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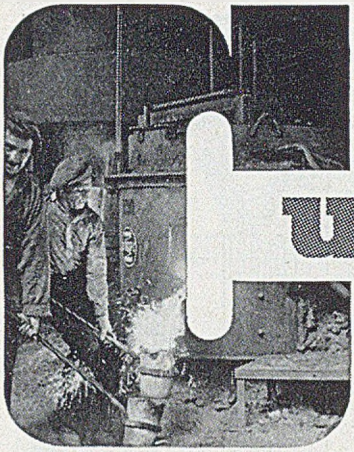

Cupola Iron

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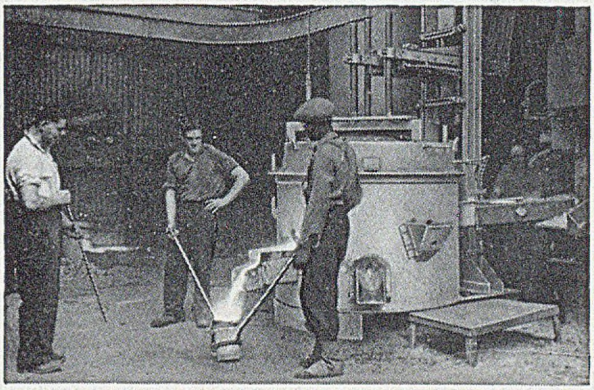

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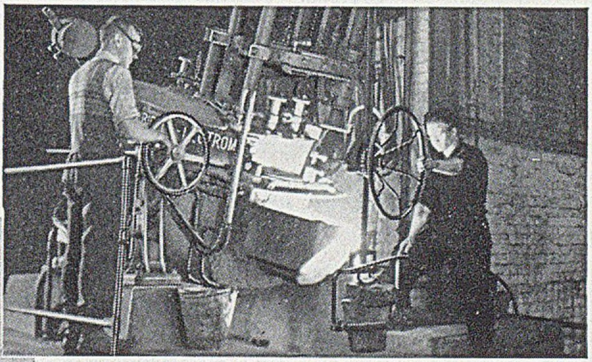

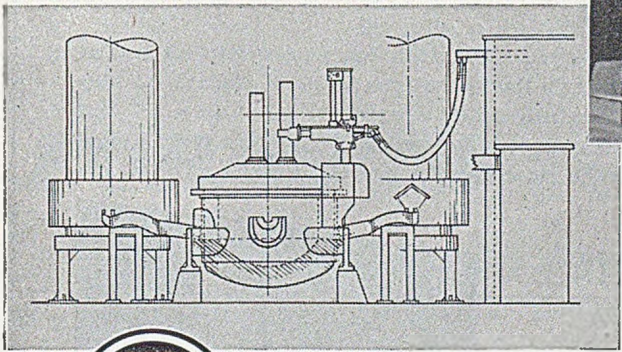

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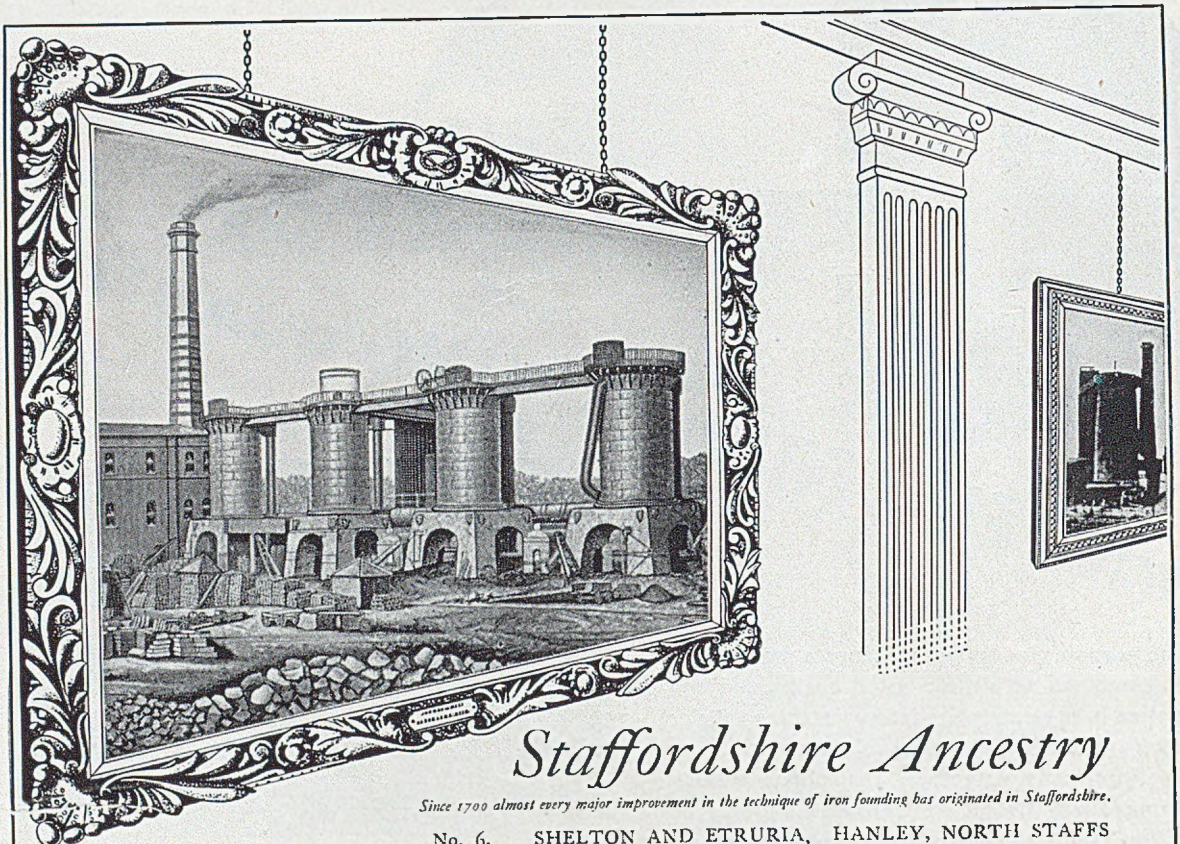

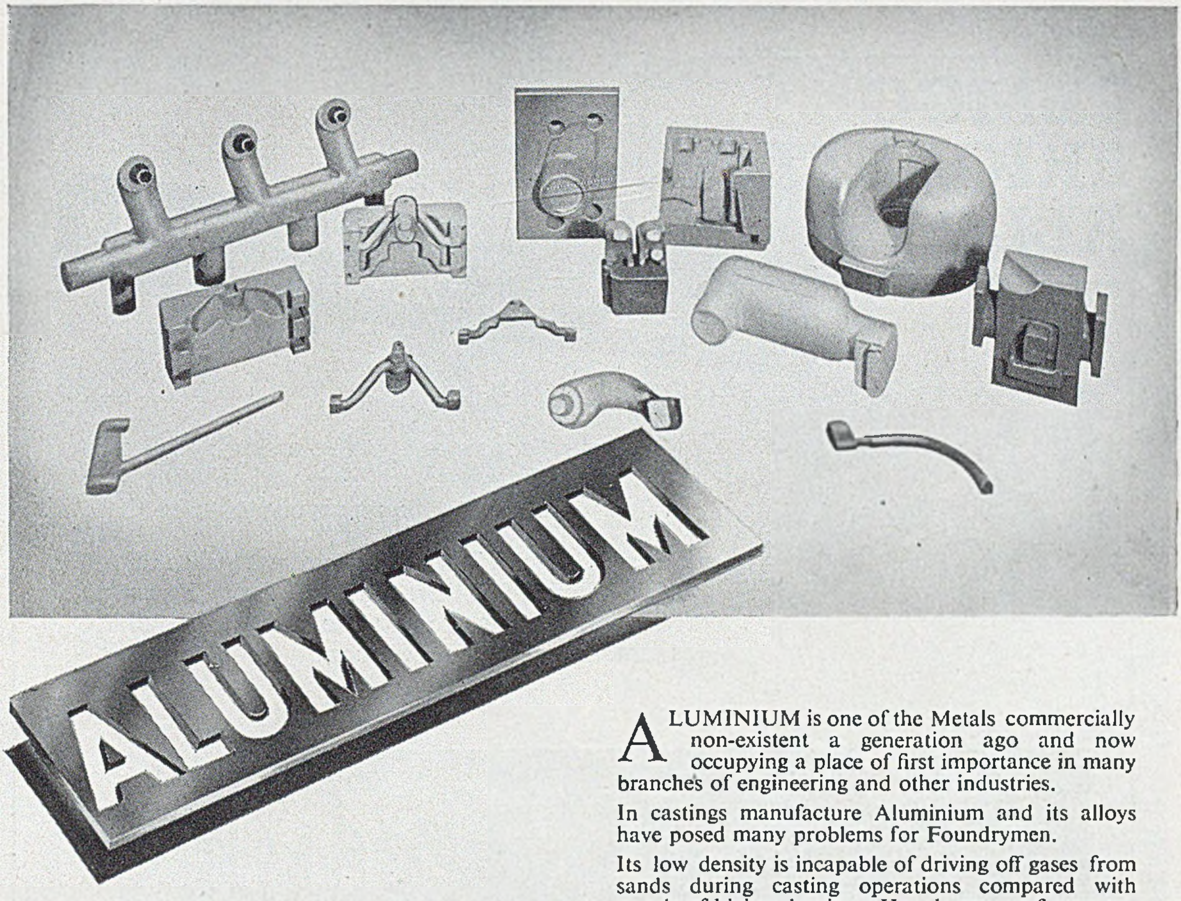

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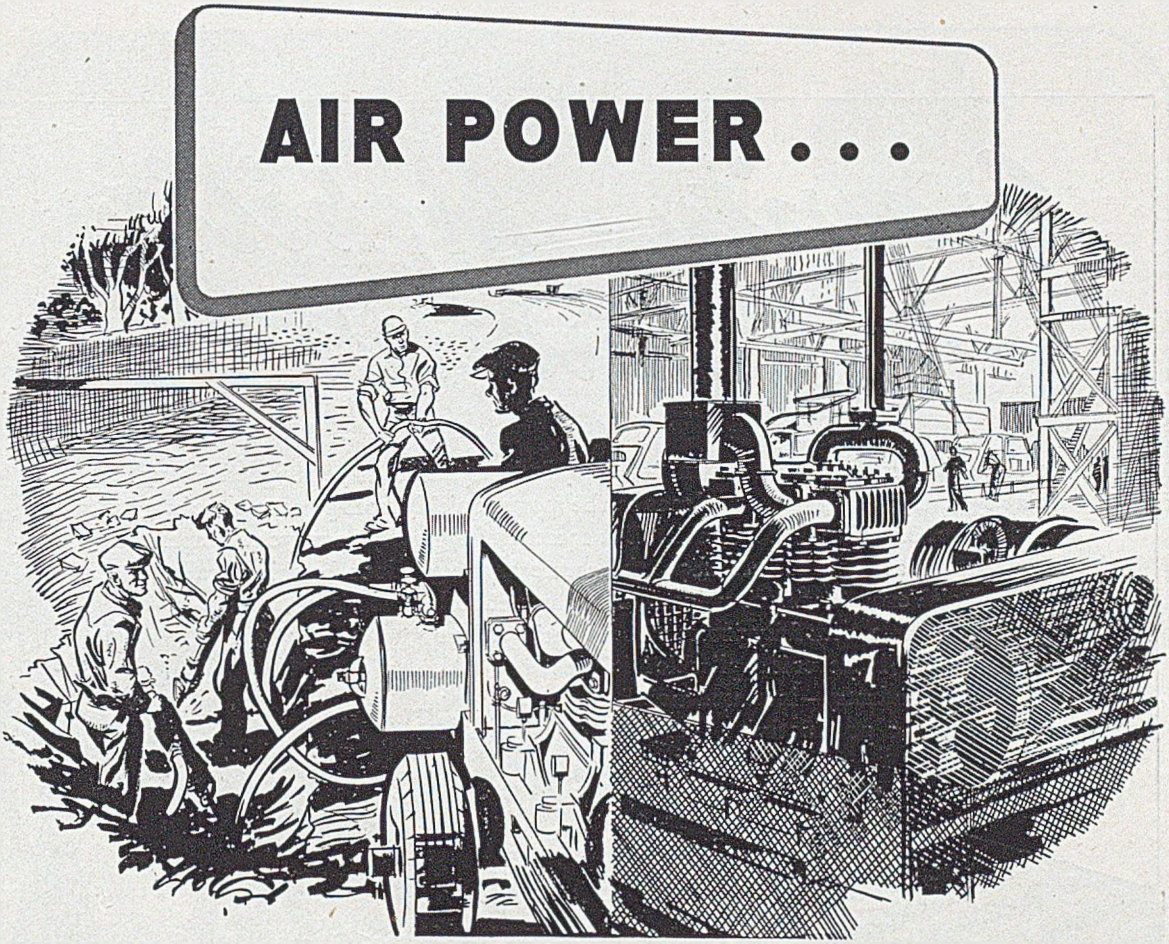
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Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

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American Technology—I, Grey Iron

The preprints of the Papers presented to the recent Annual Congress of the American Foundrymen's Society indicate most clearly that they have for their ultimate object economic production. For instance, several Papers deal with "heat transfer," yet their common objective is the reduction of cleaning costs. Another group covers "plant equipment," and here it is the elimination of machine-shop waste that is sought. It must not be thought from the above that because of this the level of technology has been lowered. Actually it is very high.

As would be expected, nodular iron was featured, and there were two Papers on the subject. One, by Mr. White, gave information on the subject of the Influence of Silicon Content on Mechanical and High-temperature Properties of Nodular Cast Iron, and the second, by Mr. J. E. Reader, on the influence that phosphorus has on this alloy. In the former case, the silicon range was from 2.6 to 6 per cent. At 5 per cent. there was a marked increase in transverse and impact strength, but at 6 per cent. these properties were lowered. The hardness of the irons was progressively increased by silicon additions, and the magnesium-treated irons were consistently 100 Brinell harder than the untreated irons. In general, 4 to 5 per cent. silicon irons are really strong and have sufficient impact strength to overcome brittleness. They are more resistant to growth and scaling than are those irons containing flake graphite. At 885 deg. C. the 6 per cent. silicon irons containing spheroidal graphite have shown excellent non-scaling properties, and up to 1,000 deg. growth was unmeasurable and the scaling resistance was the equivalent of 18 : 8 stainless steel. Phosphorus additions are equally interesting, but in general deleterious. They show an increase in tensile strength associated with impaired elongation and impact strength.

This subject of nodular iron was also touched on by Mr. Renshaw in his very well-written British Exchange Paper, for he cites the basic-lined cupola as a means of producing extremely low sulphur content—a prerequisite for its production. Methods for sulphur reduction have also been studied by Mr. W. W. Austin, Jun., and his views are set out in a Paper on the machinability of grey cast iron. Mr. Austin indicates that in the last few years Renshaw's results have been confirmed by Mr. S. F. Carter. The latter, however, adds 3 per cent. calcium carbide to an all-steel charge and reports a sulphur reduction from 0.119 down to 0.031 per cent. This interesting Paper indicates that whilst magnesium is good for reducing sulphur in medium-phosphorus grey iron, it does not improve machinability. Synthetic basic slags made up of lime fluorspar and cryolite have shown good results as desulphurisers. The use of calcium carbide for this purpose was quite effective—somewhat more expensive than soda ash, but less harmful to ladle refractories. The Author concludes that the soda-ash process is the cheapest and the basic cupola the most expensive. Three other really good Papers combined to make the grey-iron session at Buffalo a memorable one.

I.B.F. Newcastle Conference Fund

It is announced that, as at April 20, subscriptions to the special fund which is being raised in connection with the Newcastle Conference of the Institute of British Foundrymen have been received from the following. It should be noted that Mr. W. Scott, O.B.E., J.P., Sir W. G. Armstrong Whitworth & Company (Ironfounders), Limited, Close Works, Gateshead-on-Tyne, is treasurer of the conference fund:—

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Forty Years Ago

With the exception of an article on Hardness Tests for Alloys by F. H. Hurren, the FOUNDRY TRADE JOURNAL for May, 1911, is not a vintage issue. There is recorded the gift of a roll-top desk to Dr. T. Swinden on his resignation from the position of honorary secretary of the Sheffield branch of the Institute of British Foundrymen. Amongst new companies registered were: Manchester Furnaces Limited, and J. W. and C. J. Phillips Limited. It was announced that the Bessemer Medal was to be awarded to Henri Le Chatelier the eminent French metallurgist.

FIRE BROKE OUT on May 17 in a laboratory of the chemistry department at the Royal Technical College, Glasgow, causing damage amounting to several thousand pounds.

I.B.F. Golf Meeting

Woodhall Spa, September 29 and 30

Non-playing members of the Institute of British Foundrymen and their wives are particularly welcome at the Institute's annual golf meeting to be held again this year at Woodhall Spa, Lincolnshire, with a rendezvous at the Golf Hotel. This hotel offers first-class accommodation and is recommended with confidence. It may be necessary, however, for some members to share twin-bedded rooms.

Terms.—Friday night (including dinner) to Sunday (including luncheon), £3 per head; separate days (including all meals and afternoon tea), £1 5s. per head, plus 10 per cent. surcharge.

Transport.—Intending participants should state on the entry form submitted whether travelling independently and the proposed route to Woodhall if able and willing to offer lifts *en route* to other competitors.

Full details of the competitions are as follow:—

Standard Scratch Score 74

Handicaps.—Limited to 24. As a course allowance will be made, competitors are asked therefore to provide a score card of the course on which they are handicapped.

Morning, September 29.—Medal round of 18 holes; couples will be arranged on a similar handicap basis and the lowest net score returned will be deemed the winner of the I.B.F. Handicap Challenge Cup, which will be held for one year. The lowest gross score returned will be deemed the winner of the I.B.F. Scratch Challenge Cup to be held for one year. The two winners will also be presented with the usual I.B.F. tankard prizes kindly presented by the president of the Institute, Mr. J. J. Sheehan. No competitor can win more than one prize in the morning. There will be an optional 5s. sweepstake on the handicap event only, to be divided two-thirds to the winner and one-third to the runner-up. Ties, if any, will be decided on the last nine holes or, if necessary, on the last 12 or 15 holes. Sweepstakes will be divided.

Afternoon.—Greensome foursomes against bogey under three-eighths of combined handicaps for a 5s. per head entrance fee and sweepstake, two-thirds to winners, one-third to runners-up. Partners will be drawn on the "Sheep and Goats" basis.

September 30.—Four-ball foursomes against bogey (three-quarter handicaps) (arrange partners). Sweepstake arrangements the same as for Saturday afternoon.

Green fees: 7s. 6d. per day to be paid to the I.B.F. golf secretary (one round 5s.).

Starting Times.—Mornings, 8.30 a.m.; Saturday afternoon, 2 p.m. prompt. Time sheet for Saturday morning will be posted in the hotel on Friday night.

Caddies.—These will be extremely scarce, so competitors should bring their own caddy cars or hire them at the course. Any caddies available will be allocated in seniority of age to those who apply when entering. All correspondence should be addressed to the honorary I.B.F. golf secretary, Mr. F. Arnold Wilson, c/o William Jacks & Company, Limited, Winchester House, Old Broad Street, London, E.C.2.

THE COUNCIL of the Institute of Production Engineers announces that the 1951 Schofield Travel Scholarships have been awarded to Mr. F. W. Walton, chairman of the Liverpool graduate section, and Mr. A. H. Needham, a graduate of the Lincoln section. Mr. Walton will spend six months in the United States of America, and Mr. Needham will visit Switzerland for six months.

I.B.F. Conference Works Visits

Newcastle-upon-Tyne Area

Below are printed brief accounts of a number of establishments in the Newcastle-upon-Tyne area which are to be visited during the Annual Conference of the Institute of British Foundrymen from June 12 to 15. Other works to be visited will be described subsequently.

