical development plan designed to reach the targets set. This has been done by joint discussion and examination without in any way weakening the responsibility of the individual companies to judge the commercial soundness of their constituent schemes.

It is in no way suggested that the steel plan as originally formulated—or any future plans—can lay claim to perfection. All such plans are bound to be open to a considerable degree of difference of opinion. But experience of the industry does show that it is possible to combine the benefits of responsible and risk-bearing management with the formulation of comprehensive schemes designed to fit in with national policy; and that the broad objectives of the plan can be successfully achieved.

Completed, or Nearing Completion

A short outline of some of the schemes which have been completed, or which are approaching completion, under the first development plan is given below.

CARGO FLEET IRON COMPANY, LIMITED—A new blast furnace and additional coke oven capacity came into production in 1952. A new mixer and an additional steel melting furnace should be ready at the end of 1952 or early 1953.

COLVILLES, LIMITED—The third blast furnace at the Clyde Ironworks was completed early in the period under review. A reconstructed blast furnace, fitted for high-top pressure operation, has been brought into use and a new coke oven battery came into production in September, 1952. The first stage of the melting shop reconstruction at Clydebridge was completed at the end of 1950. Other work is in progress for the modernization of rolling mills and steelmaking capacity.

CONSETT IRON COMPANY, LIMITED—A new blast furnace and additional coke ovens and ore handling plant have been installed and three blast furnaces can now be operated simultaneously. A number of open-hearth furnaces have been enlarged and rebuilt, and additional capacity will also be secured by the introduction of the duplex process next year.

DORMAN, LONG & COMPANY, LIMITED—Ore handling and ore preparation facilities have been installed. Good progress is being made with the new melting shop at Lackenby, which should come into production early next year. A new open hearth furnace has been installed at Acklam.

JOHN LYSAGHT, LIMITED—Reorganization of the Scunthorpe Works is now virtually complete. A new blast furnace and additional coke ovens are now in production and the melting shop reconstruction has been completed.

RICHARD THOMAS & BALDWINS, LIMITED—At Redbourne the reconstruction of the blast furnace plant has been completed. At Ebbw Vale the rebuilding and enlargement of one of the blast furnaces is nearly complete. A new open-hearth furnace has been built and another started.

STEEL COMPANY OF WALES, LIMITED—New ore unloading equipment, three blast furnaces, and a new coke oven battery have been installed and are now operating. A new melting shop at Abbey Works and a new slabbing mill and 80-in. continuous hot strip mill, are now in operation.

STEWARTS AND LLOYDS, LIMITED—At Corby, a new open hearth shop has been completed, a new ore preparation plant installed, and additional coke ovens have been provided. Installation of a new melting shop and pilger mill at Clydesdale is now complete. Improvements are being made in the melting shop at Bilston where work has also commenced on a new high-top pressure blast furnace.

JOHN SUMMERS & SONS, LIMITED—Good progress has been made with conversion of these works into a fully integrated plant. A new coke oven battery is now coming into production and the first of two large blast furnaces will be blown in early in the new year. Production is already taking place in the new melting shop and additional capacity has been provided.

TAYLOR BROS. & COMPANY, LIMITED—The modernization and reconstruction of the railway wheel plant has now been completed.

THE UNITED STEEL COMPANIES, LIMITED—At Appleby-Frodingham additional coke oven capacity has been provided and there has also been a considerable expansion of ore preparation and sinter plant. Two blast furnaces have been enlarged to 25 ft. hearth diameter and work is proceeding with the erection of two large additional blast furnaces. The coke ovens have been replaced and the by-product plant extended at Orgreave.

No Gloves—Heavy Damages

A Paisley man, John Cunningham, has been awarded £250 in a damages action against his employers, Scottish Precision Castings, Limited, Glasgow. Cunningham, who originally sued for £1,000, said that in November, 1949, he was instructed to leave his normal machine and operate a bandsaw to trim castings, which he alleged, were covered with sharp projections. He said no gloves were available to protect his hands, which received many small cuts. A few days later blisters developed, and he had to stop work the following month because of dermatitis. The company, he claimed, failed to provide proper equipment. They, in turn, denied liability and said he had been issued with gloves and if he did not use them it was his own fault.

Silica-free Enamels *

By B. K. Niklewski, M.Ph., M.S., D.Sc. and R. H. Ashby, B.Sc.

The development of enamels maturing at low temperatures, particularly for aluminium, has focused the attention of research workers on low-silica enamels. Many efforts to produce lead-free enamels for aluminium directed research towards the field of phosphate glasses. Again, efforts to produce white enamels with adherence to iron led to the investigation of many unusual compositions. Those compositions containing high proportions of phosphoric, boric and aluminium oxides seemed to hold most promise, so the aim of this work was to cover more ground in this rather new, and unexploited, field of enamel composition.

Literature

Phosphate glasses are well known in glass literature. W. A. Wey[1] reviewed glass compositions with phosphoric oxide (P_2O_5) as a major glass-forming constituent. Early phosphate glasses date from the end of the last century, developed by E. Abbé and O. Schott.

Modern glass technology uses glasses high in phosphoric oxide for special purposes, such as heat-absorbing glasses, glasses transparent to ultra-violet light, glasses resistant to hydrofluoric acid and special optical glasses of high refractive index and low density. It was towards this group of compositions that enamel research workers turned their efforts.

Karl Kautz,[2] in his study of molybdenum in enamels, suggested for use as low-temperature enamels an alumino-phosphate type of glass containing aluminium oxide (Al_2O_3), 17.75 per cent., and phosphoric oxide (P_2O_5), 37.10 per cent.

W. J. Baldwin[3] developed enamels of high opacity, having a reflectance of 80 to 85 per cent. at an application weight of 40 gm. per sq. ft. These enamels contained 10.2 per cent. P_2O_5, 15 per cent. Al_2O_3, with only 5 per cent. TiO_2 and 6 per cent. ZrO_2 (zirconium oxide).

H. D. Prior[4] received a Patent for an enamel opacified by ZrO_2 containing 22 to 25 per cent. P_2O_5 and 7 to 15 per cent. SiO_2. J. W. Donahey, G. J. Morris and B. J. Sweo[5] have developed lead-free enamels for aluminium, using as a base, alkali-alumina-boro-phosphate glasses. L. R. Blair and M. D. Beals[6] have made a systematic study of simple, five-component enamels containing Na_2O, P_2O_5, Al_2O_3 B_2O_3, TiO_2. Their variations were made on a molecular basis. The very promising results obtained by Blair and Beals called for further investigation, and the use of methods of application customary in the enamelling industry.

Technical Procedure

A simple composition was chosen, in which three components P_2O_5, Al_2O_3, B_2O_3 could be varied in a triaxial diagram, while remaining components were kept constant. After a study of the results obtained by Blair and Beals, the following percentage composition was chosen as a basis for the investigation:—

TiO_2	.. ..	8
Na_2O_3	.. .. ..	18
P_2O_5, Al_2O_3, B_2O_3	Variable to	74
		—
		1
		—

It was decided to vary the composition weight for weight, and to use standard methods for the preparation and application of enamel slips. Blair and Beals's method was to air-cool the glass, dry-grind to pass 200-mesh sieve, and then set-up for spraying.

Fig. 1 shows the 50 enamel compositions smelted after systematic variation in the triaxial diagram. The field of attention gradually narrowed as the investigation went on.

Preliminary smelts to find the most promising compositions were made from batch weights of 650 gm. and 2,000 gm. in fireclay crucibles. The most promising compositions were smelted in a small rotary furnace from batch weights of 60 lb. Raw materials used were:—

Source

P_2O_5—Dehydrated monosodium-ortho-phosphate,
Al_2O_3—Dried aluminium hydroxide,
B_2O_3—Dehydrated borax: boric acid,
Na_2O—Borax: sodium nitrate: soda ash.
TiO_2—Commercial titanium oxide.

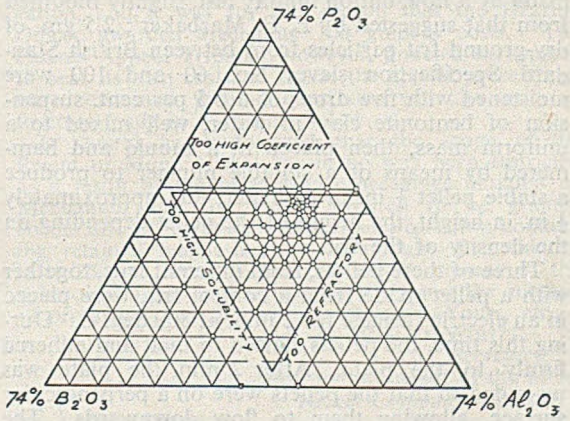


FIG. 1.—*Composition Diagram of Fifty Enamels prepared Systematically on the Basis of a Triaxial Arrangement.*

* Paper presented to the Annual Meeting of the Institute of Vitreous Enamellers in London.

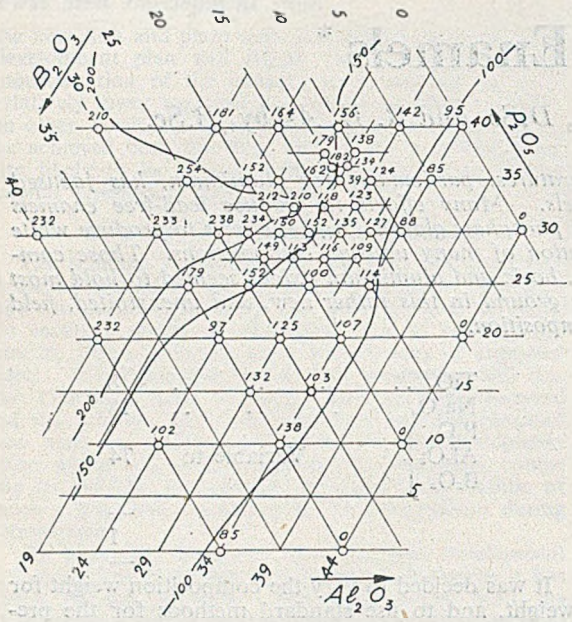


FIG. 2.—*Fluidity Data obtained by the Pellet Tests arranged according to the Ternary Diagram. Only a portion of the Original Range was investigated.*

Raw materials were well mixed, and charged into the furnace at 1,100 to 1,150 deg. C., and smelted until a smooth, clear thread could be obtained; the glass was fritted by quenching in water. All frits were wet-ground in small ball mills of 2-lb. capacity with the following mill additions:—

Frit, 100.0; white clay, 4.5; bentonite, 0.5; sodium nitrite, 0.5; sodium aluminate, 0.1; water, 32.0. A fineness of 2 gm. residue on a 200-mesh sieve from a 50-c.c. sample of slip was obtained.

Small ground-coated sheet-iron plates were sprayed to an application weight of 40 gm. per sq. ft., dried, and fired at 780 deg. C. for 3 min. in a small electric muffle furnace. Comparisons of fusibility were made by a flow-button fluidity test, slightly modified from that suggested by E. E. Marbaker[7]; 2.5 gm. of dry-ground frit particles from between British Standard Specification sieves Nos. 60 and 100 were moistened with five drops of a 0.5 per cent. suspension of bentonite clay in water, well mixed to a uniform mass, then placed in a mould and hammered by means of a suitable plunger to produce a stable pellet $\frac{1}{4}$ in. in diameter, and approximately $\frac{1}{2}$ in. in height, the height of the pellet depending on the density of the frit.

Three of these pellets, from different frits, together with a pellet made from a control frit, were placed in an electric furnace for 2 min. at 800 deg. C. During this time, the pellets started to melt and adhered firmly to the plate. After 2 min. the plate was up-ended so that the pellets were on a perpendicular surface, allowing them to flow downwards. The plate was removed from the furnace 6 min. after moving the pellets to the vertical position.

As control frit, which remained standard throughout the investigation, a standard sheet-iron frit, fully maturing at 800 deg. C. was used. In computing the results (see Fig. 2), the length of flow of the control pellet was scaled to 100, and the measured flow of each frit under test was expressed in the same unit.

An exhaustive investigation carried out by Plankenhorn[8] shows that this test gives reproducible results from one test to another, the length of flow being affected by only two variables:—(1) Composition of frit, and (2) time/temperature schedule of heating.

Measurements of reflectance were made with an E.E.L.[9] reflectometer using a green filter. The results are shown in Fig. 3. The appearance of samples are also shown, as matt, semi-matt, or gloss, by initial letters, as estimated by visual comparison with a commercial titanium white enamel.

Discussion of Results.

Fig. 1 shows a triaxial diagram on which all smelted compositions are plotted, and on which is marked the area of most promising compositions. This area is limited as follows:—

(1) High B_2O_3: too high water-solubility, leading to excessive blistering or boiling on firing.
(2) High P_2O_5: too high coefficient of thermal expansion, leading to surface cracks.
(3) High Al_2O_3: too refractory.

As the investigation went on, showing the area of best results, smaller variations were made, thus covering the diagram more densely.

Fig. 2 shows a section of Fig. 1 on a larger scale. Fluidity figures computed from flow-button tests are plotted on this figure. Fig. 3 shows reflectance data and observations on the surface appearance of samples.

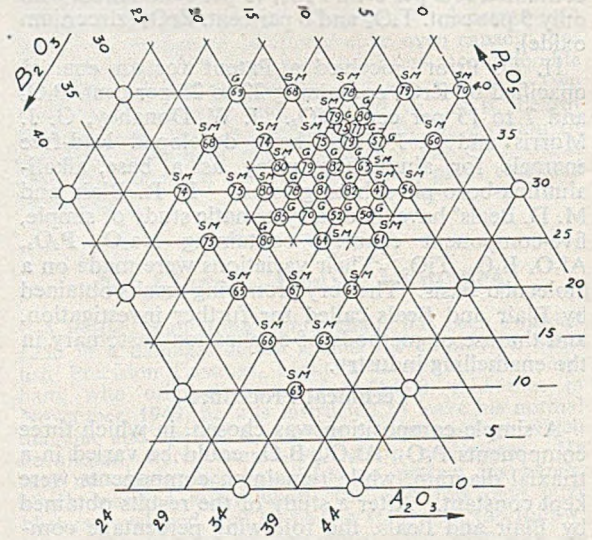


FIG. 3.—*Ternary Compositional Diagram rearranged to show Reflective Value and Gloss Observation Data, (nomenclature:—G = Gloss, SM = Semi-matt and M = Matt). Again, only the Restricted Range was investigated.*

The enamels showing best results have good acid-resistance, high opacity with low titanium-oxide content: (8 per cent. compared with 15 to 20 per cent. in commercial titanium-oxide opacified enamels) and a high coefficient of thermal expansion. The latter feature is very welcome for a number of applications in the enamelling industry. The field for further research in low-silica-containing and silica-free enamels is vast, since the influence of many oxides and also fluorides, on the properties of this type of enamel are still unknown.

Summary

Fifty enamel compositions were studied by systematic variation in the ternary system P_2O_5, Al_2O_3, B_2O_3. The composition investigated was:—

Na_2O 18: TiO_2 8: ($P_2O_5 + Al_2O_3 + B_2O_3$) 74.

Measurements of the fluidity, reflectance and gloss were made. Enamels of good workability, high reflectance and acid-resistance were developed.

REFERENCES

[1] Weyl, W. A. "Phosphate Glasses." *Chem. Eng. News*, 1949, April, 27, p. 1048.
[2] Kautz, K. "Molybdenum in Enamels—IV, White Molybdenum Enamels." *J. Am. Ceram. Soc.*, 1945, 28, p. 82.
[3] Baldwin, W. J. "Super-opaque Enamels of Low Silica Content." *ibid*, 1948, 31, p. 115.
[4] Prior, H. D. (Assignor to Titanium Alloy Manufacturing Company). "Super-opaque Enamel," U.S. Patent 2,436,825, March, 1948.
[5] Donahey, J. W., Morris, G. J., and Sweo, B. J. "Phosphate Base Glasses as Enamels for Aluminium and its Alloys." *Finish*, 1951, August and September.
[6] Blair, L. R., and Beals, M.D. "The System Na_2O—P_2O_5—Al_2O_3—B_2O_3 as a Possible Base for Low-temperature Titania-opacified Porcelain Enamels." *J. Am. Ceram. Soc.*, 1951, 34, p. 110.
[7] Marbaker, E. E. "Improvements in the Button Test for Determination of Frit Fluidity. *ibid*, 1947, 30, p. 354.
[8] Plankenhorn, W. J. "Factors Affecting Reproducibility of Flow Button Test." *ibid*, 1948, 31, p. 338.
[9] E.E.L. Reflectometer manufactured by Evans Electroselenium, Limited.

I.L.O. Situation Vacant. Through the International Labour Organization, a foreman and instructor is required for a nine-month period in Zagreb, Jugoslavia, to help in the running of a large steel foundry. Particulars are available from Mr. E. J. Toogood, the Ministry of Labour and National Service, at 32/33 St. James's Square, London, S.W.1. For such a short-term appointment it might be desirable for an applicant to secure leave of absence from his present employers.

Recording Balances.—New recording balances of industrial design have recently been developed in France, and Griffin & Tatlock, Limited, Kemble Street, Kingsway, London, W.C.2, have been appointed exclusive agents for the British Commonwealth by the makers, the Testut concern, of Paris. The balance draw a weight/time curve on a drum 150 mm. high by 240 mm. circumference. Strip recording charts are available for panel mounting. The sensitivity may be made as high as 1 mg. per mm. The time axis is determined according to the particular application, *e.g.*, one revolution of the drum in 1, 2, 4, 6, 12, 24 hours, etc. The balances may be adapted for use with high-temperature furnaces in controlled atmospheres for recording the weight change of specimens, and for studying chemical reactions. They can also be supplied for use with low-temperature ovens. A weight/time curve is normally recorded, but means can be provided for recording weight/temperature curves for special applications, *e.g.*, thermo-analysis of metals and alloys.

New Patents

The following list of patent specifications accepted has been taken from the "Official Journal (Patents)." The numbers given are those under which the Specifications will be printed and all subsequent proceedings will be taken. Applications for copies of the full Specifications (2s. 8d. each, post free) should be made to the Patent Office, 25, Southampton Buildings, Chancery Lane, London, W.C.2.

685,075 INTERNATIONAL ALLOYS, LIMITED. Production of metal castings.
685,083 MOND NICKEL COMPANY, LIMITED. Cast iron.
685,182 DEUTSCHE EDELSTAHLWERKE AKT.-GES. Casting metal.
685,264 ISTHMIAN METALS, INC. Powder metallurgy.
685,271 BADISCHE ANILIN- & SODA-FABRIK. Production of iron powder.
685,299 MATTHEWS REFRACTORIES, LIMITED, and MATTHEWS, C. Corrosion and heat-resisting coatings.
685,325 HUTTENWERK OBERHAUSEN AKT.-GES. Manufacture of steel.
685,326 INLAND STEEL COMPANY. Manufacture of steel.
685,328 KOPPERS COMPANY, INC. Coke-oven pusher machine having an articulated pusher ram.
685,338 MEEHANITE METAL CORPORATION. Adding material to molten metals.
684,323 GIZEU, J. M., and LOZA, E. Fuel-saving and soot- and grit-eliminating device.
684,325 MARTIN & SONS, LIMITED, C. W. Solid-fuel combustion apparatus.
685,082 CZECHOSLOVAK HEAVY ENGINEERING WORKS, and CERMAK, J. Furnace adapted for the combustion of small solid fuel, particularly pulverized fuel.

Correspondence—*Continued from page 4*

in cast iron manufacture, and which reads as follows:—

> "In none of the prior processes, however, is there any direction that magnesium is to be retained in the iron as cast or any suggestion that it can act to form spheroidal graphite."