C. A. PARSONS & COMPANY, LIMITED, NEWCASTLE-UPON-TYNE

THE HEATON WORKS of C. A. Parsons and Company, Limited, were founded by Sir Charles A. Parsons in 1889 in order to have greater facilities for the development of steam turbines and high-speed electrical generators than were available at Gateshead where their manufacture had been commenced in 1884. The works are located on Shields Road about two miles from the centre of the city and when first opened occupied a site of about two acres and comprised a single shop measuring 170 by 50 ft., in which turbo-dynamos were built, a small pattern-shop, a smith's shop, testing room and an office; the entire staff numbered only 48. From such small beginnings have been built up the Heaton Works of to-day, which now cover an area of 43 acres, including the welding shops and foundries at Walkergate and the optical works, employing over 5,000 persons.

Turbo-generating Plant

The principal efforts of Heaton works are directed to the development and manufacture of turbo-generating plant, and since the commencement in 1889, the aggregate output of these plants has reached 12,000,000 h.p. A view of one of the assembly shops is shown in Fig. 1. In addition to steam turbines and turbo-generators of all kinds, the manufacture of turbo-blowers and compressors, surface condensing plant and transformers is also

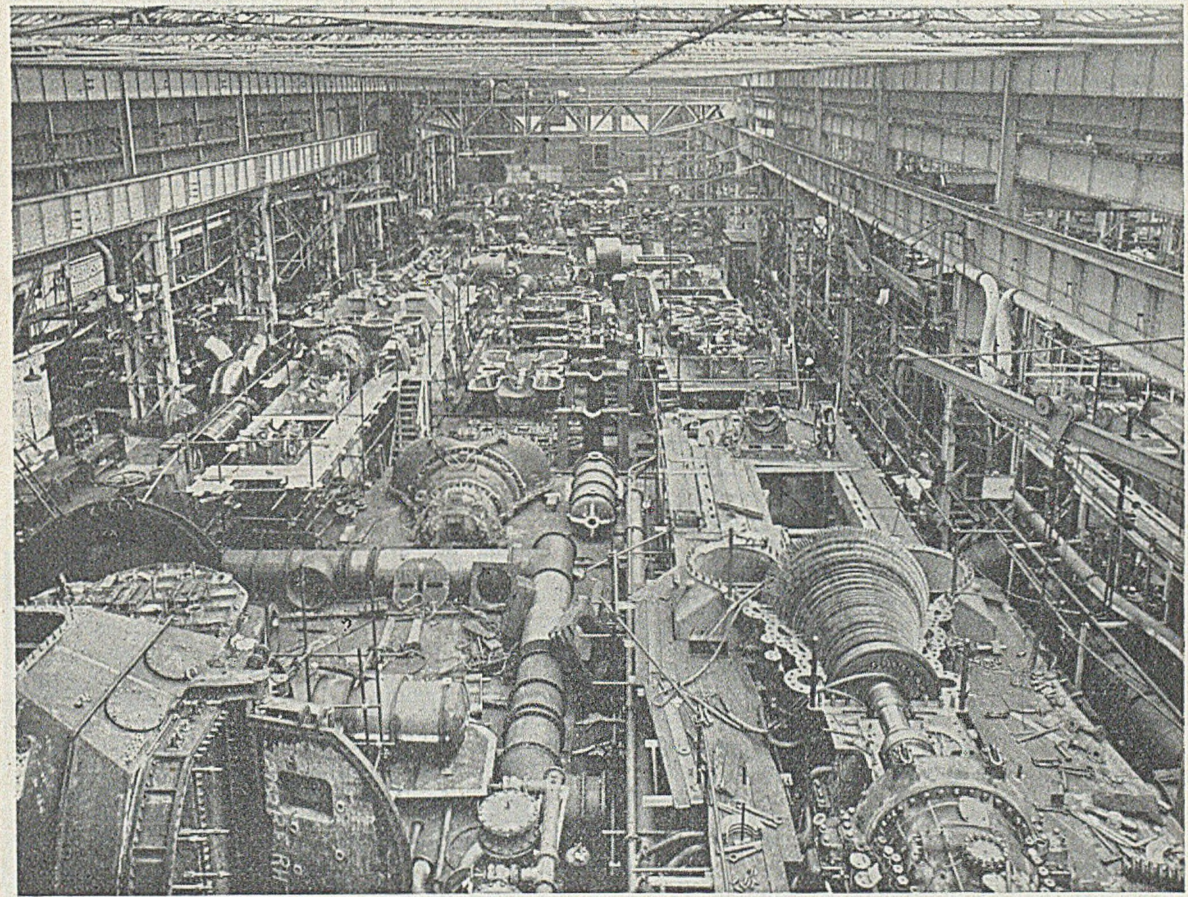

FIG. 1.—*View of the Turbo-alternator and Transformer Shop at the Heaton Works of C. A. Parsons & Company Limited.*

Fig. 2.—*Light Castings Section of the Foundry of C. A. Parsons & Company, Limited.*

undertaken. The design and construction of astronomical telescopes is another line for which the Parsons Company is famous. This work is carried out in a special department of Heaton works known as the optical works and operated under the name of Sir Howard Grubb, Parsons and Company.

When the works were founded in 1889, the largest turbine constructed was for an output of 75 kw.; this machine was installed in the Forth Banks power station of the Newcastle and District Electric Lighting Company, and was the first example of the use of a steam turbine in any public power station. By the year 1900, the size of single machines had reached 1,000 kw., whilst in 1923, a 50,000 kw. turbo-alternator was built and despatched to Chicago for service in one of the largest generating stations in America. This machine was constructed as a three-cylinder cross compound unit, the low-pressure rotor running at a speed of 720 r.p.m. By 1930 it was possible to build turbo-alternators for the same output to operate at 1,500 r.p.m., while after a further seven years there was constructed at Heaton works a 50,000 kw. turbo-alternator to operate at 3,000 r.p.m. In 1949, orders were received for turbo-alternators for outputs of 100,000 kw. when running at 1,800 r.p.m.

Morning Route of the Visitors

During the morning the I.B.F. party will visit the foundry which has recently been reconstructed at a cost of approximately £300,000. The annual output is about 3,000 tons of a wide range of sizes and weights of castings. The foundry is divided into three main units—a light section (Fig. 2) producing castings from a few ounces to about 100 lb.; a medium section handling from about 100 lb. up to 5 tons, and a heavy bay producing castings up to 40 tons. Placed between the heavy bay and the medium and light sections is a totally-covered stockyard serving two 54-in. dia. and two 24-in. dia. mechanically-charged cupolas. In the heavy section,* in addition to the normal overhead cranes, there are independent electric travelling wall-type jib-cranes. Also, a large motive-power Sandslinger, with 10-ton capacity interchangeable hoppers, runs down the centre of the bay and is so positioned that it can reach all the moulding pits. A large sand-handling, mixing and recovery plant is installed at the end of the bay, from which sand, including that used by the Sandslinger, is delivered to each pit by skip ready for use, wheelbarrows having been eliminated.

In the light and medium sections illustrated in Fig. 2, again all handling is kept to a minimum. Sand-preparation and milling plants are conveyor and elevator fed and deliver sand, carefully controlled for moisture, permeability and bond strength *via* an overhead conveyor to hoppers at each moulding station. Any sand spilled passes through a grating to a basement conveyor, which returns it to the sand-preparation unit. All boxes are closed on roller conveyors feeding the pouring line; after casting they move by conveyor to a mechanical knock-out machine, the sand falling through gratings and being returned to the sand plant.

Afternoon Route

During the afternoon, the party will visit the works at Heaton and Heaton South. At Heaton all machining and erection of turbo-generating plant and transformers up to the largest sizes is undertaken, while Heaton South is devoted to the preparation of core plate, turbine blading and the fabrication and bending of high-pressure steam pipes. All the machine shops at Heaton have been re-equipped with new machine tools at a cost of £600,000, and the re-grouping of the tools and new shop layouts have enabled the output of the works to be increased three times that of 1939 with only 20 per cent. more floor area, and without interrupting production during the changeover. One of the largest machine tools is a heavy-duty planing machine capable of handling work pieces up to 50 tons in weight. It has a stroke of 29 ft., a width between uprights of 12 ft. 6 in., and a maximum

* Illustrated in a Paper by Mr. N. Charlton to be delivered at the Conference.

height under the cross slide of 12 ft. Another interesting machine is a rotor-slot milling machine which cost over £30,000. Each cutter mills the full depth of slot up to 11 in. deep, one foot in $13\frac{1}{2}$ min. The turbo-alternator erecting shops adjoin the heavy machine shops and all machines are erected here. Depending on their destination they may be run up to speed. Machines varying in size from 2,500 kw. up to 100,000 kw. are at the present time under erection.

The large alternator and transformer shop is one of the finest in the country and was completed in 1948. It was designed for two 200-ton cranes, which could lift 350 tons together. This all-welded building has no roof trusses and is 74 ft. high, 315 ft. long and 60 ft. wide, with 50-ft. high glass windows. Towards the centre of the shop is a large reinforced-concrete foundation block for the erection and testing of the completed alternators. At the east end of the shop is the impregnating plant. In the shop will be seen alternator stators for capacities up to 100,000 kw. in various stages of construction, as well as large transformers.

The interior of the whole works is painted in stimulating colours. The roofs are sky blue to give a receding effect, the walls a warm sunshine colour and slow-moving parts are orange; bedplates and fixed parts being in a restful green. All the machine tools are so painted, the annual bill for painting averaging £16,000.

CONSETT IRON COMPANY, LIMITED

The district of Consett, situated some 15 miles south-west of Newcastle-upon-Tyne, can trace its association with the iron and steel industry for over 100 years. Consett Iron Company Limited, which is the modern development of two earlier companies, was registered in 1864 and the present works form a completely-integrated modern unit, working coal, ore and limestone through the various processes necessary for the production of iron and steel. In addition, the Company owns brickworks making all classes of refractories, and a tar distillery. The Fell coking plant produces coke for blast-furnace use, together with the usual by-products and has a total carbonising capacity of nearly 15,000 tons of coal per week. Adjacent to it is the blast-furnace plant (Fig. 3) of three modern, fully-mechanised furnaces, each capable of producing over 4,500 tons of pig-iron per week.

Steel Plant

The steel-producing plant consists of eight fixed-type open-hearth furnaces—seven of 150 tons capacity and one of 80 tons—and an inactive mixer capable of holding 1,000 tons of molten iron. All the steel furnaces are fired by a mixture of coke-oven gas and tar. The steel ingots after reheating in soaking pits are either rolled into slabs in a slabbing mill and thence into plates in No. 1 mill which is a two-stand, reversing mill 9 ft. 6 in. wide, or

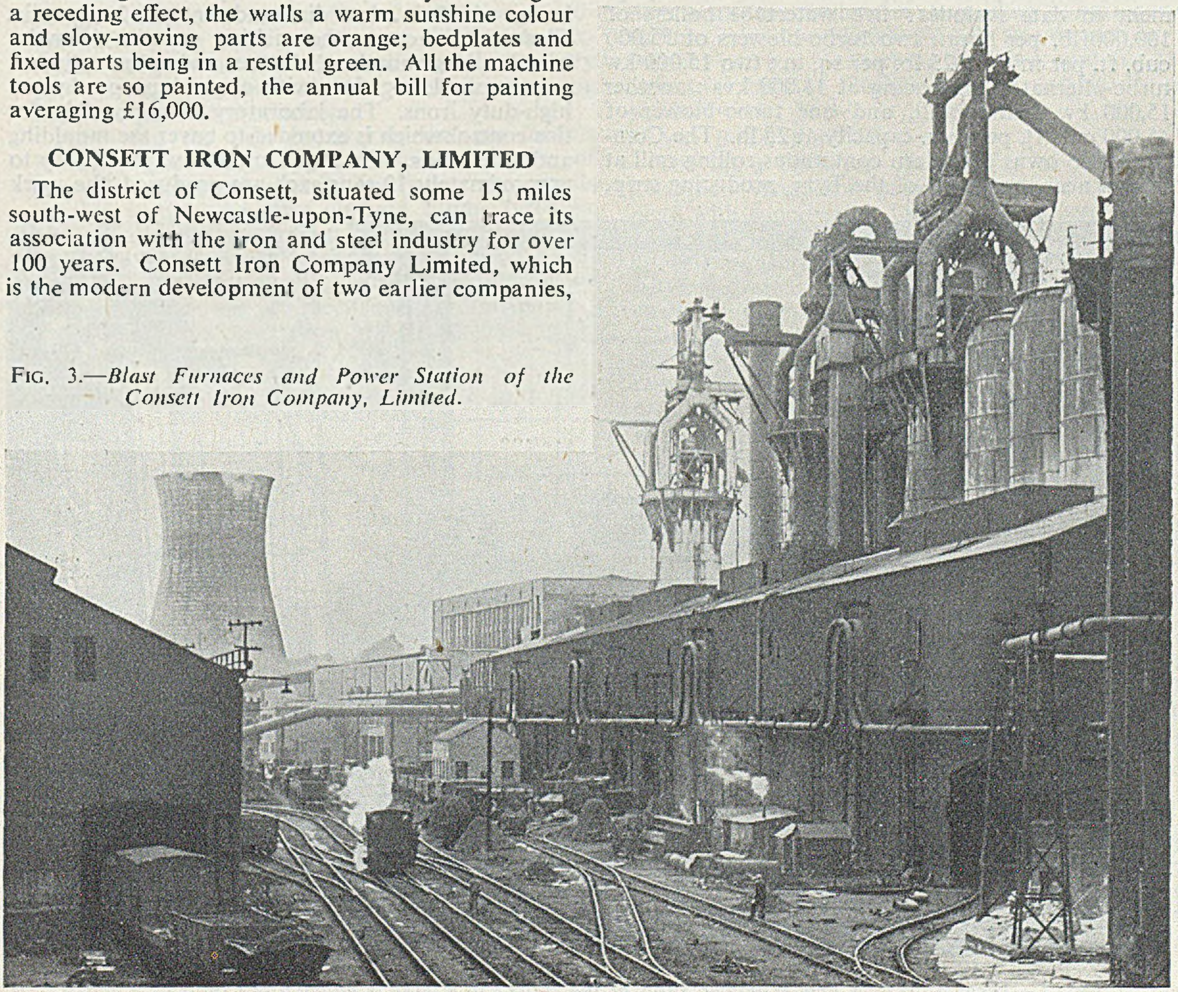

FIG. 3.—*Blast Furnaces and Power Station of the Consett Iron Company, Limited.*

I.B.F. Conference Works Visits

No. 2 mill, which is a three-high mill 6 ft. 6 in. wide, both these mills being electrically driven and producing plates from 6 to $\frac{1}{8}$ in. thick (No. 1 mill being capable of rolling plates up to 108 in. wide). Some ingots are reduced on a 36-in. steam-driven cogging mill to bloom size and then passed to a 22-in. or a 32-in. rolling mill producing a range of billets and slabs.

There is a comprehensive system distributing blast-furnace and coke-oven gas to the various metallurgical furnaces where these gases are mixed in chosen proportions. Any surplus gas passes to the central boiler plant in substitution for part of the normal pulverised-coal fuel.

Extensions

A major development programme covering the whole undertaking is at present in progress: one example being the modern power station (shown in the background of Fig. 3) recently completed and concentrating the production of all the energy requirements of the works whether in the form of steam, electric power or pressure air. The equipment to date includes: five watertube boilers of 100,000 lb. per hour.; two turbo-blowers of 55,000 cub. ft. per min. at 25 lb. per sq. in.; two 15,000 kw turbo-alternators producing at 11,000 kva.; another 15,000 kw. being built, and one turbo-blower of 45,000 cub. ft. per min. capacity at 25 lb. The Company also owns a modern continuous rolling mill at Jarrow near the mouth of the Tyne, producing strip, rounds and small sections for the lighter engineering industries from steel billets provided by the parent plant at Consett.

CLARKE CHAPMAN & COMPANY, LIMITED

Clarke Chapman & Company, Limited, at Gateshead, are primarily known as manufacturers of steam and electric ships' deck and engine-room auxiliaries. The Company has also specialised in the manufacture of water-tube boilers and ancillary plant for power-station and other land applications. The firm was established in 1862 at south shore, Gateshead, and in 1874 moved to Victoria works, where present operations are conducted. All the iron castings required are produced in the works foundry, some 200 tons of finished castings per week being required. Careful preparations have been made for the visiting foundrymen; small parties will tour the works, taking the following sections in rotation.

Foundries

The iron foundry is served by three cupolas, two being of 48 in. int. dia. and one of 28 in. dia. Close control over the melting practice is maintained as large numbers of water and steam cylinders are required, together with a good proportion of high-duty irons. The laboratory is responsible for this control which is extended to cover the moulding and core sands. Castings from a few pounds up to approximately 10 tons each are produced, the work

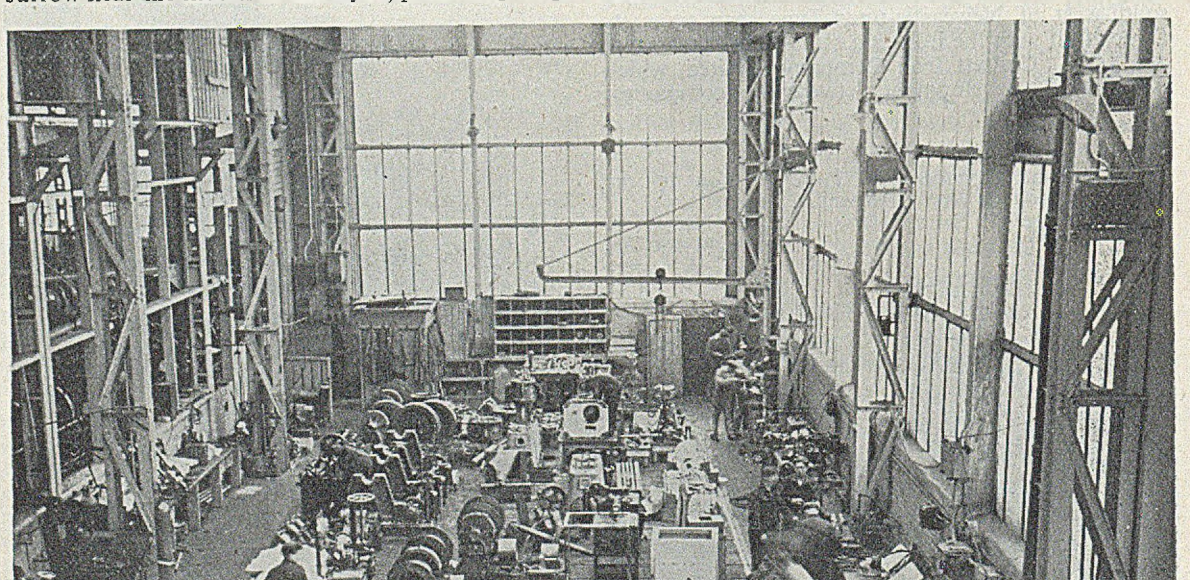

FIG. 4.—*View of Winch and Windlass Shop at the Works of Clarke, Chapman & Company Limited.*

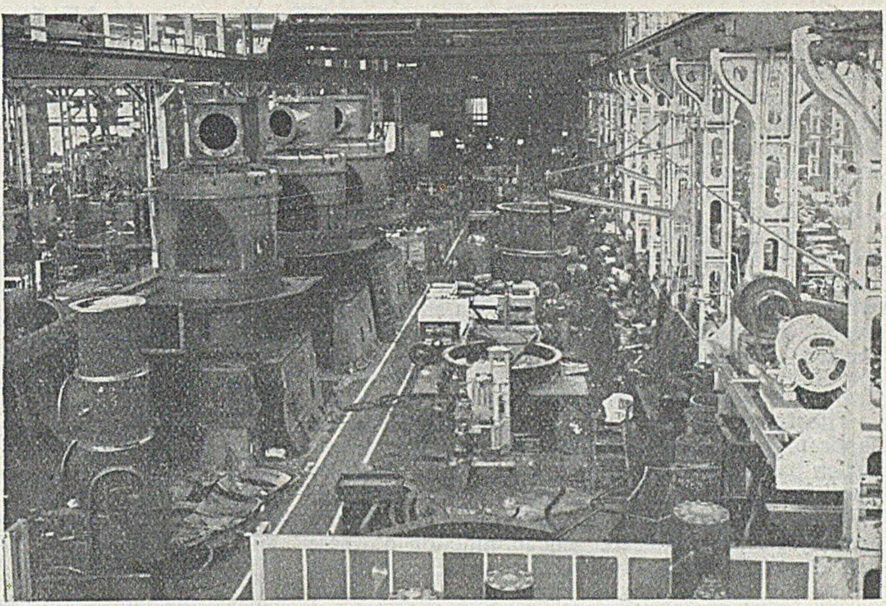

FIG. 5.—*View of Pump Shop at Clarke Chapman & Company, Limited, showing Raymond Bowl Mills being Assembled.*

being roughly divided into 50 per cent. floor-moulding and 50 per cent. machine moulding. An extended programme of modernisation of the foundry plant is being carried out, this without interfering with the present production.