Any reader of the letter in question may have gained the impression that substantial costs were awarded to Meehanite. The fact is that during the long proceedings before the Patent Office, the Patent was strengthened by a number of amendments submitted by Mond Nickel by way of clarification of the specification, and it was for this reason that the Hearing Officer awarded Meehanite 100 guineas costs. The Patents Appeal Tribunal, however, directed each party to bear its own costs, so far as the appeal proceedings were concerned, without interfering with the order as to costs made in the Court below.

It should be emphasized that the scope of the Patent of Mond Nickel has in no way been restricted as a result of the opposition proceedings initiated by Meehanite, and the Patent ordered to be granted covers alloyed or unalloyed graphitic cast iron containing retained magnesium in an amount such that at least 25 per cent. of the graphite is present in the spheroidal form in the iron as cast, and the method of producing such improved cast iron.—Yours, etc.,

F. B. HOWARD-WHITE,
Secretary,
For and on behalf of the Mond Nickel Company, Limited.

Sunderland House,
Curzon Street,
London, W.1.
December 24, 1952.

Imports and Exports of Iron and Steel in November

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in November. Figures for the same month in 1951 are given for the purpose of comparison, and totals for the 11 months of 1952 and of 1951 are also included. (All figures in tons.)

Total Exports of Iron and Steel by Destination

Destination.	Month ended November 30.		Eleven months ended November 30.	
	1951.	1952.	1951.	1952.
Channel Islands	781	653	8,214	6,333
Gibraltar	77	46	782	1,502
Malta and Gozo	95	179	2,842	2,077
Cyprus	379	1,141	4,467	6,678
Sierra Leone	650	412	5,049	4,020
Gold Coast	2,246	5,105	17,596	36,051
Nigeria	3,473	5,329	48,626	46,068
Union of South Africa	5,984	11,822	117,993	124,309
Northern Rhodesia	987	3,708	15,018	27,706
Southern Rhodesia	1,878	2,480	34,250	50,280
Tanganyika	1,475	2,585	16,104	20,353
Kenya	5,151	5,068	45,112	42,379
Uganda	667	1,219	5,734	6,879
Mauritius	416	998	6,044	5,763
Bahrein, Qatar, and Trucial Oman	1,214	2,320	7,264	18,198
Kuwait		2,515		14,701
India	6,225	7,408	81,418	69,766
Pakistan	3,696	2,816	67,040	61,556
Malaya	6,507	8,058	68,246	72,424
Ceylon	1,200	1,235	24,039	20,334
North Borneo	280	132	4,279	3,427
Hongkong	2,065	3,838	46,009	24,636
Australia	22,889	22,676	296,424	274,234
New Zealand	11,573	13,787	99,801	136,870
Canada	20,661	17,156	255,103	175,882
Jamaica	4,532	2,279	19,947	25,258
Trinidad	1,746	4,005	34,706	42,874
British Guiana	439	582	4,923	5,240
Anglo-Egyptian Sudan	660	1,866	9,064	18,216
Other Commonwealth	2,609	5,472	22,530	34,224
Irish Republic	7,702	7,581	76,245	60,585
Soviet Union	—	—	2,258	2,041
Finland	6,036	4,539	40,166	46,991
Sweden	11,358	9,525	107,160	104,308
Norway	3,998	6,797	55,853	58,950
Iceland	219	173	2,463	2,668
Denmark	8,150	6,203	73,452	68,496
Poland	101	34	748	167
Germany	30	329	1,071	1,701
Netherlands	4,565	14,510	77,652	99,679
Belgium	1,130	1,183	10,899	8,409
France	334	777	5,002	4,461
Switzerland	560	1,265	9,025	9,013
Portugal	486	1,229	11,539	9,102
Spain	690	1,613	4,298	8,615
Italy	1,658	8,122	30,278	18,859
Austria	20	80	405	550
Yugoslavia	37	384	7,369	4,399
Greece	94	262	2,356	3,195
Turkey	529	1,163	5,647	8,207
Netherlands Antilles	333	1,062	8,155	14,893
Belgian Congo	68	355	1,905	2,789
Angola	73	1,157	1,822	3,856
Portuguese E. Africa	142	263	3,041	4,287
Canary Islands	308	79	1,849	686
Syria	28	102	4,521	1,988
Lebanon	1,351	738	14,548	9,501
Israel	2,585	1,556	28,989	13,865
Egypt	1,670	2,556	36,861	32,604
Morocco	23	26	1,391	239
Saudi Arabia	819	357	2,147	6,779
Iraq	1,128	5,537	23,290	46,731
Iran	650	842	58,040	9,258
Burma	666	886	12,950	11,214
Thailand	1,086	2,206	14,199	12,280
Indonesia	930	1,086	9,418	14,954
China	10	11	4,623	290
Philippine Republic	671	544	3,578	4,586
U.S.A.	3,513	940	131,194	44,327
Cuba	116	175	3,596	2,036
Colombia	1,024	740	8,158	4,264
Venezuela	1,450	9,414	37,940	45,798
Ecuador	41	232	2,242	3,752
Peru	294	718	11,012	7,783
Chile	1,452	392	8,343	2,980
Brazil	2,905	237	21,540	19,590
Uruguay	153	40	10,005	4,037
Argentina	1,688	2,162	38,997	32,027
Other foreign	2,088	2,734	16,985	22,499
TOTAL	194,616	243,196	2,416,948	2,280,213

Total Imports of Iron and Steel and Origin

From	Month ended November 30.		Eleven months ended November 30.	
	1951.	1952.	1951.	1952.
India	2	255	14	531
Canada	4,097	22,918	45,751	156,909
Other Commonwealth countries and the Irish Republic	292	4,480	1,864	10,020
Sweden	1,851	2,425	19,876	27,153
Norway	3,525	5,546	46,268	59,515
Germany	5,799	5,570	36,263	102,288
Netherlands	5,677	8,071	69,930	148,003
Belgium	26,209	20,888	174,437	277,853
Luxembourg	3,723	15,656	76,007	170,102
France	31,955	35,630	243,127	304,431
Austria	44	30,662	19,083	227,227
U.S.A.	5,748	34,361	44,907	546,575
Other foreign countries	6,786	5,480	13,376	215,450
TOTAL	95,708	200,948	790,993	2,246,057
Iron and steel scrap and waste, fit only for the recovery of metal	54,162	56,495	565,064	649,276

Total Exports of Iron and Steel by Group

Product.	Month ended November 30.		Eleven months ended November 30.	
	1951.	1952.	1951.	1952.
Pig-iron	323	514	15,605	3,967
Ferro-tungsten	12	—	387	92
Other ferro-alloys	617	159	2,389	2,940
Ingots, blooms, billets, and slabs	87	4	5,259	155
Iron bars and rods	373	188	7,901	3,073
Steel and tinplate bars and wire rods	128	322	11,286	1,370
Bright steel bars	1,289	2,423	27,754	14,745
Alloy steel bars and rods	1,365	1,544	15,023	14,805
Other steel bars and rods	8,856	11,726	156,802	106,850
Angles, shapes, and sections	8,039	12,021	142,556	118,365
Castings and forgings	1,391	872	11,825	10,582
Girders, beams, joists, and pillars (rolled)	3,094	3,546	35,053	31,429
Hoop and strip	5,411	11,852	69,827	51,007
Iron plates and sheets	24	19	1,732	384
Tinplate	17,418	27,714	213,627	269,181
Tinned sheets	122	233	2,176	1,882
Terne plates and decorated tinplates	83	48	1,478	816
Other steel plate (⅛ in. thick and over)	25,741	24,324	247,533	219,540
Galvanized sheets	4,388	9,057	50,284	59,548
Black sheets	8,437	16,142	135,978	129,069
Other coated plates and sheets	302	1,064	7,460	10,415
Cast-iron pipes up to 6 in. dia.	9,995	7,389	78,306	79,915
Do., over 6 in. dia.	7,975	5,754	66,104	61,486
Wrought-iron tubes	26,003	39,970	355,403	391,819
Railway material	11,640	14,881	194,730	186,604
Wire	4,925	4,573	54,484	47,167
Cable and rope	2,349	3,081	26,812	28,357
Wire nails, etc.	1,445	846	23,728	10,659
Other nails, tacks, etc.	385	355	3,850	4,160
Rivets and washers	543	726	6,946	6,196
Wood screws	454	290	3,850	3,479
Bolts, nuts, and metal screws	2,542	1,699	26,287	20,604
Baths	1,232	472	13,499	11,033
Anchors, etc.	810	676	8,490	8,875
Chains, etc.	1,097	642	10,463	9,288
Springs	744	443	6,162	5,004
Holloware	3,917	2,896	32,838	32,735
Doors and windows	1,498	1,885	19,078	19,463
TOTAL, including other manufactures not listed above	194,616	243,196	2,416,948	2,280,213

Personal

Mr. J. WILKINSON, chief metallurgist of the Yorkshire Copper Works, Limited, Leeds, is to receive the honorary degree of Master of Science from Leeds University.

MR. G. W. RILEY, director of George Scott & Ernest Scott & Company, Limited, has been appointed to the board of Henry Balfour & Company, Limited, engineers, Leven.

MR. J. HOWDEN HUME has been unanimously re-elected president for a further year at the annual general meeting of members of the Scottish Engineering Employers' Association.

MR. FRASER YORKSTON, outdoor commercial representative of Jones & Campbell, Limited, Torwood Foundry, Larbert, has retired after 54 years' service, and has received an easy chair from the directors, staff and colleagues.

MR. W. BYNG KENRICK, chairman of Archibald Kenrick & Sons, Limited, ironfounders, of West Bromwich, has been presented with a leather-bound illustrated album by the staff of the company on the occasion of his 80th birthday.

MR. K. P. JAMES, who was works manager with Blackstone & Company, Limited, engineers, of Stamford (Lincs), since 1949, has been appointed manager of Tredomen engineering works, Ystrad Mynach (Glam), of the South-Western Divisional Coal Board.

MR. HERBERT E. CLIVE, who retired at the end of the year from the post of managing director of Marston-Excelsior, Limited (I.C.I.), Wolverhampton, was presented on December 22 with a silver coffee pot on behalf of the staff. Mr. Clive has completed 43 years' service with the Group.

AT A LUNCHEON given at the Waldorf Hotel, London, on December 16, two retiring branch managers of British Insulated Callender's Cables, Limited, Mr. R. S. Gough, of Bristol, and Mr. T. R. Thomas, of Cardiff, were presented with a cheque which had been subscribed to by their many colleagues in the Company.

MR. G. H. THOMAS has signified his desire to retire as managing director of Massey-Harris, Limited, Manchester. MR. LIONEL HARPER has been appointed managing director in his stead. He has been a member of the organization for 25 years, 16 of which have been spent in the British business, latterly as assistant managing director in charge of sales.

SIR ERNEST CANNING announced on December 22 that from January 1 he will relinquish the position of joint managing director of W. Canning & Company, Limited, but will continue to be chairman of the board of directors. Sir Ernest joined the firm 60 years ago and has been responsible for building it up from a workshop with 19 employees to the present business employing over 2,000 workers. Mr. G. A. Pope has been appointed deputy chairman from January 1 and will continue as joint managing director.

ATLAS DIESEL COMPANY, LIMITED, have announced the appointment of Mr. J. A. Perham as managing director. Mr. Perham succeeds Mr. E. B. F. Johnsson, who has been appointed managing director of Swedish Atlas Compressed Air, Limited, the Swedish sales organization of A.B. Atlas Diesel. Mr. Perham was formerly general sales manager of the associate company, Canadian Copso, Limited, of Montreal. He is 36 yrs. old, born in Montreal, and graduated from McGill University in 1938 with a Bachelor of Engineering Degree in Mining. After graduation, Mr. Perham was employed by the International Nickel Company, of Canada, as a miner, supervisor and efficiency engineer. From 1945 until 1949, he was mine superintendent of Senator-Rouyn, Limited, a goldmine in Northern Quebec, and, in 1949, joined the Atlas Diesel organization when Canadian Copco, Limited, was incorporated.

Obituary

MR. ERNEST TWIGG, managing director of Robert Jenkins & Company, Limited, died in a Rotherham nursing home on December 16 at the age of 64.

MR. DAVID ALLEN GORRIE, principal of David Gorrie & Sons, engineers, of Perth, which firm made petrol tanks for airships in the first world war and component parts for fighter aircraft in the second, died on December 23.

MR. ERNEST GEORGE CRAYTHORN, who died at his Birmingham home on December 22, was widely known in Midland engineering trades. Early in the last war, he adapted brassfounders' lathes so that these would do the work of capstan lathes, and he was responsible for the production of about one million components for various types of aircraft. Until his retirement five years ago, he had been associated for 50 years with Harcourts, Limited.

MR. GEORGE A. LISTER, who was well known in Midland industry, died on December 19 at the age of 73. Birmingham born, he was during the early years of the century, lecturer in the electrical engineering department at Birmingham University but in 1908 he founded the firm Morris & Lister with his colleague, the late Dr. D. K. Morris. Later the firm changed its name to M.L. Magneto Syndicate, Limited, and in 1930 the firm was acquired by Joseph Lucas, Limited.

MR. JAMES D. FRAME, of Glasgow, who has died, was a well-known non-ferrous founder in the West of Scotland. He had 55 years' service in the trade, 43 of them as foreman of the brass foundry of the North British Locomotive Company, Limited, at their Hyde Park Works, Glasgow. A keen metallurgist, he had lectured extensively on the various aspects of non-ferrous founding and was one of the oldest members of the West of Scotland Foremen Engineers' and Draughtsmen's Association. Mr. Frame retired in November, 1948.

WE REGRET to record the death of MR. IAN ROSS, director of Ian Ross Castings, Limited, of Slough, who died on December 28. During the war, Mr. Ross was foundry manager at High Duty Alloys, Limited, where he made some of the largest magnesium castings for the aircraft industry. He described his techniques in a Paper which he presented to the London branch of the Institute of British Foundrymen in 1943. This awoke his interest in the Institute and greatly assisted the formation of the Slough section of which he was an early president. After the war, he established himself in business as an ironfounder, where he quickly created a concern of quite sizeable proportions. For the last three or four years, he did not enjoy good health, but he never allowed this to damp his interest in co-operative technology, or trade associations. His rather shy demeanour, masked a personality full of drive and initiative. The funeral takes place this afternoon at St. Mary's, Langley, when the London branch will be represented by Mr. F. A. Wilson and others.

News in Brief

ONE HUNDRED AND THIRTY PEOPLE attended the children's party of the 18-ft. spun-plant department of Stanton Ironworks.

FOUR HUNDRED employees of R. & A. Main, Limited, Falkirk, are working a four-day week due to a shortage of orders.

PERMISSION is being sought by Brass Founders (Sheffield), Limited, Scotland Street, Sheffield, 3, to erect a new foundry and office block on a site at Carlisle Street and Gower Street, Sheffield.

MR. LOW, Parliamentary Secretary, Ministry of Supply, has said that companies controlled by the Iron and Steel Corporation of Great Britain accounted for 22.1 per cent. of the total output of iron castings in 1951.

THREE EMPLOYEES of Dean, Smith & Grace, Limited, lathe manufacturers, Keighley—Mr. Sam Holmes, Mr. Ernest Heaps and Mr. Frank Kelly have received cheques from the directors to mark over 50 years' service with the firm.

THE OVERFLOWING of molten metal from a furnace setting light to other inflammable material led to a fierce blaze at the works of G. Bramall (Tungsten), Limited., Peter Street, Sheffield, on December 23. It is stated that production will not be held up.

THE SHOP STEWARDS' annual dinner and social evening, of the Sheepbridge Engineering Limited, was attended by 400. Among those present were Mr. S. Barber and Mr. E. Neale, personnel managers respectively of Sheepbridge Engineering Limited and Sheepbridge Company, Limited.

EIGHT LARGE CHRISTMAS TREES, decorated with lights, were sent by employees of I.C.I. Metals Division, Kynoch Works, Witton, Birmingham, to children's homes, hospitals and other institutions in the Birmingham district. More than £800 was collected and each tree was accompanied by hundreds of gifts.

PROFESSOR S. C. REDSHAW, of Birmingham University, has collaborated with Aluminium Construction Limited, Woking, to design a self-supporting, tapered aluminium chimney which can be built to a considerable height. It is calculated that the time required to erect a 300 foot aluminium chimney will be about three months after the foundation is cast and that the chimney will not weigh more than 100 tons.

ALUMINIUM MODELS have been made so that Birmingham may see the design of the four new pieces of civic plate commissioned by the Museum and Art Gallery Committee of Birmingham City Council, which will later be made in a precious metal at a cost of about £350. The pieces, which make a coffee set, were designed by Mr. R. G. Baxendale, principal of the Birmingham School for Jewellers and Silversmiths.

THE 1,500 MEMBERS of Carron Works Recreation Club, Falkirk, were last month given the custody for all time of large new premises handsomely equipped and artistically decorated. The building, which is near the works, is 90 ft. long and 70 ft. wide, and was provided by the managers of Carron Company. Half of the premises are to be used for indoor recreation, and half as a concert hall, with seating accommodation for about 400. Nearby is a large piece of ground for cricket, football, and other sports.

PLEADING GUILTY to paying £729 10s. 9d. for 13 tons, 16 cwt., 1 qr. of steel when the maximum controlled price was £454 14s. 3d., the Goodyear Tyre & Rubber Company (Great Britain), Limited, Wolverhampton, was fined £60 with costs and their two employees, the chief buyer and the engineering buyer, £7 each, at the Wolverhampton Stipendiary Court on December 19. Defending, Mr. K. Mynett said that the steel was used to build extensions to the company's premises, failure to do which would have resulted in a breach in an American contract which brought to Britain 237,000 dollars.

LAST WEEK, as is their custom, the directors of Tyseley Metal Works Limited, entertained the staff at a Christmas luncheon. This year's occasion took a very unexpected turn, in that advantage was taken of the event to make presentations of gold wristlet watches to several employees with over 25 years' service—Mr. A. L. Partlam (34 years); Mr. S. W. Wilkes (31 years); Mr. A. A. A. Hunt (30 years); Mr. H. J. Warner (30 years); Mr. E. Woodgate (28 years); Mr. W. Jones (27 years) and Mr. W. M. Rothwell (27 years). The presentations were made by Mrs. G. W. Booth. The works manager (Mr. H. J. Warner), and chief chemist (Mr. A. A. F. Hunt) thanked the directors most warmly on behalf of the recipients.

DESPITE the latest national award of 7s. 4d. a week which became operative throughout the British engineering and allied industries on November 10, David Brown & Sons (Huddersfield), Limited, the parent company of the David Brown Group, engineers and makers of tractors, have circularized some 1,800 of their principal customers informing them that the company has decided not to increase the prices of its standard products. The parent company, announcing this decision, has stated that an examination of their trading account clearly suggested that prices ought to be increased in order to meet this latest additional cost, but in view of the trading conditions affecting the many British industries using their products they have considered it their duty to give maximum help toward the solution of these problems.

MR. G. A. SAWBRIDGE, works manager of the Coventry Gauge & Tool Company, Limited, Brechin, said on Friday that although the danger of war seemed to be receding, the sellers' market of the past few years was also receding and almost disappearing. Mr. Sawbridge was speaking at the annual dinner/dance of the Coventry Gauge apprentices, and said they could not sell unless the material was good and reasonably priced. He wanted them to realize that the matter rested upon people like themselves working harder. Mr. Sawbridge presented awards from the firm to three apprentices who gained City & Guilds Certificates this year—Eric E. Muir (first class), Alex. W. Goodall (second class), Ian Lindsay and Robert Kennedy (intermediate second class). Awards of merit were also presented to over 40 apprentices.