Adjoining the iron foundry is the non-ferrous foundry, producing approximately 12 tons of cleaned castings per week. The main melting units in this section are two oil-fired tilting furnaces. Natural draught, coke-fired, pit furnaces are also available for use when larger castings up to 2½ tons each in weight are required. All classes of brass and bronze castings are produced, melting and pouring practice for this production being also under strict laboratory control.

Other Departments

Winch and Windlass Shop

Steam driven ships' cargo winches and steam and electrically driven ships' anchor windlasses in great variety are produced in this shop, including whaling winches, self-rendering towing winches and trawler winches in addition to deck machinery for tramp steamers. Some of the winches and windlasses will be seen on test and running. The machine shop is equipped with modern milling and grinding machines, turret lathes and lathes capable of handling shafts up to 20 ft. long and chuck lathes up to 7-ft. dia. (Fig. 4.)

Boiler Shop and Fabricating Shop

The boiler shop is well laid out for the production of boiler drums, associated structures and duct work. It accommodates a light plating shop and an extensive welding bay for the manufacture of fabricated bedplates, gear cases, motor frames, etc. Plant is installed for the construction of riveted drums up to a working pressure of 400 lb. per sq. in. and for fusion-welded drums up to 600 lb. per sq. in. Work in progress at the moment includes structure and duct work for boilers at Brunswick Wharf power station, capacity 300,000 lb. of steam per hr. at 900 lb. per sq. in. working pressure, and for two industrial units of 120,000 lb. per hr. at 600 lb. per sq. in.

Works Boiler Plant

The main boiler in operation is of the Clarke-Chapman Woodeson patent water-tube type complete with superheater, forced and induced draught fans, feed-water pumps, coil elevators and bunkers, as well as ash-removal equipment, and is fired by pulverised coal. This boiler is designed for:—40,000 lb. per hr. evaporation; steam pressure of 300 lb. per sq. in.; steam temperature (final) of 600 deg. F.; heating surface, of 7,800 sq. ft., and 80 per cent. efficiency. The pulverised-coal firing equipment is of the "unit system," with one No. 3 Resolutor pulveriser delivering the fuel direct to a "Woodeson" patent burner in the front wall of the boiler furnace.

Material-testing Department

This department is equipped with all the latest machines for testing, including machines for tensile, torsion, Izod impact and Brinell.

Pump Department

From a long list of pumps of all types manufactured in this shop, some of the equipment under construction in the shop during June includes duplex and compound-duplex cargo oil pumps; simplex feed pumps; electrically-driven reciprocating pumps, and condenser pumps. A view of the pump shop can be seen in Fig. 5.

Capstan Department

Contracts for British and foreign navies, war offices and air ministries are looked after in this section. Manufactures include anchor capstan gears, both steam and electric, for all sorts of ships ranging from submarines to battleships; winches to special requirements and haulage gear of all types.

I.B.F. Conference Works Visits

Electric-winch Shop

Electrically-driven ships' cargo winches are manufactured and tested in this shop, which is complete with its machine and fitting departments where the mechanical portions are erected.

Model Room

A large number of working models are normally to be seen here but unfortunately the founders' visit coincides with the Tyneside Industrial Exhibition where some of the models will be on show. However, those to be seen are representative of much of the work produced.

Laboratory and Mirror Department

The foundries are under service control of the laboratory, which also deals with current problems which arise in a works of this nature. More specialised work, such as is involved in connection with the production of "Brytal" aluminium reflectors is also tackled. The production of these reflectors involves an electrolytic brightening process, requiring very close control.

Control-gear Shop

This department manufactures all the control gear for the electrical equipment produced, which is mainly on d.c. supply. Switchboards to meet the mercantile marine requirements, complete with ships installation and wiring are dealt with.

Electrical and Winding Shop

This shop winds and builds alternators, generators complete with their high-speed, totally-enclosed steam engines up to 350 kw. and motors for transmitting up to 250 b.h.p. Also included are projectors, reflectors, lamps for floodlighting, special machinery for bending, grinding and polishing glasses and silvering, as well as the anodising of several types of aluminium reflectors.

History Plate Exhibition

After a short time at the busy South Bank exhibition last Saturday, we found the atmosphere of the city much more to our liking. At the Goldsmiths' Hall in Foster Lane there is a brilliant display of the historic plate of the City of London. The Founders' Company have lent their famous goblet of venetian glass with a silver gilt foot. Dating from about 1527, this cup was bequeathed by Richard Weoley who was master of the Company in 1631. In his will he describes the piece as follows: "My painted Drinking Glass, with Silver and Guilte foote, which by relation was brought from Bullen (Boulogne) out of France at the time when Henry the VIIIth King of England had that place yielded unto him; this glasse being part of the pillage then taken by a Yeoman of the Crowne and hath remained ever sithence in one and the same familie to this day: which glass I bought for a valluable consideration." A set of three tankards has also been lent by the Founders' Company. As these are of one gallon and two of quart capacity, they are in every way commensurate with the thirst quenched by a founder after a hard day's work. An exhibit lent by the Goldsmiths' Company of outstanding interest is a standing salt, made to the order of the Corporation of Portsmouth for presentation to Queen Catherine of Braganza on her arrival in England for her marriage to Charles II. It was described by Pepys in his diary. As the art of the silversmith includes small castings, the exhibition has especial interest for our readers.

(Concluded at the foot of column two)

Worshipful Company of Founders

Visit to the Midlands

A new chapter opened in the history of the Worshipful Company of Founders when a number of the Livery participated in a visit to the Midlands to see some of the activities of the founding industry. Accompanied by the Master, Mr. J. L. Wheeler, M.INST.C.E., M.CONS.E., and Wardens, the party detrained at Wolverhampton on April 24, 1951, and visited the National Foundry College, where suitably qualified and experienced young foundrymen are prepared for executive and technical responsibilities in all branches of the industry. The party was received and welcomed by the Director of Education, Wolverhampton, Mr. F. Lonsdale Mills, M.C., B.A., who is also clerk to the Board of Governors of the National Foundry College; Dr. W. E. Fisher, O.B.E., who as principal of the Wolverhampton and Staffordshire Joint Technical College, acts as director of the National Foundry College; Mr. J. Bamford, B.SC., head of the National Foundry College, and his staff. The resources and facilities were then inspected and Mr. Mills expressed the hope that the building of a wing entirely for the use of the National Foundry College would be begun this year and be ready for the session beginning in September, 1953, the opening of which he invited the Worshipful Company to attend.

Industrial Visits

The party then left by motor-coach for Birmid Industries, Limited, Smethwick, where they were the guests of the firm at luncheon, being received by Mr. A. W. Berry, Mr. C. E. Keey, Mr. A. E. Pearce, Mr. E. Carey-Hill, directors, and other officers. The magnesium and aluminium foundries of the Birmingham Aluminium Casting (1903), Company, Limited, were then inspected, including both the gravity-die and pressure-die-casting shops. After thanks had been expressed, the party left for Stratford-on-Avon, being entertained *en route* to "cocktails" at the residence of Mr. D. Howard Wood. After dinner at the Welcombe Hotel, the party attended the Shakespeare Memorial Theatre.

Next morning, a visit was paid to the foundries of the Imperial Foundry Company, Leamington, subsidiary to the Ford Motor Company, Limited, of Dagenham. The company makes both steel and iron castings on mechanised lines, both for their parent company and the open market, to the extent of some 2,000 tons per month. The castings are completed and prepared for assembly into components for use with agricultural tractors, and are assembled on conveyor-belt lines.

The party was subsequently entertained to luncheon by the Imperial Foundry Company and thanks were rendered by the Master and Wardens, the response being made by Mr. J. A. Barke, the manager, who, with his staff, had shown the visitors round the works. Mr. J. J. Sheehan and Mr. C. C. Booth (who had originated the idea of the visit) and Dr. J. G. Pearce also spoke. The party then broke up to return, fully satisfied that the visit had been a great success, and determined that such events should take place at intervals in the future.

Loam Moulding of Pump Casings and Impellers*

By E. Clipson

(*Continued from page* 520)

Coremaking for the Pump Impeller

In the construction of the core sections, a layer of loam was first of all laid on the dummy boss, between the vanes, after which a cast-iron grid with three staples "cast in" was bedded on. These staples were subsequently used for lifting purposes. Further ramming of loam sand continued and, at the same time, small coke breezes were built into the centre of each core and a wisp of hemp was introduced at the outside. Three grids, each weighing about ½ cwt., were used in each core section, these being interconnected by wrought-iron distance-pieces, packed and bolted together vertically to ensure stability. Approximately 250 bolts were used in the completed core.

Core Irons

Core irons were a vital part of the job, of equal importance to any other detail. On the core-iron bed the craftsman scribed off, or marked from a template, the size and shape of irons required. Careful designing was necessary and they were cast with hot, fluid metal, for a broken or weak grid could cause much trouble. The practice of using spare metal for core irons should not be tolerated. In this case 72 core irons ¼ cwt. each were employed in the completed job.

Construction of Half-core Sections

The first half-core section was next rammed-up with loam and strickled off to form the inside of the shroud. The seven further sections were similarly built up leaving each cast-iron vane pattern in position and marking the position of the separate cores in relation to the dummy plate on the outside diameter. (See Fig. 11.)

Stove drying was the next operation, after which the first section was taken away, followed by the next two sections. No. 1 section was then put back into its previous position, noting the marks as before and leaving out Nos. 2 and 3 sections. The reason for this was the extreme difficulty experienced in splitting the completed core, an almost impossible procedure. Finally, the 9th to 12th core-sections were completed, strickled off and put back into the stove for drying. After stoving for two nights, the half core was taken out and the remaining sections were split, the edges of the cores taken off and repaired where necessary. Finally, two coats of blacking were applied, and the sections stoved again separately for a further two nights at a temperature of 450 deg. F. (230 deg. C.). It has been found that a long period of drying at a lower temperature gives much better results with heavy-section moulds and cores.

At this stage, two downrights 2½ in. dia. were built in each section-core diametrically opposite to each other, with one 4-in. by 2½-in. downright in the centre boss. All the 12 sections were next re-assembled on the dummy, to be finally bolted to two cast-iron assembly rings. This operation was by no means easy, as the core sections had to be temporarily assembled on the dummy at a larger diameter and then shuffled into position one by one. The total weight of this completed half core was 10 tons, forming the bottom portion. All was now ready for turning over.

Building the Impeller Mould, First Stage

A cast-iron bottom plate 10 ft. 6 in. dia. by 3 in. thick, with four lifting lugs and weighing 4½ tons was cast and a footstep and spindle fitted in the centre for the strickle attachment. Foundation courses of brickwork were then laid in loam, followed by a middle binder, brickwork being built roughly to shape as indicated by strickle shown in Fig. 12. A joint binder was then cast, and after thoroughly claywashing was offered into position and covered by about 1½ in. thickness of loam. Finally, the bottom half of the mould was strickled off with soft loam to the shape of the shroud. This was stoved and blacked ready to receive the bottom half core, the blacking being always applied whilst the mould was hot.

Turning Over the Core

Next came the most difficult operation, calling for extreme care in the handling of a core of the dimensions quoted and weighing 10 tons. After bolting the assembly rings to the bottom plate carefully, and making sure that the 12 sections were secure in every way, the whole core was turned over by laying wooden blocks in the manner shown in Figs. 13 and 14. At no time did the core leave the floor. It pivoted on the timber ends, and this operation called for some extremely clever crane driving.

This half core was next lowered into the bottom half of the mould, releasing the dummy plate for the making of a further half core in sections (Fig. 15). The second half core was made in precisely the same manner as described, except that the opposite-hand vanes were used. At the same time, provision was made for the inclusion of four downrights in exactly the same positions as previously mentioned, as well as four 1¾-in. dia. risers taken off the top shroud.

* Paper read before the Lincolnshire branch of the Institute of British Foundrymen, Mr. Burrell presiding. The Author is foundry manager, Foster-Gwynnes, Limited, Lincoln.

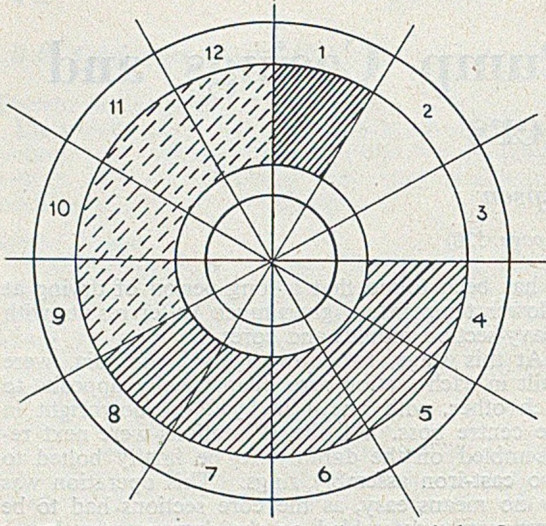

FIG. 11.—*Sequence of Manufacture of the Core Sections.*

At this stage it was necessary to check the matching of the vanes and the tip width. This was accomplished by offering the top half-core on top of the bottom half. The matching of the 12 vanes proved almost perfect, except for just one, which was duly rectified.

Second Stage

Work then commenced on the building and finishing of the top half-mould which was almost identical to the bottom half in the way of strickling-up, except for the top plate, which in this case carried a ring of inverted prods for additional brickwork support instead of the usual loose bars. At the same time, provision was made for the runners and risers. This top part was also turned over after stoving. In Fig. 16 a cross-section of the completed mould is given showing the 2-ft. 6-in. dia. hole in the centre of the top-plate. Through this hole a separate section of the mould was made to prevent the moving of the centre core whilst the cope was being lowered into position during the final assembly.

Construction of the Centre Core

The centre or lightening core, as it is sometimes

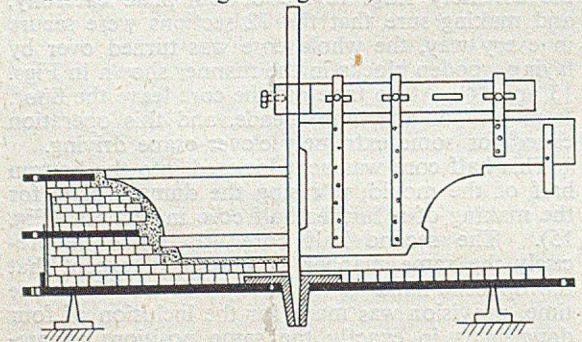

FIG. 12.—*Foundation Plate and Strickle for the Bottom-half of the Impeller Mould.*

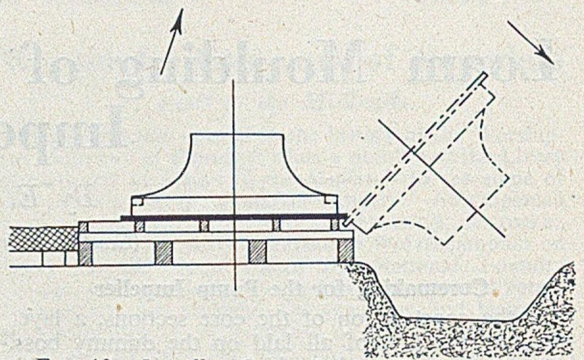

FIG. 13.—*Impeller Core, showing the Method of Turning-over—First Stage.*

called, was next made in two halves with a separate extension part carried through the top plate to above the runner box. It consisted of a wooden frame placed on a flat-machined plate held down by weights, the inside of the frame being the correct shape of the core. Next, a layer of loam was laid on the plate, followed by the bedding-on of a cast-iron grid in which a number of $\frac{1}{4}$-in. dia. wires were "cast-in." Further courses of loam bricks were added and an internal layer of cokes was added to the top of the core. The wires in the grid were tied together with $\frac{1}{16}$-in. wire, and made rigid. Further loam was added and finally strickled off to shape and the whole stoved in the usual manner. The two half-cores were finally bolted together through the two surface grids and blacked.

Mould Assembly

After removing the bottom half of the mould from the stove, it was seated perfectly level on a number of 4-in. box stands on the foundry floor, the position decided being the most convenient for casting. Before proceeding any further with the assembly, a "practice match" was arranged to ensure that both ladles of metal could be manipulated with ease. During the time the bottom half-mould was in the stove for final drying, the bottom half-core was placed on 4-ft. stands with fires underneath it to maintain the heat in the core and to prevent dampness, if any, from striking back.

After assembling the bottom half-core, the centre core was next lowered into position, care being taken to ensure that it was truly central in relation to the shroud diameter. The vertical position was checked

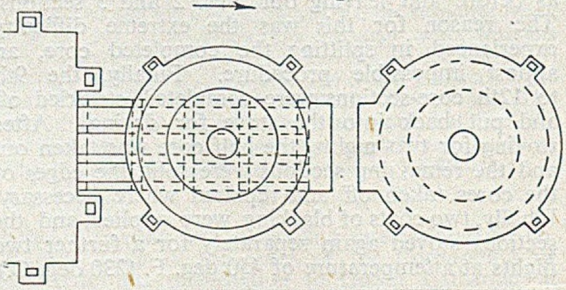

FIG. 14.—*Second Stage in Turning-over the Impeller Core.*

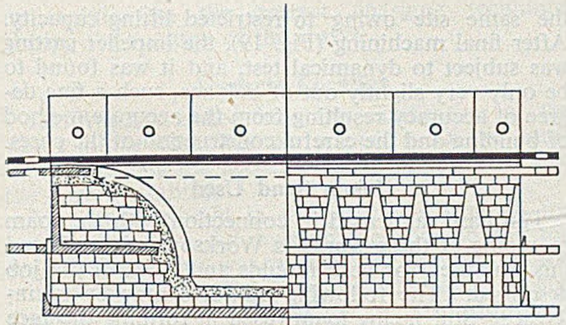

FIG. 15.—*Half-section and Part Exterior View of the Impeller Bottom-half Mould, showing the First Core Assembly.*

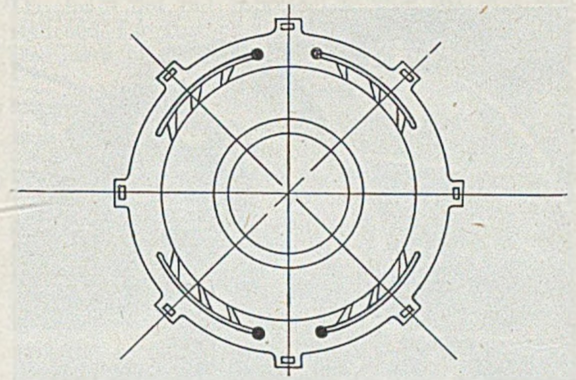

FIG. 17.—*View of the Impeller Mould Bottom-joint Flange, showing the Main Ingates.*

by means of a spirit level. Eight 1-in. dia. mild-steel screwed studs were securely placed underneath to maintain its correct position. The second main core was then lowered into place; the position and thickness of the clays on top of the lightening core being carefully noted. These were then replaced by 16 screwed studs and the main core was finally lowered into position. At the same time, the perfect alignment of the vanes and the interconnection of the four main downrights was noted (Fig. 17). Finally, the top half-mould was duly assembled and the general "set-up" as indicated in Fig. 16 was adopted.