IT WAS REPORTED by the General Purposes Committee of the Council of Birmingham Chamber of Commerce on December 22, that the Department of Engineering Production at Birmingham University is to assess what use Midland industry is making of the sources of technical information, with the object, if possible, of improving the lines of communication between industry and sources of technical and scientific information. The Committee also reported on a scheme by which, for three months last summer, manufacturing members of the Chamber were invited to submit technical questions for consideration by a panel of the Midlands Advisory Council on Industrial Productivity in conjunction with the University's Department of Engineering Production. Twenty-eight firms submitted questions on such topics as metal corrosion, metal spinning, die-casting, adhesives, quality control, high-speed machining and bearing materials. Most of the questions had been referred to sources of technical information, and the replies passed to the enquirer.

Raw Material Markets

Iron and Steel

Most of the foundries closed on Christmas Eve and reopened on Monday, but some were closed for the whole of last week. With order-books as they are the extended holiday did not affect production seriously and allowed additional time to carry out repairs. There is little change to report so far as business is concerned; the demand for castings fluctuates, some foundries being more adversely affected than others by the recession.

A number of the jobbing foundries, which cater for many trades, report that they have fairly satisfactory order-books, and those producing castings for colliery equipment are busy.

The recent relaxation in import restrictions by the Australian Government has benefited some of the light foundries producing heating and cooking stoves and pipes, and foundries catering for the building trades have a fair amount of work, with promise of further expansion in view of the Government's "licence-freeing" plan. There is little, if any, improvement in the demand for castings for household equipment. Generally, the foundries producing castings for the motor, tractor, and Diesel engine trades are short of work, and until more markets reopen abroad the future will continue to be uncertain.

Pig-iron production is maintained at recent levels, the major proportion still going to the steelworks, which are using a much larger percentage of pig-iron in their mixtures in the absence of scrap. Outputs of the low- and medium-phosphorus irons are taken up by the foundries. These grades have for some time been insufficient, but are now more in keeping with demands. Some foundries, better placed for business than others, could take larger quantities, as, apart from preferring these grades, additional supplies would avoid the necessity of making good the shortage by purchasing higher-priced irons. Hematite is in better supply, and the foundries are absorbing available tonnages after the requirements of the steelworks have been satisfied.

Refined irons are not now so heavily in demand, and some tonnage is being shipped abroad.

In addition to the Derbyshire furnace recently blown in for the production of high-phosphorus iron, another was put into blast in the same area this week, and a third is expected to be brought into production shortly. Providing all these furnaces are burdened for high-phosphorus pig-iron, this will add a further 4,000 to 5,000 tons a week to present outputs, and unless there is an improvement in demand there is likely to be some to spare.

The re-rollers are receiving a fairly good amount of business from home sources for small sections, bars, and strip, but export business is stagnant and is likely to remain so until British prices are competitive with those of foreign producers.

Makers of finished steel had a considerable tonnage to carry over into 1953, and they are proceeding warily in regard to accepting further commitments.

Non-ferrous Metals

So far as 1952 is concerned, business virtually came to an end on Christmas Eve and, even so, there had not been a lot going on for some days. This week trading has been very quiet, too. In many parts of the country January 1 is observed as a holiday and the Metal Exchange is itself closed, according to the usual custom. While many firms opened again last Monday, there are some where stocktaking is in hand, and that means a reopening probably only on Monday next.

It is not improbable that in some cases manufacturers are not sorry to have an excuse to remain closed for a longer period than usual, since, in some directions, orders have not been coming in too well and there is, therefore, a shortage of work.

On Christmas Eve the Government announced that the system of ceiling prices for brass scrap, ingots, billets, etc., would end on December 31, as well as scrap gilding metal and nickel-silver. The official statement says that this course is made possible through increased supplies of these grades, but some would probably regard this as an understatement, bearing in mind that for a period of several months there has been an ever-growing tonnage of these metals available. In consequence, the ruling prices have not been anywhere near the permitted maxima and the ceiling on brass could have been safely done away with weeks ago.

The lead market, very firm before the holidays, having advanced to £100, has been even firmer this week. For a pre-holiday market trading on Christmas Eve was remarkably active, the turnover being in the neighbourhood of 800 tons. January lead seems to be scarce and before Christmas there was a premium for that month's delivery. It will be noted, too, that the lead market now carries a backwardation, an unfortunate development at this early stage of the venture into free trading. This premium for prompt metal, of course, suggests scarcity, and to the consumers who know that the Government still has thousands of tons of lead available in the country the situation seems to be absurd. Should the squeeze for early lead continue, it is not unlikely that an approach will be made to the Ministry of Materials for the release of more metal. The consumer certainly seems to have a case, for it was understood that the market was being given its freedom because ample supplies were available.

Official prices for refined pig-lead were:—

December—December 23, £100 to £100 5s.; December 24, £101 15s. to £102; December 29, £103 to £103 10s.; December 30, £108 to £108 10s.; *January*-December 31, £107 to £107 10s.

March—December 23, £99 5s. to £99 10s.; December 24, £99 10s. to £99 15s.; December 29, £101 10s. to £102; December 30, £105 to £105 10s.; *April*-December 31, £103 10s. to £104.

Official tin prices were as follow:—

Cash—December 23, £951 to £952; December 24, £951 to £952; December 29, £948 to £950; December 30, £949 to £950; December 31, £946 to £947.

Three Months—December 23, £946 to £946 10s.; December 24, £946 to £946 10s.; December 29, £944 to £945; December 30, £943 10s. to £944; December 31, £942 to £942 10s.

With the expiration of the current contract between the Ministry of Materials and the British Aluminium Company at the end of the year, the arrangement under which the Ministry buys the company's output of virgin aluminium for resale along with imported metal will be discontinued. Most of the metal the company produces will be used in its own works, but the company had agreed to continue to supply to other users who require its metal for special purposes, and such sales will be licensed by the Ministry of Supply in accordance with any distribution scheme for the time being in operation. The company will sell at prices not exceeding the Ministry of Materials' current prices for imported aluminium.

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

(Delivered, unless otherwise stated)

December 31, 1952

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £13 1s. 6d.; Birmingham, £12 15s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £16 8s., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £15 5s. 9d.

Scotch Iron.—No. 3 foundry, £15 19s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £17 14s. 6d. South Zone, £17 17s.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £18 14s. 6d.; South Zone, £18 17s.

Cold Blast.—South Staffs, £18 2s.

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. Coast and N.-W. Coast of England, £16 2s.; Scotland (Scotch iron), £16 8s. 6d.; Sheffield, £17 3s.; Birmingham, £17 9s. 6d.; Wales (Welsh iron), £16 8s. 6d.

Basic Pig-iron.—£13 19s. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered.)

Ferro-silicon (6-ton lots).—40/55 per cent., £57 10s., basis 45% Si, scale 21s. 6d. per unit; 70/84 per cent., £86, basis 75% Si, scale 23s. per unit.

Ferro-vanadium.—50/60 per cent., 22s. to 28s. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 10s. to 11s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £204 to £210 per ton; 38/40%, £235 to £265 per ton.

Ferro-tungsten.—80/85 per cent., 27s. 6d. to 28s. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 30s. 8d. to 35s. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent. C, £85 4s., basis 60% Cr, scale 28s. 3d. per unit; 6/8 per cent. C, £80 17s., basis 60% Cr, scale 26s. 9d. per unit; max. 2 per cent. C, 2s. per lb. Cr; max. 1 per cent. C, 2s. 2½d. per lb. Cr; max. 0.15 per cent. C, 2s. 3½d. per lb. Cr; max. 0.10 per cent. C, 2s. 3¾d. per lb. Cr; max. 0.06 per cent. C, 2s. 4d. per lb. Cr.

Cobalt.—98/99 per cent., 20s. per lb.

Metallic Chromium.—98/99 per cent., 6s. 5d. to 7s. 6d. per lb.

Ferro-manganese (blast-furnace). — 78 per cent., £49 0s. 8d.

Metallic Manganese.—93/95 per cent., carbon-free, £262 to £275 per ton; 96/98%, £280 to £295 per ton.

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

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £25 4s. 6d.; tested, 0.08 to 0.25 per cent. C (100-ton lots), £25 14s. 6d.; hard (0.42 to 0.60 per cent. C), £27 12s.; silico-manganese, £33 8s.; free-cutting, £28 8s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £31 9s.; case-hardening, £31 17s.; silico-manganese, £34 9s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £29 8s.; basic, hard, over 0.41 up to 0.60 per cent. C, £30 8s.; acid, up to 0.25 per cent. C, £31 17s.

Sheet and Tinplate Bars.—£25 3s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £29 14s.; boiler plates (N.-E. Coast), £31 1s. 6d.; chequer plates (N.-E. Coast), £31 3s.; heavy joists, sections, and bars (angle basis), N.-E. Coast, £27 17s.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £31 15s. 6d.; flats, 5 in. wide and under, £31 15s. 6d.; hoop and strip, £32 10s. 6d.; black sheets, 17/20 g., £41 12s. 6d.; galvanized corrugated sheets, 24 g., £52 9s.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £50 18s. 3d.; nickel-chrome, £71 7s. 9d.; nickel-chrome-molybdenum, £79 2s. 6d.

Tinplates.—57s. 1½d. per basis box.

NON-FERROUS METALS

Copper.—Electrolytic, £285; high-grade fire-refined, £284 10s.; fire-refined of not less than 99.7 per cent., £284; ditto, 99.2 per cent., £283 10s.; black hot-rolled wire rods, £294 12s. 6d.

Tin.—Cash, £946 to £947; three months, £942 to £942 10s.; settlement, £947.

Zinc.—G.O.B. (foreign) (duty paid), £110; ditto (domestic), £110; "Prime Western," £110; electrolytic, £114; not less than 99.99 per cent., £116.

Lead.—Refined pig-lead: January, £107 to £107 10s.; April, £103 10s. to £104.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £130 15s.; rolled zinc (boiler plates), all English destinations, £128 15s.; zinc oxide (Red Seal), d/d buyers' premises, £136.

Other Metals.—Aluminium, ingots, £166; magnesium, ingots, 2s. 10½d. per lb.; antimony, English, 99 per cent., £225; quicksilver, ex warehouse, £70 10s. to £71 (nom); nickel, £454.

Brass.—Solid-drawn tubes, 26¾d. per lb.; rods, drawn, 37d.; sheets to 10 w.g., 291s. per cwt.; wire, 32⅞d.; rolled metal, 277s. 9d. per cwt.

Copper Tubes, etc.—Solid-drawn tubes, 32⅜d. per lb.; wire, 317s. 9d. per cwt. basis; 20 s.w.g., 346s. 3d. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £195 to £218; BS. 1400—LG3—1 (86/7/5/2), £205 to £238; BS. 1400—G1—1 (88/10/2), £320 to £375; Admiralty GM (88/10/2), virgin quality, £325 to £380 per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £350 to £385; L.P.Bl, £250 to £275 per ton.

Phosphor Bronze.—Strip, 413s. 3d. per cwt.; sheets to 10 w.g., 435s. per cwt.; wire, 49⅛d. per lb.; rods, 44½d.; tubes, 42⅞d.; chill cast bars: solids 4s., cored 4s. 1d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 2s. 9½d. per lb. (7%) to 3s. 10½d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 3s. 3½d. (7%) to 4s. 4½d. (30%); to 12 in. wide × .056, 3s. 3½d. to 4s. 4½d.; to 25 in. wide × .056, 3s. 5½d. to 4s. 6½d. Spoon and fork metal, unsheared, 3s. 0½d. to 4s. 1½d. Wire, 10g., in coils, 3s. 9¾d. (10%) to 4s. 10½d. (30%). Special quality turning rod, 10%, 3s. 8½d.; 15%, 4s. 2d.; 18%, 4s. 6½d. All prices are net.

*Forthcoming Events**

JANUARY 6

Institution of Production Engineers

Wolverhampton graduate section:—Works visit to Dunlop Rubber Company, Limited, Fort Dunlop, Birmingham 21, at 7 p.m.

Institution of Works Managers

Sheffield branch:—"Welfare," by B. W. Roome, 7.30 p.m. at the Grand Hotel.

JANUARY 7

Institute of Industrial Supervisors

Birmingham section:—"Industrial Law," by A. M. B. Rule, 7.30 p.m., at the College of Technology, Suffolk Street.

JANUARY 8

Incorporated Plant Engineers

Newcastle-upon-Tyne branch:—"Preventive Maintenance" by T. C. Robinson, 7.30 p.m., at Roadway House, Oxford Street.

Institute of Industrial Supervisors

Warrington section:—"More about Overheads" by S. C. Roberts, 7 p.m., at the White Hart Hotel.

Institute of Welding

Slough section:—Inaugural meeting, 7 for 7.30 p.m., in the Lecture Hall, Slough Community Centre, Farnham Road.

* Other items in the period were recorded in last week's issue.

ON THE Ministry of Supply stand at the Schoolboys' Exhibition, which opened in London on December 31, is a working scale model of the famous "Centurion" tank. This model will be demonstrated by two senior engineering apprentices from the works—James Crabtree, aged 20, and William B. Rosie, both fifth-year apprentices.

THE SEVEN WEEKS' STRIKE of foundry workers at Douglas Fraser & Sons, Limited, Arbroath, has been settled. They resumed work on December 22. The man over whom the dispute occurred has applied to rejoin the union, and on instruction from union headquarters the strikers agreed to return to work.

THE HERCULES CYCLE & MOTOR COMPANY, LIMITED, has announced to its employees that, from January 1, the firm's 1,500 operatives at Manor Mills factory will be put on a four-day week until stocks of components have been reduced substantially. The management has intimated that this measure is the alternative to redundancy.

IN A RECENT STATEMENT made in the House of Commons, the Minister of Supply presented the welcome forecast that the aggregate output of steel this year would be raised to 17,500,000 tons—approximately 1,000,000 tons more than the record of 1950. Already that estimate has undergone an upward revision. The British Iron and Steel Federation now calculates that ingot production will reach 17,500,000 tons in the ensuing year and that pig-iron production will also exceed the 1952 rate by approximately 1,000,000 tons.

AT THE ELMERS END FACTORY of H. J. Maybrey & Company, Limited, aluminium founders, the foundation stone of a new building was laid last week by Mrs. M. C. Maybrey, managing director. It will be a four-storey building and will incorporate a new patternshop, pattern stores and offices. The existing patternshop is being used as an extension to the sand foundry to permit the adoption there of various mechanical aids. The architect is J. T. Harman, F.R.I.B.A., and the building work is being carried out by A. J. Cailes & Sons, Limited.

NOTICE

Replies to Box Numbers to be addressed to "Foundry Trade Journal," 49, Wellington Street, London, W.C.2.

SITUATIONS WANTED

CHEMIST, Higher National Certificate standard, experienced in all types of alloy steels and non-ferrous alloys, requires situation, preferably Glasgow.—Box 3156, FOUNDRY TRADE JOURNAL.

YOUNG, capable, fully qualified METALLURGIST, with some years' senior research experience, seeks progressive position, preferably in industry. Specialised knowledge of ferrous metals and foundry work, with chief experience in cast iron metallurgy.—Box 3157, FOUNDRY TRADE JOURNAL.

GENERAL MANAGER AND ENGINEER (41), with estimating, costing and commercial experience, desires change. Previous positions: Full control of heavy and medium jobbing, non-ferrous foundries (all bronzes and all B.S.S. specifications). Mechanised plant and designs. Sandslinger production. Shell moulding and design for same, and jig and tool departments and machine shop.—Box 3153, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

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

WORKS MANAGER for large Light Castings Foundry, manufacturing Stoves, Grates and Cookers for solid fuel and gas. Previous executive experience in foundry producing light ferrous castings required. Must be well acquainted with modern methods of production and experienced in controlling labour—able to take full charge of foundry, pattern shop and assembly shops.—Write, stating age and full details of experience, to FORTH & CLYDE & SUNNYSIDE IRON COS., LTD., Falkirk.

A METALLURGICAL or Mechanical Engineer Graduate, age about 30, required as SALES REPRESENTATIVE for Steel Castings in the Midland and Southern District. Successful applicants may be required to work on the shop floor for 12 months to ensure practical knowledge before taking over sales duties. Staff Superannuation Scheme. — Applications, stating age, experience, etc., should be sent to the PERSONNEL SUPERINTENDENT, K. & L. Steelfounders & Engineers, Ltd., Letchworth, Herts.

FOUNDRY ENGINEER.—The International Meehanite Metal Co., Ltd., 66, Victoria Street, London, S.W.1, have a further vacancy for a position of Foundry Engineer. A knowledge of Grey Iron Metallurgy and Iron Foundry Practice is essential. This position offers exceptional opportunities of advancement to enterprising and adaptable man. Wide scope of operation. Knowledge of a foreign language desirable. Must be willing to travel in Europe. State full details of experience, technical education, age, and salary expected.

SITUATIONS VACANT—*Contd.*

WANTED. — PATTERN MAKERS, wood and metal, for Cylinder castings. Only first-class men used to this class of work need apply. Top wages paid to those of proved ability.—Apply to MACMILLAN FOUNDRIES, LTD., 130, St. Albans Road, Watford. 'Phone: WAT. 6241.

FOUNDRY FOREMAN for Grey Iron Foundry in Monmouthshire. Full charge Jobbing and Machine Sections, Coreshop and Cupolas. Must be fully experienced and good disciplinarian. Full details of career in confidence, stating age and salary required.—Box 3154, FOUNDRY TRADE JOURNAL.

TOOLMAKERS required for Aluminium and Zinc Pressure Moulds. London rates, plus bonus, paid to first-class men. Only men with 5 or more years' experience need apply.—T. D. TOOLS, LTD., Mora Road, Cricklewood, N.W.2.

REPRESENTATIVE, with established connection, already calling on engineering and allied trades, required by firm of Non-ferrous Founders to introduce their Castings as an additional line, and obtain business on part salary and commission basis. Full particulars, stating area covered and other lines already carried.—Box 3152, FOUNDRY TRADE JOURNAL.

FOREMAN for small Patternshop servicing Mechanised and Jobbing Foundries. Staff appointment. Apply in first instance by letter, giving age, full particulars of experience and salary required; also name and address of two references. All applications will be treated in strict confidence.—RICHARDS (LEICESTER), LTD., Phoenix Iron Works, Leicester.

METALLURGIST, age about 25/35, to take charge of laboratory and technical control in progressive Cylinder Foundry in Watford, Herts. Candidates should possess initiative and be production minded.—Write, giving details of age and experience, to MACMILLAN FOUNDRIES, LTD., Cassiobury Mills, St. Albans Road, Watford.

HAYWARD TYLER & CO., LTD., Luton, Beds., require for their new Canadian Foundry a METALLURGIST, not less than 25 years old, experienced in the melting, analysis, and heat-treatment of high-quality stainless and alloy steel castings. Knowledge of gamma-ray work and sand control would be useful. Salary: Canadian $6,000 per annum in the first year, rising to Canadian $7,000 in the second year. This position offers a wonderful chance to a man of enterprise and ability.

AGENCY

MODERN fully mechanised Malleable Foundry in Midlands requires SALES AGENT to cover Lancs and Yorks area. Must have practical Foundry experience and good contacts.—Box 3138, FOUNDRY TRADE JOURNAL.

TENDERS INVITED

TENDERS ARE INVITED for the provision of two Bronze Plaques commemorating the names of the fallen in the 1939-45 war (one hundred and nineteen names).—Further details from the CLERK OF THE COUNCIL, Town Hall, Brixham, S. Devon.

MACHINERY WANTED

WANTED.—2/3-ton capacity Cupola. Drop bottom type. Any condition if repairable.—TOWER FOUNDRY, Spurgeon Road, Leicester.

OFFER YOUR SURPLUS PLANT AND MACHINERY TO:—

FRANK SALT & CO., LTD.
(THE CASH BUYERS),
BLACKHEATH, BIRMINGHAM.