Details of Runner Box

One runner basin, this time built up separately, was superimposed. Very briefly, a cast-iron plate was made to the desired shape with vertical prods cast on the outside and with the necessary reliefs in the bottom to take the runners and risers. A course of brickwork was then laid inside these prods, followed by about 2 in. of loam on the bottom, forming the complete runner basin (Fig. 18). This was dried in the same manner as the mould. The total metal capacity of the runner box was 2 tons.

Weighting and Pouring

After the runner box was fixed into position and the downrights and risers made up, two slotted holding-down bars, 12 ft. long by 8 in. square, were placed on top of the mould. Through them, four $1\frac{1}{2}$-in. dia. bolts 10 ft. long were securely fastened to the bottom plate. An additional bar of similar dimensions was placed on top of the lightening core and packed up to the top plate. This was also fastened to the bottom plate. Next, two sets of four steel plates, $\frac{1}{4}$ in. thick, were bolted together to form two complete circular rings; these were used to seal the core joints round the perimeter, $1\frac{1}{2}$-in. clearance being left between the core and the rings. Inside the rings, sand was well rammed, care being taken to permit the free escape of gases from each section core.

Runners and Pouring

The downrights have been referred to previously. To ensure soundness in the heavy-boss section, a feeding head of 7- by 3-in. section was carried up through the top core, with the runner basin separated out by means of a blanking-off device. Four separate risers, each $1\frac{3}{4}$-in. dia., were taken directly off the top shroud through the top plate and into special elevated bushes. The estimated weight of the casting was 11 tons, and 15 tons of metal was used to pour it from two ladles of 13 tons and 6 tons capacity respectively. Plugs were placed over the downgates so that the runner basin could be filled without any undue splashing of the metal.

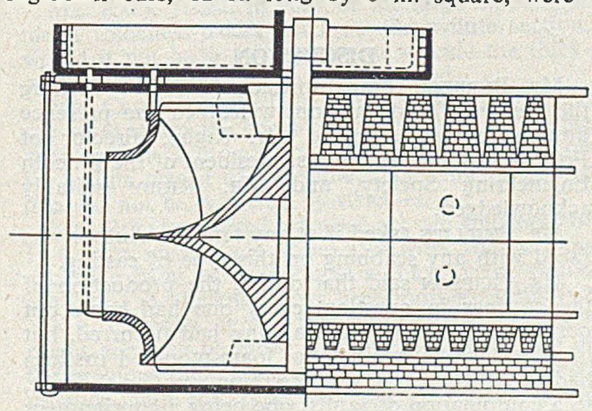

FIG. 16.—*Half-section and Part Exterior of the Completed Impeller Mould Set-up.*

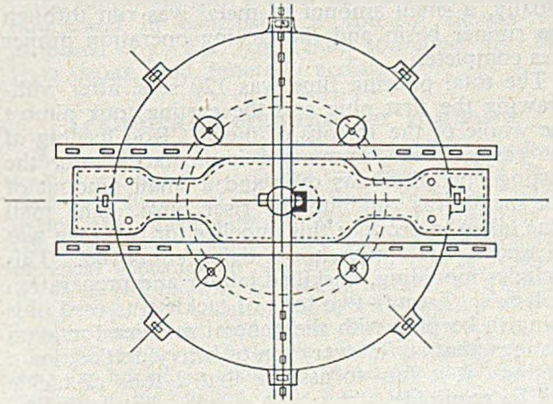

FIG. 18.—*Plan View of the Runner-box Arrangement for the Impeller Casting.*

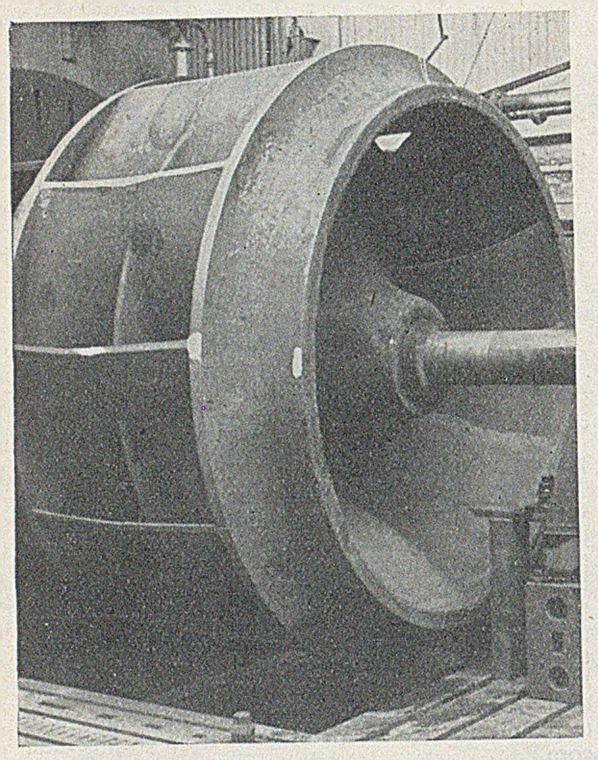

FIG. 19.—*Finished Impeller Casting being Machined. The Job was only 66 lb. Out-of-balance.*

One of each extreme end plugs in the runner basin (Fig. 18) was withdrawn, so that the first metal would enter the bottom shroud through these main ingates, followed later by metal from two more. Pouring continued until the bottom shroud was well covered, and metal had entered the heavy-section boss. The centre downright plug was then withdrawn, followed by the riser plug. The reason for delaying the withdrawal of the centre runner until the centre boss was partly filled was to prevent any excessive impingement of metal in the bottom of the boss, the drop being some 6 ft. Pouring was stopped when the level of the metal reached the riser bushes. Finally, a small amount of metal was run through the runner basin and the casting operation proper was complete.

The total pouring time was 120 secs. after withdrawing the first plug and the casting took almost the whole of the 15 tons of metal. Rod feeding of the centre boss commenced immediately after the casting operation was over and a small amount of hot metal was run into the riser bush. The total time taken to produce this impeller for two men was 18 weeks, 1,600 man/hours being employed. This includes moulding, unskilled labour and preparation of tackle. Twenty-two tons of tackle was used, this being in keeping with the general practice for loam castings, that is, for every ton of heavy, fettled, loam castings, it is fair to assume that 2 tons of tackle will be required.

The casting was stripped down to the bottom plate before fettling commenced. Fettling was done on the same site owing to restricted lifting capacity. After final machining (Fig. 19), the impeller casting was subject to dynamical test, and it was found to be only very slightly out of balance, such a fine degree of accuracy resulting from the accurate method of building and the careful construction of the cores.

Loam Sand Used

The base sand used in connection with the loam moulding at these works is Worksop red sand, and this was used for both moulds and cores of the job described. The following mixtures may be of interest:—Stiff facing loam (used in forming the face of the mould and core):—12 shovels Worksop red sand; 5 shovels black shop-returned sand; 2 shovels horse manure; 1 shovel coal dust; 1 handful cowhair, and water to suit.

Loam bricks.—These were made from the above mixture and stove dried.

Thin loam.—Used as mortar in building the brickwork, this was made from shop-returned sand mixed with ample water. This was mixed in a pug-type mill for about five minutes, providing one barrowful per mixing.

Conclusion

The loam-moulded work discussed represents only 10 per cent. of the total foundry output and each pump is more or less tailor-made for the job to be done. However, the object of this Paper is to show how large jobs can be achieved in a small general foundry using practical common-sense methods and relying upon careful observations. It will be realised that loam work not only represents much effort from the moulder and patternmaker in which the problems arising require vastly varying solutions, but also demands team work from all concerned.

In conclusion, the Author would like to express his sincere thanks to the directors of Foster-Gwynnes, Limited, for their kind permission to present this Paper and to those of his colleagues of the foundry floor, whose co-operation has made the task an enjoyable one, and particularly to Mr. Armitage, whose enthusiasm and interest in the work of the foundry in general has made the preparation of this Paper easy and, it is hoped, of general interest.

DISCUSSION

MR. BURRELL (branch-president), before opening the meeting for discussion, welcomed the presence among the gathering of Mr. Rigby, director of Foster-Gwynnes, and a past-president of the Lincoln Engineering Society, and MR. RIGBY suitably acknowledged.

MR. PHILLIPS asked if at any time the Author was faced with any scabbing on this type of casting.

MR. CLIPSON said that during the production of the castings in question, every one had come out perfectly sound and no scabbing had occurred, but in recent weeks two smaller loam-moulded castings had exhibited very severe scabbing, due, he thought, to a combination of faults; one being a consignment of very bad coke, another being due more or less to the human element, namely, the neglect of duties in maintaining the correct charging technique during the running of the stoves.

Accurate Location

DR. WALTER asked how the rectification of the vanes in the core was performed. At the same time, how was the accurate fixing of the blades in the core guaranteed.

MR. CLIPSON said in this case one vane in the bottom half-core did overlap the vane in the top half by $\frac{1}{8}$ in.; this was rectified by tapering off the projections with a file after scribing carefully any discrepancy on the joint of the core, the top half-core being lifted off to perform this rectification. He added that the position of the blades was fixed by a series of vertical assembly marks around the perimeter of the two half-cores.

MR. DUNLEAVY commented on the comparatively weak tackle used in the production of such large castings, which he had personally observed on a recent visit to the works in question.

MR. CLIPSON said no difficulty had been experienced with regard to the tackle, which was thoroughly examined and tested against load before being used on the work described in the Paper.

A MEMBER asked whether straw rope was used in loam-moulded work, and what was the true object of using loam bricks.

MR. CLIPSON said that hemp was used in preference to straw rope; the reason for its use being, of course, that this material burned out during the drying operation, and permitted subsequently the free escape of gases from the mould. He also explained that parts of the brickwork were deliberately " weakened " by the building in of what were known as loam bricks. These were made from stiff loam in which some readily combustible material, such as manure, had been added. They were well dried before use. The use of these loam bricks, he added, was to provide for the contraction of the casting, which was very appreciable in the case of these large jobs This contraction could be observed at the junction of the casting and the prints of the core.

Thickness Pieces

MR. RACK asked, in view of the large amount of metal thickness-pieces used on the volute section, would it not have been better to strickle the thickness of the metal on the core in sand.

MR. CLIPSON replied that in the case quoted the use of separate thickness-pieces appeared to be the more practical proposition, as at no two places on the volute was it of the same shape, and therefore it could not be swept up by strickles.

MR. ROLLETT asked whether a loam thickness of $1\frac{1}{2}$ to 2 in. on the face of the brickwork was perhaps excessive from an economical point of view; would not $\frac{3}{4}$ to 1 in. thickness have been more satisfactory?

MR. CLIPSON agreed that the reduced thickness might prove to be more economical, but the use of the previous thickness quoted was more the general practice with this type and size of work. Some of the smaller cores, however, were taking loam up to from 6 to 8 in. thickness without any difficulty. The loam did not represent a total loss but was returned for further use after casting and after treatment in the sand mill.

Alloy Iron

MR. SHEPHERD asked if there was some specific reason for using 1 per cent. nickel in this metal; also, was the 16 per cent. nickel content referred to used specifically for corrosion-resistance purposes.

MR. CLIPSON said that the addition of 1 per cent. nickel had become more or less standard practice for this sort of pump work, and was considered helpful as regards the machinability and internal soundness of the castings. In contra-distinction the castings carrying a 16 per cent. nickel content, which were of course in the minority, were used for the specific purposes mentioned by Mr. Shepherd.

Mould Drying Practice

MR. SHEPHERD asked if the possibility of an automatic stoker for the drying stove had been considered in view of the difficulties experienced in controlling night-stoking practice.

MR. CLIPSON said this had not been considered as yet, but would certainly be kept in mind.

MR. SHEPHERD also asked if low-to-high drying temperatures had been tried, and what was the reason for adopting the reverse.

MR. CLIPSON replied that in actual practice one firebox was used to run the two stoves, and it had been found better to boost the heat into both stoves at the start with the valve fully open untily 650 deg. F. had been reached, followed by fairly frequent charging and running at 450 deg. F.

A MEMBER asked if the patternmakers were employed on the job the whole of the time.

MR. CLIPSON replied that they were not employed in the foundry for the whole of the time, as loam work consisted of building-up in stages, the patternmaker being employed at varying intervals for " setting-up," etc. At the same time the patternmaker was definitely responsible for the whole job, in spite of the fact that moulder and patternmaker did not always see eye-to-eye with one another.

At this point MR. BURRELL reluctantly had to bring the meeting to a close on account of the late hour, and in conclusion a vote of thanks was proposed by DR. WALTER, seconded by MR. HALLAMORE, and generally acclaimed.

Technical Personnel in Industry

A warning of the growing shortage of technically trained personnel in industry was given by Mr. D. S. Anderson, director of Glasgow Royal Technical College, in an after-lunch talk on May 16 to members of Glasgow Junior Chamber of Commerce. Contrasting technical education in Scotland with that in America, which he had recently visited as a member of a productivity team, Dr. Anderson thought the quality of work in our universities and senior technical colleges was distinctly higher than that in America, though we fell very far behind in quantity. American technical institutions, in his opinion, were doing too much research work, and that was endangering the quality of their teaching.

More Supplies and Services Legislation

By F. J. Tebbutt

The Supplies & Services (Defence Purposes) Act 1951, is a measure additional to the Supplies & Services Acts of 1945 (Transitional Powers) and 1947 (Extended Purposes), and to understand this and what has gone before it is thought that a short article showing the position under the three Acts up to date may be useful.

The 1945 Act (amended by the 1947 Act) was really a substitute for the Emergency Powers Act (which terminated February, 1946) and a measure which gives the power of Governmental control over industry (and individuals for that matter) but this power cannot be exercised unless it is within the "purposes" specified in the Acts. The history of the matter, is that the war-time Acts were for the purpose of furthering the war effort, the 1945 and 1947 Acts are roughly to cover matters of the post-war period, reconstruction and the like. There are seven groups of "purposes" in the 1945 and 1947 Acts and space exigencies prevent details of all of these but the following may be mentioned: One generally covers the maintaining, controlling and regulating of supplies and services, and there is one for promoting the productivity of industry commerce and agriculture; one for furthering and directing exports and reducing imports (if considered necessary); and finally one which can cover almost anything in the way of control, this being, generally, for ensuring that the whole resources of the community are available for use and are used in a manner best calculated to secure the interests of the community.

This 1951 Act now provides that the 1945 and 1947 Acts can be used for additional "purposes" introduced by this 1951 Act which relate to defence and world peace and security, thus for providing or securing supplies and services required for the defence of any part of His Majesty's Dominions or any Protectorate or for the maintenance or restoration of peace and security in any part of the world, and for any measures arising out of a breach or apprehended breach of peace in any part of the world and for preventing supplies or services being disposed of in a manner prejudicial to the defence of any part of His Majesty's Dominions or any such territory as aforesaid (*e.g.* Protectorate) or to peace and security in any part of the world, or to any such measures as aforesaid.

The procedure of these Acts is that certain Defence Regulations of the war-time Acts were turned into Orders in Council, but no alteration could be made in these except to bring them into conformity with the "purposes" of the post-war Acts, and no new Regulations could be brought in (except one on price control). Those continued are those in Parts III and IV (some of Part V) of the Defence (General) Regulations 1939, with certain other Regulations (*e.g.* Defence (Finance); Defence (Encouragement of Exports).

Important Points

Although as shown, only those Regulations mentioned can be continued as Orders in Council, these really give all the power required to exercise full control of everything relating to industry, trade and individuals (there are over 100 Orders), if, of course, within the "purposes" mentioned.

Take the powers of Parts III and IV (No. 55; General Control of Industry). Part IV gives the Government power to regulate or prohibit the production, treatment, keeping, storage, movement, transport, distribution, disposal, acquisition, use or consumption, of articles of any description. Road and rail affairs, agricultural matters, requisitioning, etc., also come under Part IV. Under Part III come ships, aircraft, etc.

Covered by these Orders come such things as limitation of supplies, licensing, rationing etc. of production and of raw materials and so forth, the coupon business, rationing of food, the points system, control of building operations, etc., and of civil engineering contracting undertakings. Orders relating to these matters are all retained; whether they will be used is another matter. Furthermore the powers retained include the direction of labour (if thought desirable or necessary) and the taking over of shares of individual companies (this power does not mean that it could be used to nationalise whole industries).

(*Continued at the foot of column 2*)

Notes from the Branches

Scottish

On the invitation of the directors of Babcock & Wilcox, Limited, the members of the Scottish branch of the Institute of British Foundrymen paid a visit to their foundries at Renfrew on May 3. The invitation was accepted by fully 130 members, some coming from places as remote as Arbroath, Edinburgh, Falkirk and Ayr. They were received by Mr. R. O. Patterson, works manager—a past-president of the branch—and Mr. Tom Miller, foundry manager. Members of the staff acted as guides and conducted the party through the core-shop, jobbing foundry, mechanised foundry, melting shop, steel foundry and fettling shop. The visit was made all the more attractive by reason of the arrangement whereby the mechanised section continued working until all the visitors had passed through. At the conclusion of the visit, tea was served in the works canteen. Mr. James G. Arnott, president of the branch, expressed the thanks of the members to all who had helped to make the visit so successful, and Mr. Tom Miller replied for the firm.

Publications Received

"Gas at Your Service," issued by the Gas Council, 1, Grosvenor Place, London, S.W.1. This is a very well produced booklet, and contains about 70 pages, mostly carrying illustrations. The historical side, in view of the occasion—the Festival of Britain—has been over-restricted to two pages of print and four of pictures. The balance has been carefully chosen and well reproduced, and is in every way worthy of the great industry—now of course a State monopoly—it portrays.

Raw Materials of the Refractories Industry, by R. J. Mitchell. Published by the Purchasing Officers' Association, 146a, Queen Victoria Street, London, E.C.4. Price 2s. 6d.

The Author is on the staff of the Morgan Crucible Company, Limited, and has dealt with his subject quite technically, by treating successively with acid, intermediate and basic refractories and finally pure oxides This survey is thoroughly reliable and its matter has been particularly well chosen for study by those possessing an elementary knowledge of chemistry.

Safety Goggles. J. & R. Fleming, Limited, of 146, Clerkenwell Road, London, E.C.1, have sent us a leaflet which describes and illustrates the "Duraframe" make of welder's goggle. The features of the goggle are clearly set out.

Magnetic Properties of Nodular Cast Iron

*By Dr. H. E. Stauss**

Data given by Dr. A. B. Everest in a recently-presented Paper have been re-orientated to reveal additional information comparing the magnetic properties of nodular cast irons with ordinary irons.

The importance of nodular cast iron has led Everest[1] to make a broad survey of the properties of ordinary and nodular cast irons. In this survey, interesting data on the magnetic properties of the two irons were included. One anomalous result was found in the unexpectedly high hysteresis loss of nodular cast iron as compared with that of flake-graphite cast iron. Everest's data are reproduced in Table I, including measurements on a ferritic nodular cast iron. It is the purpose of this article to explain this relatively high hysteresis loss found with nodular cast iron.

A tabular form of presentation is often not so effective for comparing magnetic properties as curves can be. The published data are not sufficiently detailed to permit the drawing of exact curves, but they are adequate. By use of three values of induction, B, the two as measured at fields of 75 and 600 oersteds and one as calculated from the reported maximum permeabilities, each of the normal magnetisation curves shown in Fig. 1 can be drawn. By use of the initial and maximum permeabilities (as slopes of the curves), the inductions at maximum permeability and at H = 75, and inductions as read from Fig. 1, the magnetisation curves between H = O and H = 90 shown in Fig. 2 can be constructed.

On the basis of the magnetisation curves of Fig. 2, the residual induction, Br, and the coercive force, Hc, from Table I, and the usual relationship between hysteresis loops and magnetisation curves,[2] hysteresis loops have been drawn for each of the three specimens of Table I, and are given in Figs. 3, 4 and 5. An approximate check on the validity of the hysteresis curves is furnished by a comparison of the ratios of the areas within the loops with the ratios of hysteresis losses given in Table I. For ordinary cast iron, nodular cast iron, and ferritic nodular cast iron, respectively, the ratio of areas in the loops is 1.1 : 3.8 : 1 and the ratio of losses is 1.2 : 3.8 : 1.

* The Author is head of the Electric and Magnetic Alloys branch of the Metallurgical Division of the [American] Naval Research Laboratory

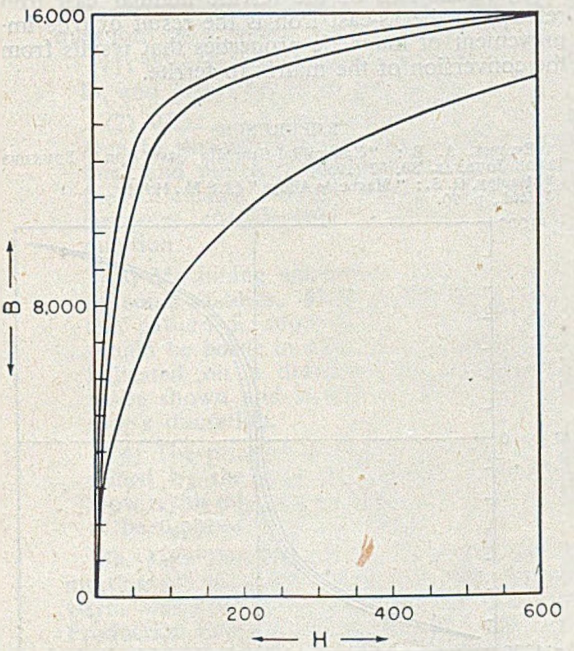

FIG. 1.—*Normal Induction Curves drawn from Data given by Everest. The Upper Curve is for Ferritic Nodular Cast Iron; the Middle One for Nodular Cast Iron; and the Lower for Ordinary Cast Iron.*

Differences

The hysteresis loops of the two types of cast iron, flake and nodular, are seen to be different in several respects. Both nodular irons, Figs. 4 and 5, show a higher central portion of the loop, while the flake-graphite cast iron loop, Fig. 3, shows a central portion contracted along the vertical B-axis. The ferritic nodular cast iron (Fig. 5) has a narrower loop than the "as-cast" metal, Fig. 4 indicating softer magnetic properties. The flake-graphite iron loop (Fig. 3) lies between the two nodular irons in breadth.

Fig. 1 shows that saturation is about the same for the three metals, but it is reached with more difficulty by the flake iron. Fig. 2 shows for fields below H = 75 (and above about H = 8) that the value of induction B attained for a field H by the flake iron is significantly less than that attained by nodular iron.

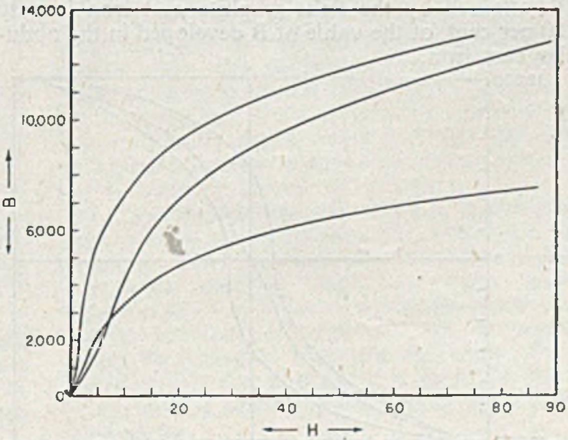

FIG. 2.—*Normal Induction Curves for the Low Fields re-drawn from Fig. 1. Again, the Upper Curve is for Ferritic Nodular Cast Iron; the Middle for Nodular Iron; and the Lower for Ordinary Iron.*

TABLE I.—*Comparison of Steady-field Magnetic Properties of Flake and Spheroidal-graphite Cast Iron.*

Material.	Initial permeability. μ_0.	Maximum permeability. μ max.	Field strength for μ max. H (Oersted).	Induction at field strength = 600 Oersted. B (Gauss).	Induction of field strength = 75 Oersted. B (Gauss).	Remanent Induction for H max. = 75 Oersted. B_R (Gauss).	Coercive force to reduce B to zero. H_c (Oersted).	Hysteresis loss for H max. = 75 Oersted. Ergs./c.c./cycle.	Steinmetz factor x10–3.
Flake-graphite cast iron ..	250	440	4.5	14,300	7,300	2,900	3.3	8,600	5.6
Nodular - graphite cast iron (as-cast) ..	75	425	12.0	16,000	12,100	6,000	7.5	28,000	8.0
Nodular - graphite cast iron (after conversion of the matrix to ferrite) ..	—	1,400	3.0	16,000	13,100	3,600	2.0	7,000	1.9

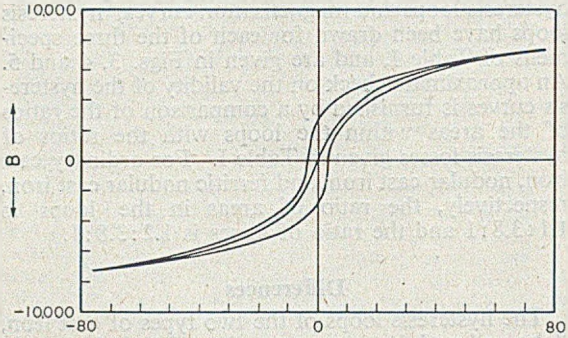

FIG. 3.—*Hysteresis Loop of Flake-graphite Cast Iron as deduced from the Induction Curve in Fig. 2.*

In the reported specimens, the ordinary cast iron appears somewhat better than nodular cast iron in that the hysteresis loop (Fig. 3) is smaller and has a narrower waist at B = O than that in Fig. 4. As seen by comparison with Figs. 4 and 5, the narrower waist could be in part the result of a greater degree of ferritisation, but it arises also from the generally smaller size of the hysteresis loop occasioned by the lower maximum value of induction B attained. The smaller area contained in the hysteresis loop of Fig. 3 is the result, at least in part, of the fact that for equal fields of H = 75, the induction, B, attained by the flake-graphite cast iron is only 60 per cent. of the value of B developed in the nodular cast iron.

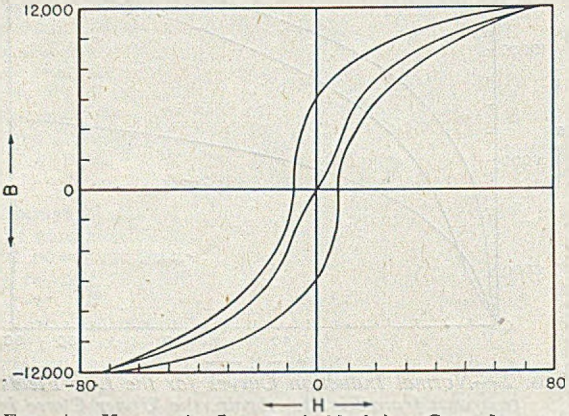

FIG. 4.—*Hysteresis Loop of Nodular Cast Iron as deduced from the Induction Curve in Fig. 2.*

Interpretations

Everest's data may be interpreted to show that important dfferences arise in the magnetic properties of cast iron depending upon the form of the graphite, with the flake form having greater and more deleterious effects than the spherulitic. Earlier workers reached the same conclusion for flakes in cast iron and nodules occurring in malleable iron, namely, "that the flake form of graphite is more harmful than the nodular form,"[3] but here "nodular" does not necessarily mean "spherulitic." Thus the lower value of hysteresis loss in the flake-graphite iron relative to the nodular iron probably is the result of the reduction of the magnetic induction of the flake-graphite iron resulting from flake-created gaps. The higher loss found in the nodular iron is not a sign of poorer magnetic properties in this iron, but of better magnetic induction for like applied fields, H. On the other hand, the lower value of hysteresis loss of the ferritic nodular cast iron relative to the as-cast iron is the result of true improvement of magnetic properties that results from the conversion of the matrix to ferrite.

REFERENCES

1 Everest, A. B.: "Spheroidal-Graphite Cast Iron," FOUNDRY TRADE JOURNAL, 89, 57 (1950)
2 Stanley, G. S.: "Magnetic Alloys" (A.S.M., 1949)
3 *Ibid.*, p. 70

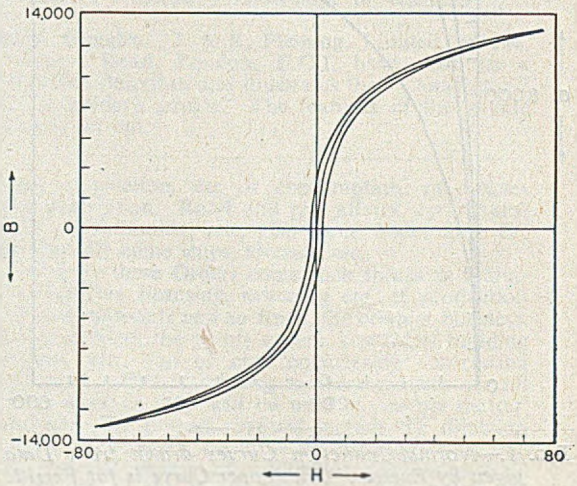

FIG. 5.—*Hysteresis Loop of Ferritic Nodular Cast Iron as deduced from the Induction Curve in Fig. 2.*

Foundry Cost Estimation

Difficulties experienced by foundrymen in cost estimating were discussed at a meeting of the South African branch of the Institute of British Foundrymen, held at Barclays Bank Building, Johannesburg, in January. What follows is a slightly abbreviated report of the meeting.

THE MEETING OF THE South African branch of the Institute of British Foundrymen was attended by nearly 50 members and visitors, and Mr. S. Jane, branch president was in the chair.

The discussion on Problems of Cost Estimating in the Foundry was opened by MR. G. GODFREY, who said that when the Council decided to hold this discussion evening on the problems of estimating for the foundry, the idea was to try to arrive at some common basis for the various problems entailed. In introducing this subject, it was not proposed to indicate how the many problems should be approached.

Estimating, to-day, was a very serious business. Since the end of the war, South Africa had been forging ahead in the industrial field, and of course competition had become much keener. Added to this was the competition from the large number of overseas concerns now branching out in South Africa. If foundries were to hold their own, they must know their work and handle it correctly. The success of a company was usually gauged by the reading of its balance sheet, and sound estimating was one of the cornerstones for success.

Four Questions

It was proposed to put forward four of these questions now, which were:—

(1) Why do some foundries tender on price per lb. and others on price per piece?

(2) What is a reasonable casting tolerance? Due to various factors a casting may come out thick and therefore be considerably heavier than the calculated weight. This can affect the customer considerably in terms of the first question.

(3) Machining allowances can be a big item on some castings. How is this taken care of if the pattern is supplied by the customer? It should be borne in mind that machining may be indicated on a drawing, but the allowance is never shown and is always left to the patternshop's discretion.

(4) The price of a casting is very often determined by the type of pattern to be supplied. How is this taken care of when the type of pattern to be supplied is not known?

MR. JANE thanked Mr. Godfrey for getting the meeting off to a good start; he then extended a warm welcome to members of the Institution of Production Engineers (S.A. branch), who had been invited to attend the meeting.

Referring to Mr. Godfrey's first question, MR. DAVIDSON expressed the opinion that the price per lb. system was really a relic of the old days when all mine contracts were issued on a price-per-lb. basis, covering the price of both pattern and casting. He felt that the system should be dropped once and for all, because the type of work undertaken at present was (generally speaking) not the same as the work required of the Union's foundries years ago. The price-per-lb. system could not be applied to the intricate jobs which were being produced at present.

It was apparent that most big foundries were getting away from the system; the mines were also doing their best to avoid it. The system could still be used, of course, on certain classes of work in which a foundry had had previous experience of producing castings which were exactly the same in all respects.

MR. GODFREY said the price-per-lb. basis might be a relic of the old days but it was still frequently used to-day. For a certain casting he had received prices from various foundrymen who had worked them out on both price per lb. and price per piece. He would like to know which was the better basis on which to estimate. It seemed to him that the price-per-lb. system would have serious disadvantages when used for estimating the price of a casting put out to tender. The casting might be heavier than the makers thought it would be when completing the tender, and the price they gave would therefore be too low for the making of a reasonable profit.

Calculated Weight

MR. GOYNS said Mr. Godfrey had touched upon the heart of the matter when he referred to a possible difference between calculated weight and finished weight. The naturally cautious foundryman was reluctant to commit himself on the price-per-piece basis in case the casting should turn out heavier than the calculated weight; it was as a result of caution among foundrymen that the price per lb. came into being. To-day it was often found that a foundry would work out the total cost of an article and then convert that cost to give a price per lb.—just to be on the safe side.

It was impossible, Mr. Goyns maintained, to answer in a direct fashion Mr. Godfrey's second question. Obviously the tolerances allowed on 9-lb. and 9-ton castings would be vastly different. "Reasonable" tolerance in weight posed another thorny problem—whether or not a percentage should be added to the estimated price of a casting to ensure the making of a profit in the event of the casting absorbing more metal than had been allowed for.

Referring to the effect of patterns on casting prices, he said no foundryman would be greatly concerned about the type of pattern to be used

Foundry Cost Estimation

when a casting was required in small quantities, because it could be assumed that a certain joint line would be taken and a certain method of moulding used. The type of pattern to be used became a different proposition when a quantity run was required; few foundries would undertake a job involving a large number off unless they knew what type of pattern was to be supplied.

MR. ANDERSON said he would like to make out a case for the price-per-lb. system. In the case of repetition casting over a period of years the system was of great benefit because it simplified estimating.

Beneficial System

From the storekeeping point of view it simplified procedure and minimised the possibility of errors in the dispatch of castings. The customer knew exactly what he was paying for when a job was charged out to him at a price per lb.

It had been proved beyond doubt that estimating costs could be considerably reduced by grading castings on a price-per-lb. basis. It was an easy matter for the estimator, in conjunction with the foreman, to place a casting in any particular grade —6d., 10d. or 1s. 6d. per lb.

MR. GODFREY said he could not agree with Mr. Anderson. Many overseas foundries worked to very fine limits in costing and estimating. It was common practice in one British concern, for instance, to draw up their estimates to within one-tenth of a farthing. If South African concerns wished to compete on a serious basis with overseas firms they would have to improve their estimating. A firm could not fight for business, and win it, if they depended on guesswork most of the time. Estimating had to be done carefully.

In regard to the calculation of weights, past experience had shown him that such calculations could be made very accurately in the drawing office. For years he had had to calculate weights to within 2½ per cent. for the British Admiralty—and the Admiralty imposed a penalty if the finished weights were out by more than the 2½ per cent., with the result that the firm in question soon learnt to calculate weights with the greatest possible accuracy.

Referring to the third of his introductory questions, he stated that it was essential to give careful thought to machining allowances. He recalled the case of a steel flywheel cast in the Union some time ago. The specification called for a flywheel of 9-ft. dia. and 11.7 tons finished weight. The makers were a little nervous because they had never made such an article before—and the rough casting weight turned out to be 23 tons, and there was a 2-in. machining allowance all over. The machining cost was naturally out of all proportion. This sort of thing could easily happen, and the people in the machine shop had a right to know approximately how much it was going to cost them to machine each casting.

MR. HOLDSWORTH said it was inevitable that there should be a certain amount of guesswork in the foundry. For instance, the estimator could hardly do more than take a guess at the time that would be spent on the job by the patternmaker and the foundryman. In his opinion, it was important that a quotation should include a certain percentage as insurance against a "waster."

MR. TONGE expressed himself in full agreement with Mr. Holdsworth. An amount should be added to the estimated price for the risk the foundry took of turning out a "scrapper." This was, of course, particularly important when handling a one-off casting that weighed eight or nine tons. Referring to Mr. Godfrey's remarks on estimating to within one-tenth of a farthing, Mr. Tonge said he had no doubt that some people went to such extremes—but he had also no doubt that they increased that very accurate estimate by a percentage to allow for "contingencies."

Pointing out that estimating was carried out principally for protection against the acceptance of orders at a price which would not be a commercial proposition, MR. JEW said an estimate could be divided into two sections—the first being a case of simple arithmetic and the second a matter of judgment.

In the first section were placed the primary factors such as weight and value of materials required, and wages and shop rate for each operation through which the work must pass. The second section covered the secondary factors, or those considerations which affected the work indirectly, such as extra tackle; length of time for which floor space was required; trouble from uneven sections; risks of rejection; position of castings relative to work in hand and machining, etc.

It therefore became obvious that no rules could be made for price-fixing which would apply equally to all foundries. Various methods of estimating must be adopted to suit the individual foundry.

Methods Available

Five methods of estimating could be classified:—

(1) Estimate based on a cursory glance at a pattern or drawing, and a price quoted according to what the estimator assumes the order for the castings will be placed at; or use made of a previous selling price for similar work.

(2) Castings classified by weight considerations only, and prices quoted in inverse proportion to the weight.

(3) Castings classified according to type and weight.

(4) Estimates based on previous orders for similar castings.

(5) Estimates fully considered and prepared from the calculations of weights and wages for each process in the course of production.

The first two methods were guesswork. Methods 3 and 4 presented difficulty when no precedent was available. Changes in method of production, rates of labour and cost of material must be taken into account when basing selling prices on previous records.

In regard to machining allowances, it should be borne in mind that such allowances depend on the type of metal used, the design of the casting, size of the casting, its tendency to warp and the machining method or set-up.

Insufficient information on drawings could seriously affect an estimate. If an inquiry or drawing did not contain sufficient information to enable the estimator to arrive at a definite conclusion as to the actual requirements, he must allow a higher contingency factor and could not offer the lowest price.

Generally speaking, it was not possible to forecast at the estimating stage the class of pattern that would be required nor the machining allowances. A contingency factor must therefore be allowed.

Foundry Responsibility

MR. McGOWAN said one point in favour of the price-per-lb. system was that it enabled the foundryman to make his normal profit even if such an undesirable thing as a swell occurred.

Referring to the difficulty of producing a casting in accordance with calculated weight, he said that when a foundry had to handle a large casting and the foundrymen were asked to prepare an estimate, they would probably know well enough that it would weigh eight tons but a snag faced them in regard to the head they were going to use. One man might want a head of 18 in., another would probably feel that a head of 2 ft. was indicated, and yet another might think in terms of a 3-ft. head. If the drawing office would lay down a definite size for the head, and if they were prepared to take responsibility if the casting proved to be porous, the men in the foundry would probably be able to produce a casting to the required weight.

MR. GODFREY said draughtsmen were not foundrymen—and *vice versa*. Draughtsmen were not interested in heads or risers. Whether a pattern should be made in white wood or mahogany was the business of the patternmaker and was of no concern to the draughtsman. Similarly, heads and risers were the business of the foundryman.

MR. JANE supported Mr. Godfrey, stating that the foundryman must realise that the drawing office was primarily concerned with design. Of course the drawing-office staff should consult with the men in the foundry as to the best way of casting the job and so on, but their responsibility ended there and the job then became the "baby" of the estimator.