MACHINERY FOR SALE

FOR SALE.—No. 12 Jolt and Pattern Draw Moulding Machine, by Macdonald, Glasgow. Table size, 53 in. by 53 in., weight 5½ tons. Good condition. Can be inspected at RESISTANCE WELDERS, LTD., Rose Street, Inverness.

B.T.H. very powerful Dust Extractor-Blower. Motorised unit (unused), £15. One-third to-day's cost.—BELLANGER'S, 306, Holloway Road, London, N.7. North 4117.

TROPENAS Converter Steel Plant, comprising 2—30 cwt. (nominal) converters, charging lift, Cupolas, Blowers and all electrical gear. All in working order and good condition. Price: £3,500 as it stands.—Box 3151, FOUNDRY TRADE JOURNAL.

ONE — TWO TON OIL FIRING SKLENAR FURNACE FOR DISPOSAL; POWER TILTING.—Box 3158, FOUNDRY TRADE JOURNAL.

FOR SALE.

NO. 16 ATRITOR CRUSHER by Alfred Herbert, complete with Feed Hopper, overhauled and with a quantity of spares. Also a No. 12 Atritor by Alfred Herbert, for which we have available about 6 tons of spares. Both these machines are offered at extremely low prices for quick clearance.

SAVILLE-CALVERT (MACHINERY) LIMITED.
BIRMINGHAM ROAD,
STRATFORD-ON-AVON
Tel.: Stratford-on-Avon 3681.

MACHINERY FOR SALE—*Contd.*

FOR SALE.—COLEMAN Pneumatic Core Blowing Machine. Three plunger type. Table, 29½ in. by 15¾ in. Box, 22 in. by 22 in. Excellent condition.—R. O. GRAY, Minerva Road, Park Royal, N.W.10. Elgar 4841/4842.

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

IMMEDIATE DELIVERY.

Pneulec Royer. £85.

Jackman Ballbearing Sand Mill, with a.c. Motor drive. £155.

Sand Mill, by James Evans. 48 in. diam. £55.

New unused Sand Thrower. a.c., 3-phase. £50.

New Cupolette, unused, complete.

Over 70 new and secondhand Tilting and Bale-out Furnaces, by Morgan, etc.

Foundry Git Cutter, as new, for 1¼ square.

Six nearly new Ballard Core Stoves. £55 each.

Our new Catalogue would interest you. May we send you a copy—free.

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

600

AIR COMPRESSORS.

1,000 - C.F.M., ALLEY & McLELLAN, type 18B, vert., encl., 2 stage, watercooled, 100 lb. w.p., speed 360 r.p.m. With vert. intercooler.

1,000-c.f.m., FULLERTON, HODGART & BARCLAY, vert., double acting, 2 stage, watercooled, w.p. 100 lb., speed 290 r.p.m. With separate vert. Intercooler, and motorised water circ. Pump. Fitted with Flywheel and shaft ext., carrying "V" pulley supported by outer bearing.

665-c.f.m., SULLIVAN, type WJ3, vert., high pressure, right angle, watercooled, 125 lb. w.p., speed 188 r.p.m. Direct coupled 170-h.p. auto synch. Motor by Crompton, 415/3/50, with control gear.

600-c.f.m., TILGHMAN, vert., single cyl., single stage, watercooled, type F.C.9, speed 365 r.p.m., w.p. 60 lb.

600-c.f.m., INGERSOLL RAND, model 10XB, horiz., 2 stage, 110 lb. w.p., speed 185 r.p.m. With Intercooler between the 2-cyls., Automatic Unloader. Driven by 127-h.p. S/R. Induction Motor by L.S.E., 415/3/50, with Control Gear.

600-c.f.m., ALLEY & McLELLAN, Series 18B, size No. 6, vert., single crank, 2 stage, watercooled, 100 lb. w.p., speed 290 r.p.m. Driven by New 140-h.p. S/R. Brook Motor, 400-440/3/50, with Control Gear.

505-c.f.m., TILGHMAN, model FC8B, vert., single stage, double acting, watercooled, w.p. 30 lb., speed 980 r.p.m., belt driven by 60-h.p. Crompton Motor, 400/3/50. With vert. Air Receiver, 8 ft. by 3 ft. 6 in. dia.

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.*

FOR SALE.

LANCASHIRE BOILER FLUES, suitable for Cupolas; can be inspected at our works; cheap.

MARKLAND SCOWCROFT, LTD.,
Cox Green Works, Bromley Cross, near Bolton.
Tel. No. Eagley 600/1/2

FRANK SALT & CO., LTD.

ONE 2-ton E.O.T. Crane. 30 ft. span, 3-motor, floor controlled, 20 ft. lift. 400/3/50.

One 5-ton 2-motor Crane Grab, 4 ft. wheel centres, 20 ft. lift, 400/3/50. New, unused. Suitable for floor control.

One 3-ton "Morris" secondhand Electric Hoist. Power travel, wire rope. Reconditioned as new. 400/3/50.

One 2-ton "Morris" secondhand Electric Hoist. Wire rope, hand geared travel. 400/3/50.

Two 5-cwt. "Wharton" Electric Hoists. Pull travel carriage. As new.

One 6-ton New "Coles" Electric Hoist Block. Hand geared travelling carriage. 400/3/50.

One Cupola, 36 in. shell dia., drop bottom. Reconditioned as new. Complete with motorised Blower, 400/3/50.

One Cupola, 42 in. shell dia., drop bottom.

One New Cupola, 30 in. shell dia. Complete with motorised Blower.

Two High Efficiency Blowers, by Keith Blackman, 1,250 c.f.m., at 14 w.g. 5 h.p. motor, 2,800 r.p.m.

Geared Crane Ladles. Brand New. 10-, 15-, 30-cwt., and 3-ton in stock.

Portable Platform Scales, by Avery. 5-cwt., 1-ton and 2-ton.

Tilting Furnace, by Morgan. 600-lbs. capacity. Oil fired.

Bale-Out Furnace, by Lees Hall. 100-lbs. capacity. Complete with motorised Blower and Oil Burner.

No. 1 Jackman Sand Blast Plant Barrel Type.

Two Pneulec Herman Rollover Moulding Machines. 750-lbs. capacity.

One August Simpson No. O Sand Mill. Complete with Automatic Charging Hoist, reconditioned.

20 h.p. Electric Motor. T.E., S.C., 1,500 r.p.m., ball bearing, contd. rating.

10 h.p. ditto, 720 r.p.m., S.R., ball bearing, by Lanc. Dynamo.

10 h.p. ditto, 1,460 r.p.m., S.C., T.E., by C. Parkinson.

7½, 1,430 r.p.m., S.C., Protected Type.

Two Pneulec Herman Jolt Rollover Moulding Machines. 750 lbs. capacity.

One Pneulec 36 in. diam. Cupola and motorised Blower, 400/3/50. New condition.

Four F.E.I. Jolt Squeeze Moulding Machines, by Foundry Equipment.

ALL ABOVE PLANT IS IN STOCK AT BLACKHEATH, BIRMINGHAM.
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New shot blast cabinets complete with Dust Extractors, etc., size 5ft. × 3ft. Also new 8ft. cube room Plants

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MACHINERY FOR SALE—*Contd.*

ALBION TWW WORKS

FANS AND BLOWERS:

MOTOR DRIVEN BLOWERS:

SEVERAL ELECTRIC FORGE BLOWERS. 125 c.f.m., 3 in. w.g., ⅜ in. inlet, 2 in. outlet, 400/3/50.

MOTOR DRIVEN BLOWING FAN. 4½ in. by 3½ in. dia. outlet, 6 in. inlet. 3 h.p. S.C. Motor, 400/3/50, by Brook.

KEITH BLACKMAN, TYPE N, SIZE O, BLOWING FANS. Outlet 2½ in. dia., capacity 10,000 c.f. hour; 13 in. w.g. 1 h.p. S.C. Motor, 400/3/50. P.B. Starter, Blastgate, etc.

SIZE 20 MULTIVANE STEELPLATE PRESSURE FAN. 1,500 c.f.m. against 18 in. w.g. 10 h.p. S.C. Motor, 400/3/50. 12 in. inlet, 8¼ by 3½ outlet.

SIZE 15 MULTIVANE STEELPLATE PRESSURE FAN. 2,500 c.f.m., 10 in. w.g. 10 h.p. S.C. Motor, 400/3/50.

SIZE 24 MULTIVANE STEELPLATE PRESSURE FAN. 2,820 c.f.m., 22 in. w.g. 20 h.p. S.C. Motor, 400/3/50. Inlet 13 in. dia., outlet 12 in. by 4½ in.

BELT DRIVEN:

BELT DRIVEN BLOWING FANS, by KEITH BLACKMAN, TYPE NP4. 8 in. flanged outlet, 2,800 c.f.m. against 24 in. w.g. or 2,200 against 15 in. w.g. and intermittent duties.

STEELPLATE MULTIVANE FAN. 24 in. dia. inlet, 16 in. by 26 in. outlet; grooved pulley for 2⅜ in ropes.

PROPELLER BLADE:

18 in. dia. PROPELLER BLADE FANS, by MIDLAND FAN CO., LTD. ¾ h.p. FLAMEPROOF MOTOR, 380-440/3/50; 1,420 r.p.m.

KEITH BLACKMAN 24 in. MOTOR DRIVEN SIX BLADED PROPELLER FANS. TOTALLY ENCLOSED S.C. MOTOR, 440/3/50; 700 r.p.m.; capacity approx. 4,500 c.f.m.

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Phone 26311 'Grams: "Forward."

Remember . Wards might have it!

CAPACITY WANTED

HIGH purity Magnesium Gravity Castings required for delivery over the next six months.—Any Foundry with capacity write W. VINTEN, LTD., 715, North Circular Road, London, N.W.2.

CAPACITY AVAILABLE

CAPACITY available for castings weighing from 1 lb. to 15 tons, including Quasi-Bessermised ingot moulds up to 10,000 tons per annum.—THE CROSS FOUNDRY & ENGINEERING CO., LTD., Gorseinon, near Swansea.