Difficulty with Averages

MR. GOYNS declared that the subject of estimating was a very important one, especially if a foundry were dealing with steel castings. The yield in this case might be about 46 per cent. so that the job of estimating would have to be done very carefully. Mr. Goyns felt that the estimator should always take into consideration the price per lb. of hot metal and thereafter the price per hour, thus amalgamating the two methods. If estimating were done by taking an overall yield on the foundry's output, one job might be loaded unnecessarily while another was being sold under its proper price. Mr. Godfrey had been quite correct in his remarks about the accuracy of estimating overseas. If one were producing castings weighing 11 lb., for instance, one's estimating would have to be very accurate indeed.

MR. DAVIDSON said estimating was a matter which required co-operation between the costing people and the various production departments. It was close liaison between three or four persons that gave one a successful estimate. Accurate time-keeping, in his opinion, was one of the most important factors in estimating.

MR. WEST felt that all estimating should be done by an ex-patternmaker. As far as machining allowances were concerned, he considered that an allowance of $\frac{1}{8}$ in. was sufficient for one-off jobs weighing up to 500 lb. in iron and non-ferrous materials. In the case of steel, this allowance would have to be increased to $\frac{1}{4}$ in. Where a job involved a large number off, the machine-shop should determine the optimum machining allowance by a system of trial and error. The pattern could then be altered to get the amount of machining down to a minimum.

A MEMBER pointed out that drawings he had seen in America gave the required dimensions of the castings in both rough and machined conditions. Dotted lines were used to show the outline of the casting before machining, and one could tell at a glance what machining allowance had been provided for.

MR. GODWIN said one should really segregate mass-producing foundries from jobbing foundries in discussing machining allowances. The mass-production foundry had a much better chance of sticking to minimum allowances than the jobbing establishment, because the former would make permanent metal patterns.

J.I.C. Alloy Additions Panel

The Joint Iron Council, to meet an emergency arising through the shortage of certain alloying materials added to cast iron and some pig irons, has formed an alloy additions panel of its Advisory Technical Committee. This panel comprises, Dr. J. E. Hurst, chairman of the Advisory Technical Committee of the Joint Iron Council and president of the British Cast Iron Research Association, Mr. J. J. Sheehan, President of the Institute of British Foundrymen and chairman of the Council of the British Cast Iron Research Association, Mr. P. A. Russell, chairman of the British Cast Iron Research Association's Engineering-castings Sub-committee, Mr. M. M. Hallett, chief metallurgist of the Sheepbridge Engineering Company, Limited, and Dr. J. G. Pearce, O.B.E., director of the British Cast Iron Research Association, who will act as secretary of the panel.

The aim of the panel is to ensure that alloy additions in short supply, particularly nickel and molybdenum, will be made available and will only be used where they are essential for the purpose required, and where no alternative material or procedure is practicable. The existence of the panel should be a safeguard that the Ministry of Supply and/or the raw materials department of the Lord Privy Seal, will be technically guided as to the needs of the iron industry. Ironfounders are invited to notify the secretary of the panel, Dr. J. G. Pearce, of the quantities of nickel and/or molybdenum or other alloying materials which they use, and the purposes for which the materials are required.

Tin Research Institute New Laboratories at Greenford

Diplomatic representatives of tin-producing and consuming countries, together with many distinguished scientists and industrialists, will foregather at Greenford (Middx) on May 31 for the opening of the new laboratories of the Tin Research Institute by the Duke of Gloucester.

The Institute, which originated in 1927, is a unique example of international collaboration for research. Funds for the work are subscribed voluntarily by the mining organisations of the various countries and the results of the researches are published and distributed free to all users of every nationality. The researches are mainly carried on at Greenford, but certain work is entrusted to specialist laboratories both in England and overseas.

On the following day the laboratories will be open for inspection and visitors will see for the first time a new electroplate "tin-nickel" which was discovered at the Institute, an alloy made by the simultaneous deposition of two parts of tin to one part of nickel. The electroplating process is simple and trouble-free and the coating is permanently brilliant under adverse outdoor conditions, the colour tone being a faint rose. A large range of articles has been plated with tin-nickel, sufficient to show that it must be considered a serious rival to chromium.

In addition, five other alloy platings, all invented in the Institute's laboratories, will be seen and other sections will demonstrate research work on hot-dip tinning, soldering, and the mechanical testing of tin alloys, including Babbitt metals.

British Gauge and Tool Industry

The third in the series of exhibitions organised by the Gauge and Tool Makers' Association was opened in London last week by Mr. W. R. Herod, president of the International General Electric Company of America, and co-ordinator of North Atlantic Defence Production. He stressed the importance of the British gauge and tool industry, the key-nature of which is generally appreciated throughout the iron, steel and engineering trades. There are 75 exhibitors on stands of uniform design and colour scheme, showing the latest equipment, including gauges and measuring instruments; jigs and fixtures; special-purpose machinery, press tools; portable power tools; engineers' small tools; moulds and dies, and diamond tools. A competition in craftsmanship and draughtsmanship for apprentices and learners attached to member-firms is being held by the Association in conjunction with the exhibition, and entries are on view. A panel of experts has been appointed to adjudicate the entries, and suitable prizes are being awarded for the best efforts. The exhibition, which is being held in the New Hall of the Royal Horticultural Society, Elverton Street, Vincent Square, London, S.W.1, remains open until to-morrow.

ON APRIL 16 a reception was held at Fabrimetal—the Belgian Employers' Organisation—to welcome home from the United States the teams which had been investigating foundry practice and forging.

AUSTRALIAN VISITORS at the British Industries Fair (1,400) headed the attendance list of overseas buyers. They were followed by Holland (1,250), India (1,030), South Africa (1,000), the Republic of Ireland (950), and the U.S.A. (900).

Summer Overhaul Causes Power Cuts

Complaints about the widespread power cuts which caused serious production losses for industry in recent weeks brought a statement from Mr. Philip Noel-Baker, Minister of Fuel and Power, in the House of Commons. Load shedding, it was stated, reached 10 per cent. in most areas.

Regretting the inconvenience caused, he said that the three main reasons for it were the great increase in the demand for electricity in the first four months of the year, when the British Electricity Authority had sent out 14 per cent. more power than in the same period last year; the large proportion of generating capacity, (28 per cent.) which had been out of commission, mainly because of necessary summer overhaul and maintenance and temporary breakdowns; and the exceptionally cold weather.

Unsuitable coal was "a very small" factor indeed, said the Minister. The amount of capacity out of use because of overhaul and breakdowns was certainly heavier than before the war, and maintenance had to be carried out between April and September. The B.E.A. had to run a great deal of old plant which it had taken over and new plant was having teething troubles. Generating capacity had increased last year by 965 megawatts, 30 per cent. more than in the highest pre-war year. It would increase this year by between 1,050 and 1,100 megawatts.

British Standards Institution

The Monthly Information Sheet for April, issued by the British Standards Institution, lists under "Amendment Slips Issued," PD 1156, Amendment No. 1 to L. 53:1950, Aluminium-magnesium alloy ingots and castings (solution treated); under "Future Publications," B.S. 1735:1951, Flanged cast-iron gate valves, classes 125 and 250, for the petroleum industry (5s.); under "Standards Withdrawn," B.S. 3L.5:1933, Aluminium-zinc-copper alloy castings; B.S. 3L.8:1933, 12 per cent. copper-aluminium alloy castings; B.S. 4L.11:1933, 7/1 aluminium alloy castings; B.S. 2L.24:1933, "Y" aluminium alloy castings; and under "Draft Standards Circulated for Comment," CM 9379, Malleable cast iron and cast copper-alloy pipe fittings (screwed B.S.P. taper male and parallel female thread), for steam, water, gas and oil (revision of B.S. 1256), and CN 162, Malleable cast iron and cast copper-alloy pipe fittings (screwed B.S.P. taper thread or A.P.I. line-pipe thread), for steam, water, gas and oil (revision of B.S. 1431).

Joint Engineering Conference

During the joint engineering conference of the Institution of Civil Engineers, the Institution of Mechanical Engineers, and the Institution of Electrical Engineers, in London, from Monday, June 4, to Friday, June 15, a number of technical Papers on various aspects of engineering will be read, including the following:—On Thursday, June 14, at the Institution of Mechanical Engineers, a Paper entitled "A Century of Engineering Progress in British Coal Mines (1851-1950)," will be read by B. L. METCALF, M.I.Mech.E., M.I.E.E. On Friday, June 15, also at the Institution of Mechanical Engineers, a Paper on "Mechanical Engineering in the Iron and Steel Industry" will be read by W. F. Cartwright, M.I.Mech.E. The office of the joint secretariat of the Conference will be at the Institution of Civil Engineers, Great George Street, Westminster, London, S.W.1.

Spanish Iron and Steel Industry

Present and Future Prospects Reviewed

The Spanish iron and steel industry during the past year or so has been faced with numerous difficulties which restricted output. Indeed, steelworks and blast-furnaces at one time were so hard pressed that the government found it necessary to resume the system of priorities, for industries connected with shipbuilding, electrical power production and electrical plant manufacture, coal mining and railway equipment.

During recent years the output of iron ore has not reached 2 million tons—although the output was nearly 10 million tons in 1913 and 6.5 million tons in 1929. Exports which, in 1929, amounted to 5.5 million tons, have been, for some years, under 2 million and, in the past year, the figure was under a million tons, about three-quarters of which went to the United Kingdom.

TABLE I.—*Spanish Output and Exports of Iron Ore in Thousands of Tons.*

Year.	Output.	Exports.
1913	9,861	8,907
1929	6,546	5,594
1935	2,815	1,893
1941	1,720	559
1942	1,606	671
1943	1,587	591
1944	1,508	527
1945	1,171	261
1946	1,596	789
1947	1,513	729
1948	1,630	843
1949	1,876	989
1950	1,873	949

New Ore Deposits Found

Although some of the principal ore deposits of Vizcaya are becoming exhausted, the prospecting done by the new Spanish Iron and Steel Institute has disclosed new deposits of about 15 million tons (85 per cent. spathic and 15 per cent. hematite) south of Bilbao, and prospecting is being continued in the north of the province, where a compact mass of spathic ore is expected to be found. These two new deposits and the old ones will amount to a very important quantity—sufficient for the local works for many years to come. Spain still possesses large high-grade deposits, some of which have not yet been exploited.

In spite of the difficulties—scarcity of coal, scrap and electricity—the output of pig-iron and steel increased, last year being a continuance of the steady rise in production since 1945, in response to an insistent home demand, which has never been anywhere near satisfied. The figures for 1950 for iron and steel—657,000 tons for pig-iron and 775,000 tons for steel—are the highest for the last 10 years, but fall far short of those for 1929—748,936 tons and 1,003,459 tons respectively.

Progress in developing and modernising the existing Spanish works has continued, although on a small scale, and new coke ovens, blast furnaces, steel furnaces, electric furnaces, and rolling mills have been erected or are in course of erection.

The field of metallurgical investigation is being explored with increasing diligence in Spain and the new Iron and Steel Institute has been active fostering meetings of metallurgists and iron and steel engineers. The principal subjects dealt with have been the treatment of iron ores, design and operation of blast furnaces, steel furnaces and rolling mills; the study of heat-treatment, the production of iron and steel castings and of special steels.

TABLE II.—*Spanish Output of Pig-iron and Steel.*

Year.	Pig-iron.	Steel.
	Tons.	Tons.
1913	424,774	316,336
1929	748,936	1,003,459
1935	341,114	594,710
1941	535,742	574,304
1942	535,298	601,306
1943	583,701	653,689
1944	550,830	495,269
1945	476,754	438,569
1946	493,455	575,361
1947	503,384	548,269
1948	522,496	623,696
1949	619,229	651,623
1950	657,000	775,000

Industrialisation

Spain emerged from the civil war with a clear realisation of the possibilities and implications of the industrialisation of the nation, and the arguments in favour of it were confirmed during the second world war. The Government, eager to consolidate and extend the gains made in years past, has decided to promote Spain's industrialisation to the full. In the middle of 1950 the "*Instituto Nacional de Industria*," a State department, was commissioned to prepare a plan for a new steelworks. Under a new scheme, the Institute has created a company, with a nominal capital of 1,000 million pesetas—of which the Government subscribe 400 million pesetas, leaving 350 for private companies and 250 for foreign capital.

The new plant would produce 531,000 tons of pig-iron (with three blast furnaces) and 613,000 tons of steel (with three tilting open-hearth furnaces of 125 tons and five of 250 tons). The scheme will be carried out in three stages.

The exact location of the new works has not yet been decided, although they are certain to be somewhere in Asturiars, near the coalfields. The iron ores of that district have a very low Fe content and therefore only half of these ores will be charged; the rest being obtained from other provinces and from Spanish Morocco. It is expected that the country's heavy industry will show a substantial growth in the future; a credit of $62.5 million from the United States has been obtained.

Gas Content of Light-alloy Melts

W. Edwards & Company (London), Limited, Worsley Bridge Road, Lower Sydenham, London, S.E.26, have sent us details of an apparatus they have designed in consultation with the British Non-Ferrous Metals Research Association for estimating the gas content of molten light alloys. It is based on the notion that if a sample of liquid aluminium be subject to a reduced pressure of, say, 20 mm. of mercury, the trapped gas in escaping has a profound influence on the size and shape of the test-piece. Thus the test is ordinarily qualitative, though instituting controlled conditions.

The apparatus consists of a vacuum-tight chamber and a system for producing, controlling and measuring the vacuum. The vacuum is created by a "Speedivac" pump. The molten sample is contained in an uncoated iron crucible supported by a fireclay triangle. The entire apparatus is mounted on a trolley having 5-in. dia. castors for mobility on the foundry floor. The table top is 30 in. high and the body measures 25½ by 16½ in. Shelves are fitted for the storage of tools and crucibles.

To make a test, the crucible is warmed up by flushing with liquid metal, refilled, and placed in the vacuum chamber. The pump is then brought into action and in a few seconds the test is completed and the appearance of the sample examined and classified. This will reveal the general condition, so far as gas content is concerned, of the metal being melted. Full details of this new and interesting apparatus are available on writing to Lower Sydenham.

Changes of Name

The undermentioned companies have recently changed their names. The new titles are given in parentheses.

HORSTMAN & FRY, LIMITED, founders, etc., of Bath (Frenchay, Limited).

ISOMETRIC PROJECTIONS, LIMITED, Newport Pagnell, Bucks (High Precision Equipment, Limited).

BLOOR, BAYLEY & COMPANY, LIMITED, Newcastle-under-Lyme, Staffs (Metanodic (Engineers), Limited).

BENFORD, LIMITED, manufacturers of machinery, ironfounders, etc., of Warwick (Cape (Warwick) Holdings, Limited).

OLDINGS (HATFIELD), LIMITED, manufacturers of earth-moving machinery, etc., of North Audley Street, London, W.1 (Jack Olding & Company, Limited).

A.B.E. PROPERTIES, LIMITED, London, S.W.1 (Brush Aboe Properties, Limited). At November 24, 1950, Brush Electrical Engineering Company, Limited, held practically all the issued shares.

POWDERLOYS, LIMITED, manufacturers of metal and plastic powders, etc., of Coventry (Powderloys (Coventry), Limited). At June 22, 1950, A. C. Wickman, Limited, held 76,498 and Fenchurch Nominees, Limited, 73,498 shares out of 150,000 issued.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference E.P.D. or C.R.E. can be obtained from the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, London, S.W.1.

CORK, July 7—Supply and laying of trunk and distribution mains, etc., for the County Council. Mr. E. Callanan, county secretary, Council's Offices, Clonakilty. (Deposit, £10 10s.)

MORETON-IN-MARSH, June 21—Provision and laying of approx. 1,820 yds. of 6 in., 7 in., and 9 in. dia. spun-iron sewers, approx. 550 yds. of 6 in. dia. GSS sewers, and approx. 1,760 yds. of 4 in. and 7 in. dia. spun-iron pumping main, etc., for the North Cotswold Rural District Council. W. H. Bateman & Partners, Chesterfield House, Batheaston, Bath. (Deposit, £5 5s.)

Weights and Measures

The report of the committee on Weights and Measures Legislation, which was appointed in October, 1948, by the president of the Board of Trade "to review the existing Weights and Measures legislation and other legislation containing provisions affecting weights and measures and the administration thereof, and to make recommendations for bringing these into line with present-day requirements," has now been published. The report is unanimous. Certain recommendations are in favour of complete departures from existing practices. Of these one of the most important is that the Government should, in concert with the Governments of the Commonwealth and the U.S.A., abolish the imperial system of measurement in favour of the complete adoption of the metric system over a period of about twenty years. The committee also recommends, whether this long-term and admittedly controversial proposal be accepted or not, that the imperial yard and pound should as soon as possible be defined as specific fractions of the international metre and kilogramme instead of by reference to the present Imperial Standards, in such a way as to bring, if possible, the values of the United States' and the British yards and pounds into exact agreement. It further recommends that the apothecaries, troy and pennyweight systems of measurement, together with certain obsolete imperial units, should be abolished, and that a permanent commission on units and standards of measurement, to be composed mainly of persons distinguished in the science of measurement, should be appointed by the president of the Board of Trade to advise on matters relating to the units and standards of all forms of measurement.

Schuman Plan Welcomed

By a majority of 80 votes to seven, with nine abstentions, the European Assembly welcomed the Schuman coal and steel plan on May 11. Oppositions came from the German and Saar Socialists, while eight of the nine British Labour Party members and a Socialist from Luxembourg accounted for the abstentions.

In earlier votes on separate clauses the British Labour members joined in welcoming the Schuman treaty and in expressing the hope that Great Britain and other interested countries would examine the possibility of negotiating a working agreement with the High Authority. Later the Assembly discussed a draft convention of a European transport pool modelled on that of the coal and steel pool.

German trade-union leaders, while expressing formal, if unconditional approval of the plan, have asked that there should be full economic equality for Western Germany before it is ratified, and that before the coal sales board is disbanded a system be devised to safeguard German wishes on coal.

Board Changes

BARROW, HEPBURN & GALE, LIMITED—Mr. J. A. Rowland and Mr. J. S. Mitchell have been appointed to the board.

TWEEDALES & SMALLEY (1920), LIMITED—Mr. A. H. Lawton, the chairman, has resigned from the board, and Mr. F. R. W. Preston, the deputy chairman, has been appointed in his stead.

CONSOLIDATED MINING & SMELTING COMPANY OF CANADA, LIMITED—Mr. W. A. Mather has been elected vice-president, succeeding Mr. Ross McMaster, who has been re-elected a director.

Personal

MR. ARTHUR SELVEY, an inspector at the foundry of Ley's Malleable Castings Company, Limited, has been elected a member of Derby Town Council.

MR. A. A. SWINBANK, commercial manager at the Wilton (Yorks) works of Imperial Chemical Industries, Limited, has been elected a member of Middlesbrough Town Council.

MR. FRASER YORKSTON, outdoor representative of Jones & Campbell, Limited, Torwood Foundry, Larbert, has received a gold watch from the firm on completing 50 years' service.

MR. C. E. HANCOCK, of Edgar Allen & Company, Limited, steelmakers, etc., of Sheffield, has taken up new duties on the sales staff at the Johannesburg office of Edgar Allen & Company (South Africa), Limited.

MR. J. H. RUSSELL, works director of Hall & Pickles, Limited, has been elected president of the Crucible Steel Makers' Association in succession to MR. PERCY WARDROBE, director of Wardrobe & Smith, Limited, who has held office since 1948.

MR. J. D. F. YUILE has been elected secretary of the West Wales section of the Wales and Monmouth branch of the Institute of British Foundrymen. Mr. A. S. Wall, who has been acting as secretary, continues, of course, as secretary of the parent branch. Mr. Yuile's address is 85, Vicarage Road, Morriston, Swansea.

MR. G. E. BEHARRELL, deputy chairman and managing director of the Dunlop Rubber Company, Limited, has been elected president of the Society of Motor Manufacturers and Traders in succession to MR. W. LYONS, chairman and managing director of Jaguar Cars, Limited, who becomes deputy president of the society.

MR. R. J. GOSSAGE has been appointed the first sea-going scientific adviser to the staff of a commander-in-chief in the Royal Navy. A physicist, who took a leading part in devising counter-measures to the German magnetic mine early in the last war, he will take up his post as scientific adviser to Admiral Sir Philip Vian when the Home Fleet visits Rosyth early next month.

MR. B. C. CURLING'S services to the Institute of Marine Engineers are to be recognised by the opening of a presentation fund. As previously announced, Mr. Curling, who has been secretary of the Institute for the last 30 years, will be retiring next October. The council of the Institute is keeping the subscription list open until September 1 to enable overseas members to participate.

MR. G. E. FOXWELL, formerly chief technical officer of Koppers Coke Oven Company (1943), Limited, is to be the next president of the Institute of Fuel. He joined Koppers in 1912 as a junior chemist and took the B.Sc. degree of London University, the M.Sc. and the D.Sc. He has contributed valuable Papers which have opened the way to more progressive research into the coking of coal. Mr. Foxwell takes office in October.

THIRTEEN EMPLOYEES of James Howden & Company, Limited, engineers, Glasgow, who have been with the firm for 40 years or more, received inscribed gold watches on May 16 to mark their long service. The gifts were presented by Mr. Crawford W. Hume, chairman of directors, to the following:—Mr. James Fulton (62 years' service), Mr. Henry Glen (46 years), Mr. William Ferguson and Mr. James Murray (43 years), Mr. James Purvis and Mr. Alfred MacIntyre (42 years), Mr. Robert Burns, Mr. John Cochran, Mr. James Fulton, Mr. James McGuire, and Mr. Arthur Thomson (41 years), Mr. Arthur Hills and Mr. George Mulgrew (40 years).

Movement of Wholesale Prices

The index of wholesale prices prepared by the Board of Trade registered a rise of 1.5 per cent. in April. Prices of a number of raw materials, including tin and rubber, fell during the month, but there were price increases in the non-ferrous and the chemicals and oils groups, with the net result that there was little change from the previous month in the industrial materials and manufactures index.

Compared with 1938 the index for all items has risen by 214 per cent., and for industrial materials and manufactures by 258 per cent.

There was a rise of 0.3 per cent. in the iron and steel index during April, the price of galvanised steel sheets rising by 2.0 per cent., and of tinplate by 6.8 per cent. In the non-ferrous group, copper and brass prices rose by 4 per cent., zinc by 5.8 per cent., and pig-lead and lead pipes by 16 and 17 per cent., respectively. The price of tin, however, continued to fall, the average price for the month being 9.4 per cent. lower than in March. The index for the non-ferrous group rose by 6.3 per cent.

The following table, taken from the "Board of Trade Journal," shows the movement of wholesale prices of industrial and building materials, expressed as percentage increases on the average for the year 1930=100.

Group.	1950.			1951.			
	April.	Nov.	Dec.	Jan.	Feb.	Mar.	April.
Coal .	305.3	308.6	311.2	311.2	329.9	332.7	333.0
Iron and steel .	257.9	265.1	265.4	267.8	269.5	277.2	278.1
Non-ferrous metals .	277.6	434.8	461.0	467.2	453.2	451.3	479.8
Chemicals and oils	201.5	220.1	221.2	223.4	231.3	232.9	239.4
Building materials	223.8	237.9	237.6	238.6	241.2	252.1	†

† Discontinued.

Exports at New Peak

The value of British exports during April, according to provisional figures, was at the new record level of £241,100,000, which compares with the previous peak of £222,900,000 in January last. Exports in March were valued at £207,600,000.

Imports also set up a new record in April, the figure of £311,500,000 comparing with the previous record of £303,400,000 which was returned in March. April imports were 44 per cent. above the monthly average for last year.

There was a drop in the visible adverse balance during April from the post-war high level of £95,800,000 recorded in March to £70,400,000.

Electro-metallurgical Research

The following reports have been published by the Electrical Research Association and are available on application: Technical Report N/T59, 1950. "Domain Wall Movement in a Single Crystal" by K. H. STEWART (price 3s.); Report N/T58, 1950, "The Domain Structure of Ferromagnetic Crystals" by H. LAWTON (price 6s.); Report N/T55, "The Use of the Bitter Powder Pattern Technique in the Determination of the Domain Structure of Single Crystals of Silicon-Iron" by PROF. L. F. BATES and F. E. NEALE (price 18s.). Copies may be obtained from the British Electrical and Allied Industries Research Association, Thornycroft Manor, Dorking Road, Leatherhead, Surrey.

News in Brief

THE PRICE OF CRUDE LINSEED OIL was increased from £160 to £180 per ton naked ex works from May 20.

OWING TO THE SHORTAGE of raw materials Ley's Malleable Castings Company, Limited, Derby, had two days longer holiday than usual at Whitsuntide.

ON ACCOUNT OF THE inadequacy of rail transport, the Sheffield Trades Technical Society have cancelled a visit by their members to the Festival of Britain—South Bank Exhibition.

IT IS PROBABLE that silica mining at the village of Bwlchgwyn, near Wrexham, will go ahead despite the fact that at an inquiry held 18 months ago it was stated that it might mean the virtual extinction of the village.

EMPLOYEES OF Babcock & Wilcox, Limited, Renfrew, last week received their two weeks' extra wages as bonus for increased production, and in many cases this meant pay envelopes containing anything from £20 to £30.

THE DUCHESS OF KENT performed the opening ceremony of the Leicester, Leicestershire and East Midlands Industries Exhibition and Trade Fair at the Granby Halls, Leicester, yesterday. The exhibition will remain open until June 2.

BURNBANK FOUNDRY SCHOOL for apprentices in the light castings industry will probably be opened in September. It is estimated that for each week 200 young people, or 40 a day, will attend the school to begin with. In all, 313 apprentices will be available for attendance.

BRITISH RAILWAYS has awarded a contract to build 1,200 mineral wagons valued at £500,000 to the Butterley Company, Limited, Ripley, near Derby. The wagons will be all-welded and will require 9,000 tons of steel. Work on the new contract will be started early in 1952 and it will be completed in about a year.

THOMAS BROADBENT & SONS, LIMITED, engineers, Central Iron Works, Huddersfield, have bought Buxton Road Methodist Chapel, Huddersfield, to extend their business premises. The chapel has been closed for worship for 15 months. It is understood that Broadbent's intend to use it as an office block.

THE MARSHALL ORGANISATION announce the appointment of Mr. T. W. Stanier as general sales manager to Marshall Sons & Company, Limited, Gainsborough and John Fowler & Company (Leeds), Limited. Prior to this appointment Mr. Stanier was for a number of years export sales manager of Aveling Barford Limited, Grantham.

A LICENCE FOR THE MANUFACTURE of bi-metallic automotive components through use of the Al-Fin process has been granted to Aluminiumwerke Nürnberg, of Nürnberg, Germany, the Fairchild Engine and Airplane Corporation announces. The Al-Fin process, developed by Fairchild, is a method of molecularly bonding aluminium and its alloys to iron or steel.

A LETTER received from Foundry Equipment Limited of Linslade Works, Leighton Buzzard, Bedfordshire, reports the results of their exhibition at the Castle Bromwich section of the British Industries Fair, where they showed the Junior Sand Rammer. It is stated that 20 per cent. of the enquiries were from overseas buyers. The business done was good and "exceeded expectations."

AN ORDER has been placed by the Victorian Electricity Commission, Australia, with the Westinghouse Electric International Development Company at an estimated cost of nearly £A6,000,000. This is part of equipment for power stations valued at $11,000,000, with a total generating capacity of 60,000 kw., which will be obtained from the United States by the Commission.

THE DIRECTORS of W. & T. Avery, Limited, weighing, testing, and counting machine manufacturers, of Birmingham, announce that consent of the Capital Issues Committee has been received for the company to make a free issue of ordinary £1 shares to the ordinary stockholders, at the rate of one share for each ordinary £1 stock unit held on June 26 next. The new shares will not rank for dividend in respect of the year ended March 31 last.

THE SOCIETE FRANCAISE DE METALLURGIE is to hold its annual autumn symposium in Paris from October 22-27. The meeting will be run on similar lines to the one arranged last October when a large number of specialists from other countries presented Papers. The French Society is anxious to have once more the collaboration of scientists from abroad concerned with different problems of metallurgy. Those interested are invited to write to the Société Française de Métallurgie, 5, Cité Pigalle, Paris, 9.

THREE SENIOR EXECUTIVES of G. Clancey, Limited, West Bromwich and Halesowen, makers of valve guides and tappets for the bulk of the British motor industry (the firm produced some special castings for the Rover gas-turbine car) have been made directors. They are Mr. C. Field, works manager, Mr. F. G. Timmins, foundry manager, and Mr. E. R. Dunsby, sales manager. Mr. G. Clancey is chairman and managing director of this privately-owned company, which he founded 25 yrs. ago.

AN ORDER for four bulk ore carriers each of 22,400 tons dw. placed with the Fairfield Shipbuilding & Engineering Company, Limited, Govan, by the Liberian Navigation Corporation is described as being one of the largest contracts to be placed with a single British shipyard. The new vessels will be similar to the two bulk ore carriers ordered by the same owners from the Fairfield Company early last year, when it was stated that they were the largest ore carriers to be constructed in the British Isles.

TREASURY CONSENT has been received by the Metal Agencies Company, Limited, to the capitalisation of £313,263 of reserves and to issue to ordinary stockholders as a free bonus two new ordinary shares of 5s. each for every 5s. unit held. In January, 1951, the ordinary capital was increased by the issue of 104,421 ordinary shares of 5s. each to existing holders at a premium of 23s. per share. During the year the company acquired for cash the share capital of Service & Company, Limited, of Plymouth.

THE LATEST air freight booklet published by the British Overseas Airways Corporation gives details of all the corporation's facilities for the carriage of air freight from the United Kingdom, including special collection services, favourable insurance rates, and special commodity rates for certain classes of goods. Following are some of the commodities for which charges are given:—Agricultural implements, machinery components and parts; coke-oven parts; cutlery; electrical equipment; internal combustion engines; machinery; metals; scientific instruments; tool tips.

THE OUTPUT of commercial vehicles in March was 23,952, making 68,646 for the quarter, compared with 66,683 last year, while motor-car production was 41,592 in March, bringing the quarter's total to 123,174, compared with 131,371 in the first quarter of 1950. Commercial vehicle exports were slightly higher during the first quarter at 34,046 (33,863), and the total value of car, commercial vehicle, and agricultural tractor exports in March was £15,800,000, compared with £16,100,000 in February. The industry is becoming increasingly handicapped by the shortage of sheet steel and other materials.

Raw Material Markets

Iron and Steel

The difficulties arising from the short deliveries of foreign ore are still acute, and most of the blast furnaces are operating below their full capacity. News from the ore ports does not encourage hopes of early improvement. Tonnage is still scarce and the ascent of freight rates does not appear to have been completely arrested. The consequential contraction in the production of pig-iron has already involved the foundries in serious difficulties. Full allocated tonnages are unobtainable, and as stocks are now almost exhausted, outputs of castings, for which there is a heavy demand, are adversely affected.

The chief problem of the re-rollers is to use available supplies of steel semis to the best advantage. There is scope for their ingenuity and adaptability in the use of defectives and re-rolling scrap to eke out the supply of prime billets, etc. Deliveries of home-produced semis are maintained at a high level, but still they do not suffice wholly to compensate for the drop in the imports of material from Belgium. The sheet-bar position is becoming very difficult, and scarcity of acid severely limits the possibility of galvanising.

Substantial rearmament orders have now reached the steelworks and these involve extensive changes in production. Inevitably these changes will involve a contraction in the export trade. In fact, shipments are already in arrears owing to the shortage of shipping. This is most noticeable on the Far Eastern run, and considerable tonnages are also awaiting shipment to Canada and the United States.

The capacity of the sheet and light-plate mills is heavily overtaxed and demand for material for shipbuilding has reached its highest peak. The speed-up in wagon building also involves heavy demands on the rolling mills and the call for railway equipment is such that even the home railways are on short commons.

Non-ferrous Metals

Mr. Gibson, acting administrator of the Defence Production Authority in Washington, has announced that the copper companies, and not the U.S. Government, will be called upon to foot the bill for the additional 3 cents per lb. on copper, recently agreed between Chile and the United States. It was added that the U.S. Government has no authority to pay this subsidy, but it is only the other day that a contrary view was expressed by an official of the General Service Administration. Not unnaturally, the American companies, which own the Chilean mines, feel disturbed over this development, for as things stand at the moment there is a price ceiling on the U.S. domestic price of 24½ cents per lb. Some days may elapse before matters are straightened out satisfactorily, but at the time of writing it certainly looks very much as though a rise will take place in the f.a.s. New York quotation. This would, of course, mean that the Ministry of Supply here would be involved in a higher price for the copper it purchases from Northern Rhodesia and Canada. Consumers in Britain may be called upon to pay as much as £24 additional to the present-day price of £210.

It is all very confusing and points the moral of the advantage of having a free and independent market in London, which would react promptly and accurately to all events bearing on the copper price.

In scrap there is nothing fresh to report, supplies being as scarce as ever and consumers very short of much needed material. It is hoped that when the new control Order fixing upper limits for ingots is made effective some improvement will occur. Licensing of scrap acquisition and the compulsory revelation of stocks held should also go some way towards preventing metal getting into the wrong hands. But there is no escaping the fact that the disease from which the non-ferrous industry is suffering is that of undernourishment, and until a normal flow of virgin metal is restored the scrap situation cannot improve. It is believed that the Ministry is endeavouring to add to the supplies of metal already secured under long-term arrangements with the producers. At the moment the lead situation seems to be the most difficult, but the outlook is not very bright for any of the metals.

Metal Exchange official tin quotations were as follow:—

Cash—Thursday, £1,145 to £1,150; Friday, £1,145 to £1,155; Monday, £1,140 to £1,145; Tuesday, £1,125 to £1,130; Wednesday, £1,130 to £1,135.

Three Months—Thursday, £1,120 to £1,125; Friday, £1,115 to £1,120; Monday, £1,115 to £1,120; Tuesday, £1,105 to £1,110; Wednesday, £1,105 to £1,110.

Italian Grey-iron Production

According to recent statistics available there are 898 foundries in Italy employing 37,000 men. Their total output potential is 491,000 tons yearly but at present they are working at the rate of 384,000 to 401,000 tons a year or to the extent of about 80 per cent. of their capacity.

Only 18 of these foundries are large, employing as they do an average of 450 men each. They account for about 29 per cent. of the country's potential in this field. About 25 per cent. of the capacity is represented by medium-size foundries, 80 in number, employing on the average some 150 men each. The remaining 46 per cent. are represented by 800 small foundries employing an average of 21 men each. This, however, is only a statistical average and many of them are so small that the proprietor is actually one of the workmen.

This predominance of small foundries is typical of Italy and it reacts unfavourably on the productivity. This is clearly evident if the statistics of the output per man/hour in various countries be compared, *viz.*:—United States, 33.0; Holland, 15.7; France, 15.4; Germany, 13.2, and Italy, 10.7 lb. per man/hour.

Even without taking into consideration the exceptionally high American output due to integrated mechanisation, it is clear that the productivity of most of Italian foundries is poor. The fact is that only about one in five is specialised in definite types of work and the rest are only jobbing foundries undertaking any job and having recourse to improvisation which, while often being very clever, waste time and material.

The evident remedy is to reduce the number of small foundries and introduce a greater degree of mechanisation into the large ones. It is observed, for instance, that France has only 750 foundries or 16½ per cent. fewer than Italy and yet produces 900,000 yearly tons or more than double the Italian output.

Mechanical Handling.—Ransomes & Rapier, Limited of Ipswich have just released three folders covering "8" and "5" super mobile cranes and portable electric wharf winches. Both technical and commercial information is given, while good use has been made of illustrations.

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

(Delivered, unless otherwise stated)

May 23, 1951

PIG-IRON

Foundry Iron.—No. 3 Iron, Class 2 :—Middlesbrough, £10 17s. 9d. ; Birmingham, £10 13s.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £12 9s., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si)—North Zone, £12 16s. 6d. ; South Zone, £12 19s.

Scotch Iron.—No. 3 foundry, £12 7s. 9d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £13 7s. 6d. ; South Zone, £13 10s.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £13 17s. 6d. ; South Zone, £14.

Cold Blast.—South Staffs, £16 10s. 6d.

Hematite.—Si up to 2½ per cent., S. & P. over 0.03 to 0.05 per cent. :—N.-E. Coast and N.-W. Coast of England, £12 7s. 6d. ; Scotland, £12 14s. ; Sheffield, £13 2s. 6d. ; Birmingham, £13 9s. ; Wales (Welsh iron), £12 7s. 6d.

Spiegeleisen.—20 per cent. Mn, £18 3s.

Basic Pig-iron.—£10 19s. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered.)

Ferro-silicon (6-ton lots).—40/55 per cent., £37 15s., basis 45% Si, scale 14s. per unit ; 70/84 per cent., £52, basis 75% Si, scale 14s. 6d. per unit.

Silicon Briquettes (5-ton lots and over).—2lb. Si, £44 2s. ; 1lb. Si, £45 2s.

Ferro-vanadium.—50/60 per cent., 15s. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 9s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £167 ; ditto, copper-free, £183.

Ferro-tungsten.—80/85 per cent., 31s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 33s. 6d. per lb. of W.

Ferro-chrome (6-ton lots).—4/6 per cent C, £66, basis 60% Cr, scale 22s. per unit ; 6/8 per cent. C, £61, basis 60% Cr, scale 21s. per unit ; max. 2 per cent. C, 1s. 6¾d. per lb. Cr ; max. 1 per cent. C, 1s. 7¼d. per lb. Cr ; max. 0.15 per cent. C 1s. 8d. per lb. Cr. ; max. 0.10 per cent. C, 1s. 8¼d. per lb. Cr.

Chromium Briquettes (5-ton lots and over).—1lb. Cr, £69 4s.

Cobalt.—98/99 per cent., 17s. 6d. per lb.

Metallic Chromium.—98/99 per cent., 5s. 9d. per lb.

Ferro-manganese (blast-furnace). — 78 per cent., £36 1s. 1d.

Manganese Briquettes (5-ton lots and over).—2lb. Mn, £40 15s.

Metallic Manganese.—96/98 per cent., carbon-free, £215 per ton.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—Basic : Soft, u.t., £17 4s. ; tested, up to 0.25 per cent. C (100-ton lots), £17 9s. ; hard (0.42 to 0.60 per cent. C), £19 4s. ; silico-manganese, £24 6s. 6d. ; free-cutting, £20 9s. Siemens Martin Acid : Up to 0.25 per cent. C, £22 11s. 6d. ; case-hardening, £23 9s. ; silico-manganese, £26 14s.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £20 4s. ; basic, hard, over 0.41 up to 0.60 per cent. C, £21 9s. ; acid, up to 0.25 per cent. C, £23 9s.

Sheet and Tinplate Bars.—£17 6s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £21 3s. ; boiler plates (N.-E. Coast), £22 10s. 6d. ; chequer plates (N.-E. Coast), £23 8s. ; heavy joists, sections, and bars (angle basis), N.-E. Coast, £20 1s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £22 15s. ; flats, 5 in. wide and under, £22 15s. ; hoop and strip, £23 10s. ; black sheets, 17/20 g., £29 13s. ; galvanised corrugated sheets, 17/20 g., £43 6s.

Alloy Steel Bars.—1-in. dia. and up : Nickel, £37 19s. 3d. ; nickel-chrome, £56 6s. ; nickel-chrome-molybdenum, £63 1s.

Tinplates.—48s. 3½d. per basic box.

NON-FERROUS METALS

Copper.—Electrolytic, £210 ; high-grade fire-refined, £209 10s. ; fire-refined of not less than 99.7 per cent., £209 ; ditto, 99.2 per cent., £208 10s. ; black hot-rolled wire rods, £219 12s. 6d.