PATTERNMAKING capacity available immediately. Large turning facilities; sub-contract work accepted.—FOUNDRY PATTERNS, 7, The Parade (Basement), Carshalton, Surrey. 'Phone: Wallington 1691.

BEEHIVE FOUNDRY, 50, Hall Lane, Walsall Wood, Staffs, for small to medium Sand Castings in all Aluminium Alloys. We specialise in all types of Aluminium Plates and Bottom Board for foundry use.

JOBBING IRON FOUNDRY have capacity for Castings up to 2 tons. Own Pattern and Machine Shop.—FOWLER & HOLDEN (GRIMSBY), LTD., Church Street, Grimsby.

CAPACITY AVAILABLE—*Contd.*

IRON FOUNDRY Capacity Available on Jobbing Floor and in Moulding Machine Shop for large and small castings.—MANLOVE, ALLIOTT & Co., LTD., Bloomsgrove Works, Nottingham.

CAPACITY available for High Quality Grey Iron Castings, Exhaust Manifolds, Switch Gear, Stove and Grate, and any castings up to 5 cwts. Quality and prompt delivery guaranteed.—Apply CRADLEY CHAIN & MFG. Co. LTD., Mill Street, Cradley, Staffs.

NON-FERROUS FOUNDRY. — First-class quality castings, in Aluminium, Bronze, Gunmetals, etc., at competitive prices, including patterns if required.—BERSTEN LEE & Co., LTD., 33, Swindon Road, Stratton St. Margaret, Wilts.

THE PATTERN EQUIPMENT COMPANY (LEICESTER), LTD., has continuing capacity for Jig, Fixture and "One Off" patterns. Speedy delivery assured for this class of work.—147, Mount Road, Leicester. 'Phone 23773.

WE specialise in Large Type Aluminium Castings, and can always find you capacity.—M.R.T. CASTINGS, LTD., Bromley, Kent. RAV. 3571.

TIVIDALE FOUNDRY, LTD., Local Board Road, Watford. (Tel. 3743.) Non-ferrous Sand Castings, 2 cwt. maximum. Prompt quotations and deliveries.

NON-FERROUS SAND CASTINGS.—Clean, high quality, sand blasted castings in gun metals, brass, aluminium, etc. Necessary patterns if required.—MEYNELL & SONS, LTD., Montrose Street, Wolverhampton.

CAPACITY AVAILABLE—*Contd.*

MECHANISED FOUNDRY.—Malleable and Grey Iron Castings offers 20 tons per week free capacity at early date. Preference for boxes up to 28 in. by 16 in. by 5 in. by 5 in. Snap Flasks up to 14 in. by 14 in. by 3 in. by 3 in. Hand moulding capacity also available. Cast Iron Pipes flanged and specials. Patternmaking facilities if required.—E. J. WALLACE, 39, Constitution Street, Dundee.

CASTINGS.—We can save your porous castings, ferrous or non-ferrous, by an approved Impregnation Process; sample castings treated.—RECUPERO, LTD., 65, South Harrow Viaduct, Harrow, Middx. 'Phone: Byron 1178.

HAYWOOD BROS., Littleborough, Lancs., invite enquiries for all types of Patterns and Scale Models. Highly finished, accurate work of any size Tel. 8543.

MISCELLANEOUS

GRAPHITE / PLUMBAGO. — We specialise in the supply of all qualities and all meshes. Enquiries welcomed and answered immediately. Prompt deliveries from stocks. — WOODSTOCK (LONDON), LTD., 33, The Little Boltons, London, S.W.10. FREmantle 6646/7.

PATTERNMAKING.—Engineering and Light Castings Patterns in wood and metal. Aluminium Alloy Castings.—BADDELEY, Toll Road Works, Kincardine-on-Forth.

REFRACTORY Repairs and Renewals to Annealing Muffle, Refinery, and Reverberatory Furnaces, and Furnaces of all types.—B. RICHARDSON, 49, Milton Avenue, East Ham, E.6. Tel. No.: Grangewood 0619.

"STERLING" MOULDING BOXES.

NEW BOXES AVAILABLE FOR DISPOSAL:
40 PARTS "DL," 18 in. by 25 in. by 4 in.
40 PARTS "DL," 18 in. by 25 in. by 6 in.
40 PARTS "DL," 18 in. by 25 in. by 8 in.
20 PAIRS "SF-Y," 30¾ in. by 39⅜ in. by 3½ in. by 3½ in.
74 PARTS "DBA" 15⅝ in. dia. by 4 in.
ALSO A NUMBER OF 20 IN. SQUARE BOXES. 4 in., 6 in., 7 in., 8 in., and 9 in. deep.
For full details write Box 3155, FOUNDRY TRADE JOURNAL.

MISCELLANEOUS—*Contd.*

SEA SAND for Castings, any quantity by road or rail.—JOHN LIVESEY, LTD., Leamington Road, Ainsdale, Southport.

PATTERNS for all branches of Engineering for Hand and Machine Moulding.—FURMSTON AND LAWLOR, LTD., Letchworth.

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

PATTERNS—All types and for all duties. Wood and Metal. Competitive prices and good delivery.—ESCRITT & SUTCLIFFE, Clough Mill, Todmorden, Lancs. Tel. 725.

FIREWOOD for Cupolas. Sleepers and Sleeper Wood in wagon loads.—TILLEY'S (WOLVERTON), LTD., Wolverton, Bucks.

PATTERNMAKER

PATTERNMAKERS' Section

PATTERNMAKERS' Section

SINEX HIGH FREQUENCY VIBRATORS AND VIBRATING SCREENS

3 Ton Model Illustrated

Larger and smaller machines available

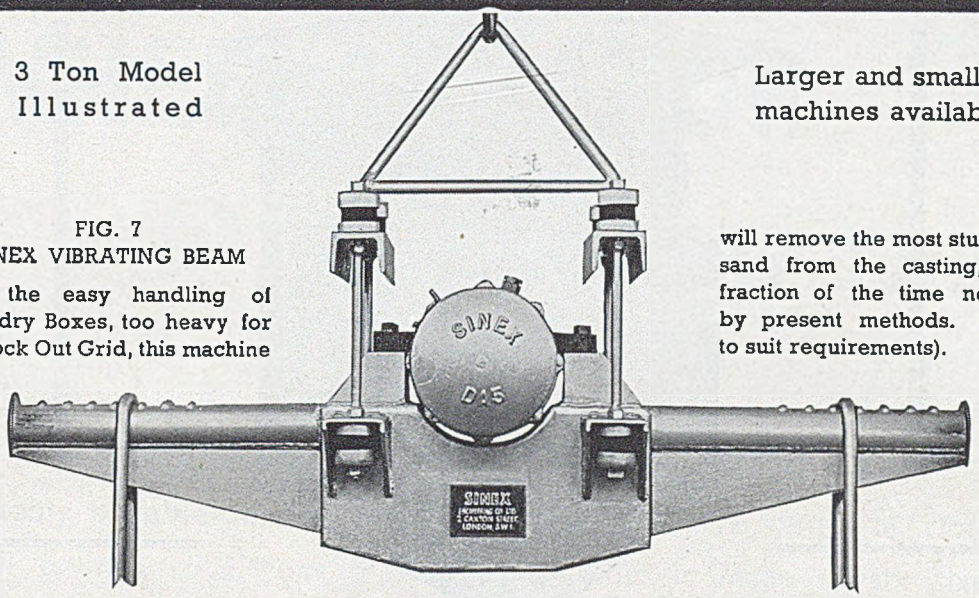


FIG. 7
SINEX VIBRATING BEAM

For the easy handling of Foundry Boxes, too heavy for a Knock Out Grid, this machine will remove the most stubborn sand from the casting, in a fraction of the time needed by present methods. (Links to suit requirements).

We have an extensive prefabrication department and will be pleased to quote you for alteration or addition to your existing plant, and if Hoppers, Chutes and Roller Conveyors and Ancillary Equipment is required, please contact Sinex Technical Department

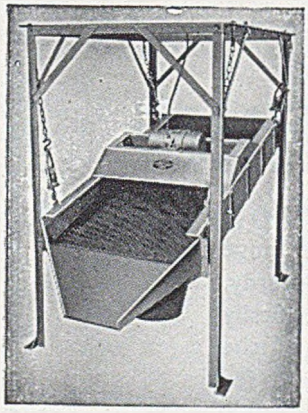


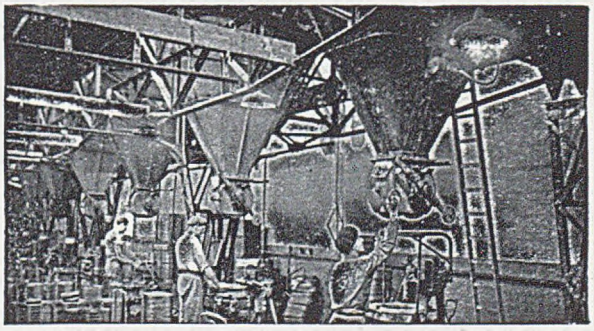
FIG. 10 (on left)

Sinex Vibrating Screen 6ft. × 3ft. Single Deck. Hourly output—15 tons of sand through ⅜ inch mesh.

This screen is also manufactured in sizes to suit requirements.

FIG. 8 (illustrated below)

An important function of Sinex High Frequency Vibrators is the application to Sand and Storage Hoppers. To facilitate the rapid discharge of the material, long experience has shown that the fitting of a Sinex Vibrator to a Hopper containing the most stubborn material will avoid "arching" or "funnelling" of the material in the neck of the Hopper and assure a regular flow. Fig. 8 shows a batch of moulding Sand Hoppers fitted with Sinex Vibrators. These machines are manufactured in various sizes suitable to the capacity of the Hopper, and are wound suitable for any electric supply, single or 3-phase A.C.



THE **Sinex** ENGINEERING CO., LTD.

Telegrams: VICTORIA 7503

Telephone: VICtoria 7503-4-5

12 ROCHESTER ROW, WESTMINSTER, LONDON, S.W.1

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