Tin.—Cash, £1,130 to £1,135 ; three months, £1,105 to £1,110 ; settlement, £1,135.

Zinc.—G.O.B. (foreign) (duty paid), £160 ; ditto (domestic), £160 ; "Prime Western," £160 ; electrolytic, £164 ; not less than 99.99 per cent., £166.

Lead.—Good soft pig-lead (foreign) (duty paid), £160 ; ditto (Empire and domestic), £160 ; "English," £161 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, all English destinations, £180 ; rolled zinc (boiler plates), all English destinations, £178 ; zinc oxide (Red Seal), d/d buyers' premises, £178.

Other Metals.—Aluminium, ingots, £124 ; antimony, English, 99 per cent., £390 ; quicksilver, ex warehouse, £73 10s. to £74 ; nickel, £406.

Brass.—Solid-drawn tubes, 21¾d. per lb. ; rods, drawn, 29¼d. ; sheets to 10 w.g., 26⅝d. ; wire, 27⅛d. ; rolled metal, 25⅝d.

Copper Tubes, etc.—Solid-drawn tubes, 23¼d. per lb. wire, 226s. 6d. per cwt. basis ; 20 s.w.g., 254s. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), — ; BS. 1400—LG3—1 (86/7/5/2), — ; BS. 1400—G1—1 (88/10/2), — ; Admiralty GM (88/10/2), virgin quality, — , per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, — ; L.P.Bl, — per ton.

Phosphor Bronze.—Strip, 37d. per lb. ; sheets to 10 w.g., 39⅜d. ; wire, 40½d. ; rods, 36¾d. ; tubes, 42d. ; chill cast bars : solids —, cored, —. (C. Clifford & Son, Limited.)

Nickel Silver, etc.—Ingots for raising, 2s. 4¼d. per lb. (7%) to 3s. 3½d. (30%) ; rolled metal, 3 in. to 9 in. wide × .056, 2s. 10¼d. (7%) to 3s. 9½d. (30%) ; to 12 in. wide × .056, 2s. 10½d. to 3s. 9¾d. ; to 25 in. wide × .056, 3s. 0½d. to 3s. 11¾d. Spoon and fork metal, unsheared, 2s. 7¼d. to 3s. 6⅛d. Wire, 10g., in coils, 3s. 4d. (10%) to 4s. 3¼d. (30%). Special quality turning rod, 10%, 3s. 3d. ; 15%, 3s. 7¾d. ; 18%, 4s. All prices are net.

Forthcoming Events

MAY 28

Incorporated Plant Engineers

West and East Yorkshire:—"Recent Developments in Metallurgy," by Dr. Irvine, of Leeds University, 7.30 p.m., in the Fuel Department, or the Mining Department Lecture Theatre, Leeds University.

MAY 30

Institution of Production Engineers

Shrewsbury Sub-section:—"Commercial Possibilities of the Lost-wax Process," by A. Short, 7.30 p.m., at the Technical College, Shrewsbury.

MAY 30 to JUNE 2

Birmingham and District Industrial Safety Group

Exhibition, to be held in the Bingley Hall, Birmingham.

MAY 30 to JUNE 1

Iron and Steel Institute

Annual General Meeting, beginning at 10 a.m., at 4, Grosvenor Gardens, London, S.W.1. Details published in the JOURNAL, April 19, 1951.

Wills

BAKER, W. B., joint secretary of Swinney Bros., Limited, ironfounders, of Morpeth (Northumberland), previously chief clerk with Smith's Dock Company, Limited, North Shields £3,728

DEWAR, M. B. U., chairman of British Timken, Limited, and Fischer Bearings Company, Limited, a director of Cincinatti Milling Machines, Limited, and Neckar Water Softener Company, Limited, and interested in other companies, who was closely associated with the United States Ordnance in designing and producing the Sherman tank, and a former vice-president of the Federation of British Industries £464,411

Obituary

MR. J. B. BOYLE, formerly at the Renfrew branch of Babcock & Wilcox, Limited, died on May 13, at the age of 78.

MR. JAMES MORTON, late of Alexander Stephen & Sons, Limited, shipbuilders, etc., of Linthouse, Glasgow, died on May 9.

MR. DAVID BAUM, a director of C. & J. Hampton, Limited, manufacturers of engineers' and woodworkers' tools, etc., of Sheffield, died suddenly on May 9 at the age of 74.

MR. EDWARD EVANS, assistant secretary of Belliss & Morcom, Limited, engineers, of Birmingham, died on May 9 at the age of 61. He had been with the company for 48 years.

The death has occurred of MR. J. W. CROWTHER, at the age of 78. For over 46 yrs. he was foundry manager for John Haigh & Sons, Limited, textile machinery manufacturers, Priestroyd Ironworks, Huddersfield. A native of Todmorden, Mr. Crowther retired in 1946.

THE DEATH IS ANNOUNCED of Mr. H. Stringer, foundry foreman at the Widnes Foundry & Engineering Company, Limited, where he had spent nearly 30 yrs. of his working life. He was 59 yrs. old, and joined the Institute of British Foundrymen in 1936.

THE SHIPPING AND INDUSTRIES EXHIBITION, which is to form part of Southampton's Festival of Britain activities, will be inaugurated by Earl Mountbatten on June 30. It will remain open until July 14.

CLASSIFIED ADVERTISEMENTS

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

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

SITUATIONS WANTED

FOUNDRYMAN.—Keen, with experience of all foundry requirements in grey, high duty irons and steel, seeks change, where experience can be fully utilised. Any district considered.—Box 980, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER, iron and non-ferrous, seeks situation with progressive company. Wide experience in general jobbing work and mechanised production; estimating, costing and outside representation. Cupola control for high duty irons.—Box 998, FOUNDRY TRADE JOURNAL.

GENERAL FOUNDRY MANAGER (age 45) desires change. Present position full control of foundries and pattern shop producing heavy, medium and light castings for machine tool, marine, electrical, and diesel engine work, ranging from semi-mechanised and core assembly production up to 35 tons in loam, green and dry sand. Sound practical training, commercial and technical experience, accustomed to full control, good organiser with modern ideas.—Box 966, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

PATTERNMAKERS REQUIRED.—MOYLE, KINGSTON-ON-THAMES.

PATTERNMAKERS (metal) for air-cooled cylinder work. State age, experience, and wages required.—THE BIRCO MOTOR CYLINDER CO., LTD., Oldbury Road, West Bromwich.

ASSISTANT to Foundry Manager for small Foundry, who specialise in high duty iron castings. Man with knowledge of machine shop routine preferred. State age and experience. Salary £800 p.a.—Box 968, FOUNDRY TRADE JOURNAL.

SKILLED MOULDERS, PLATERS, TURNERS, BORERS, etc., required by Distington Engineering Co., Ltd., Workington, Cumberland.—For further details apply to the LABOUR MANAGER.

REPRESENTATIVE, calling on Foundries and Engineers Lancs. and Yorks., to sell Red Moulding Sand, on commission.—Reply Box 962, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required for Grey Iron Foundry in Birmingham district. Plate work and light general castings. Able to quote, price, control labour and cupola. State age, experience, and salary required.—Box 958, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

MANAGER for Gravity Die Casting Foundry. Good salary for first-class ability and personality.—JOHN DALE, LTD., London Colney, St. Albans, Herts.

MOULDER required for bedding in lumpy castings averaging 2 tons. Good piecework rates. 5-day week.—MOYLE, Kingston-on-Thames.

FOUNDRY METALLURGIST required for Steel Foundry in Scotland. Must be experienced in the production of alloy steel castings from electric Furnace (Ark) and Tropenas processes. This is a progressive position to the right person.—Reply, giving details of experience, age, and salary required, to Box 960, FOUNDRY TRADE JOURNAL.

CORE-SHOP FOREMAN required for Grey Iron Foundry in Tipton, Staffordshire. Applicants must be technically sound and capable of controlling both male and female labour. Excellent Canteen facilities and Superannuation Scheme in operation. Our present staff is aware of this advertisement.—Apply, stating age, experience, and salary required, to Box 984, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER, to take charge of Non-ferrous Metal Foundry in Manchester district. Qualifications required include sound practical experience and managerial ability. Applicants should give full particulars of technical and practical experience, together with age, wages required, and when at liberty to commence.—Box 978, FOUNDRY TRADE JOURNAL.

UNION STEEL CORPORATION (OF SOUTH AFRICA), LTD.

EXPERIENCED FOUNDRY SUPERINTENDENT required to control the Steel and Iron Foundry at Vereeniging, Transvaal. Annual production 4,500 tons of steel and 2,500 tons of iron castings.

Applicants must have practical and technical knowledge of the manufacture of castings in plain carbon, alloy, and manganese steels up to 20 tons in weight, be fully conversant with estimating from customers' drawings, and also job costing methods. Previous positions held should be stated, also age and marital state.

Commencing salary £1,200 per annum, on an initial three years' contract, plus "cost of living" allowance, at present £190 per annum for a married person. It is obligatory for the successful applicant to join the Corporation's pension, recreation and medical benefit funds.

Fare to South Africa for successful applicant and family will be paid by the Corporation.

Applications, endorsed with the reference "U/39," should be forwarded to the LONDON REPRESENTATIVE, Union Steel Corporation (of South Africa), Ltd., 535/546, The Adelphi, London, W.C.2.

SITUATIONS VACANT—*Contd*

FOUNDRY FOREMAN.—Good practical Foundry Foreman wanted for small Foundry in Merseyside area. Capable of taking full charge of Foundry and Fettling Shop, etc.—Applicants should give details of experience and state salary required to Box 996, FOUNDRY TRADE JOURNAL.

PATTERNMAKERS wanted. Wood and metal. Constant employment.—Apply J. H. MAY, 117, Central Street, London, E.C.1.

FOUNDRY MANAGER required for important Light Castings Foundry in Birmingham area. Mechanised and floor moulding foundries. Successful candidate must be M.I.B.F., good disciplinarian, with knowledge of planned production. Experience in production of castings for vitreous enamelling would be an advantage. Excellent prospects. Staff Pension Scheme. Age preferred 35-45. Give full details, in confidence, of age, experience, and salary required, Box 992, FOUNDRY TRADE JOURNAL.

PATTERNMAKERS.—Two good men required for wood, tin and stucco work. Excellent working conditions, canteen and welfare facilities.—Apply to WORKS MANAGER, Smith & Wellstood, Ltd., Bonnybridge.

METALLURGIST required, preferably with some knowledge of engineering.—State age, experience, and salary required, to JOHN GARDOM & Co., Ripley, near Derby.

NATIONAL FOUNDRY COLLEGE.

APPLICATIONS are invited from suitable candidates for:—

(1) THE TWO-YEAR DIPLOMA COURSE, and
(2) THE ONE-YEAR RESEARCH COURSE,

both courses commencing in the Autumn of this year.

The Courses are of post-graduate standard, although it is not essential for Students to possess a degree. There is liberal provision for awards of College Scholarships.

Full details of entry qualifications and application forms may be obtained from:

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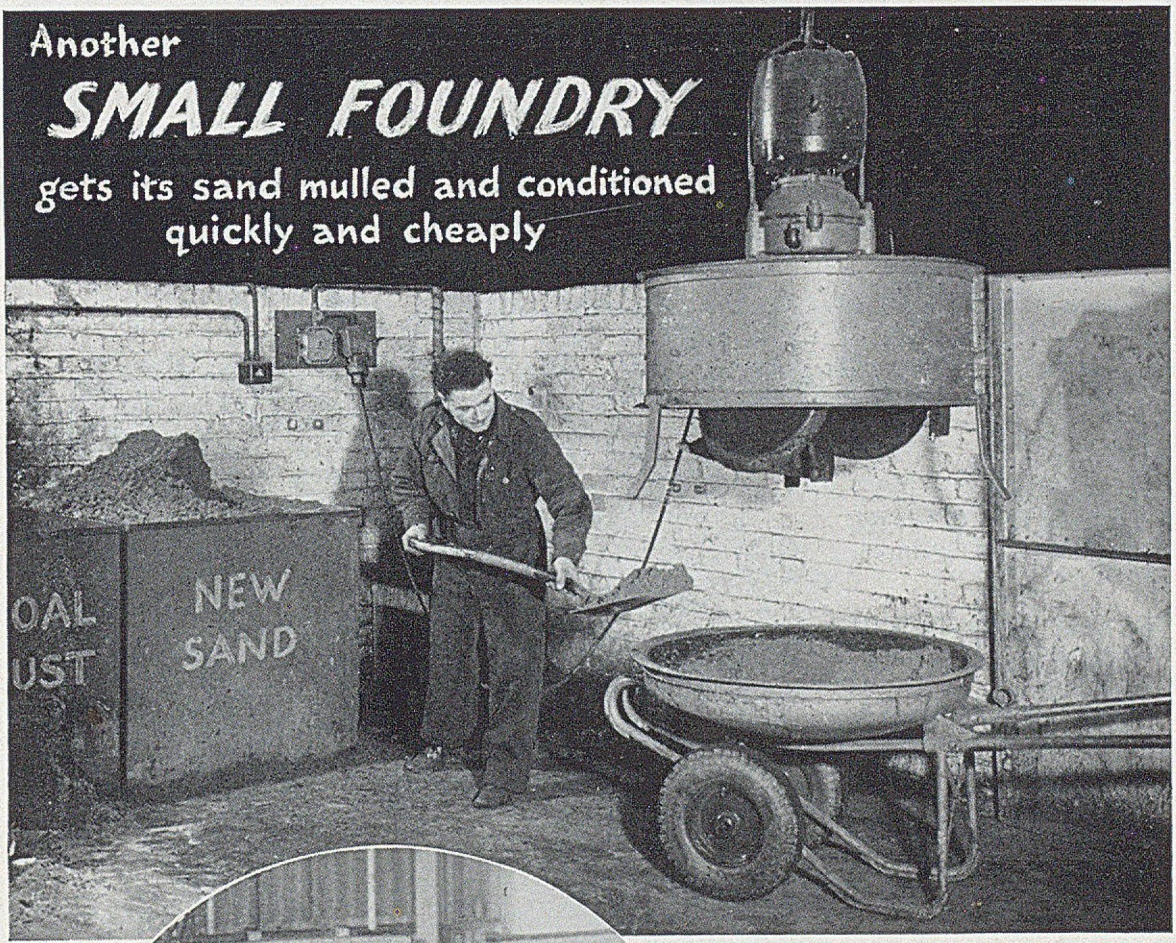

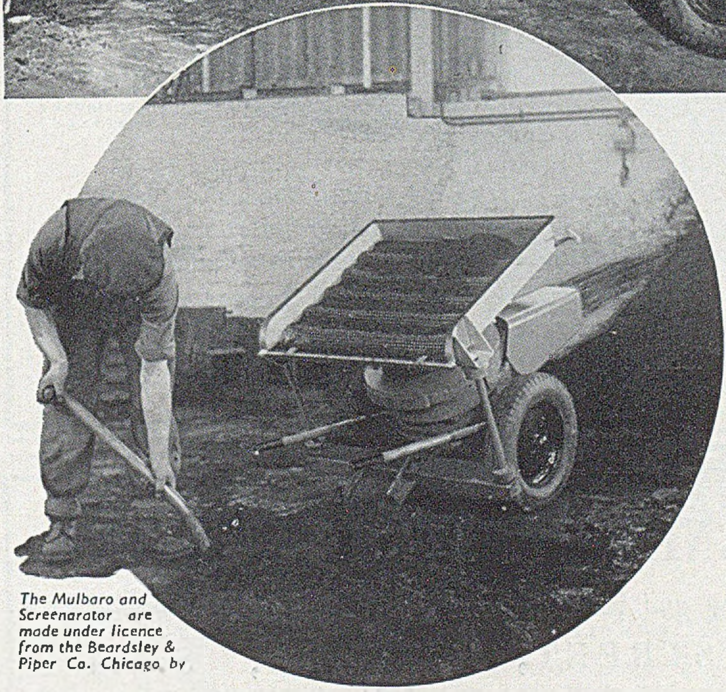

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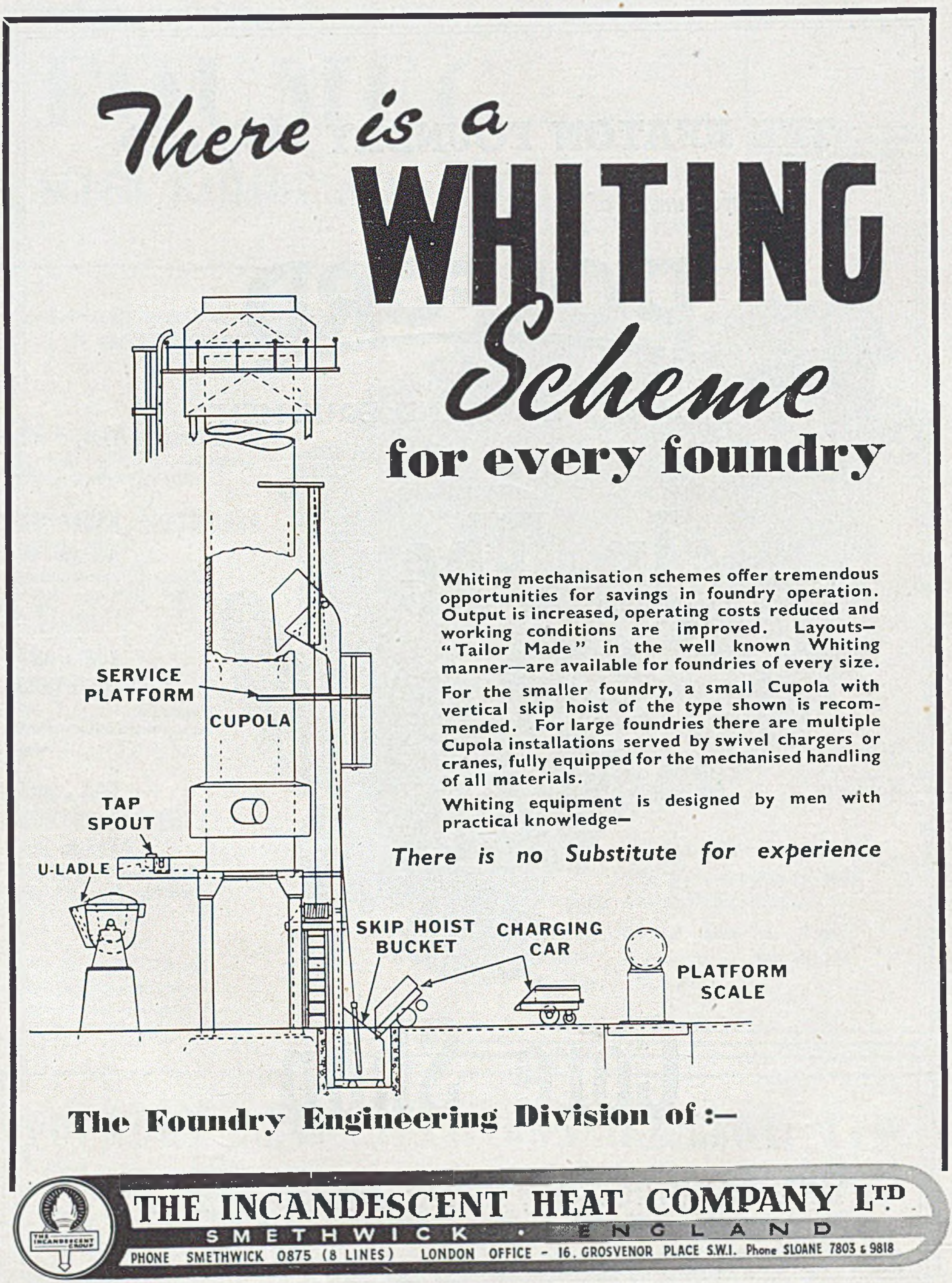
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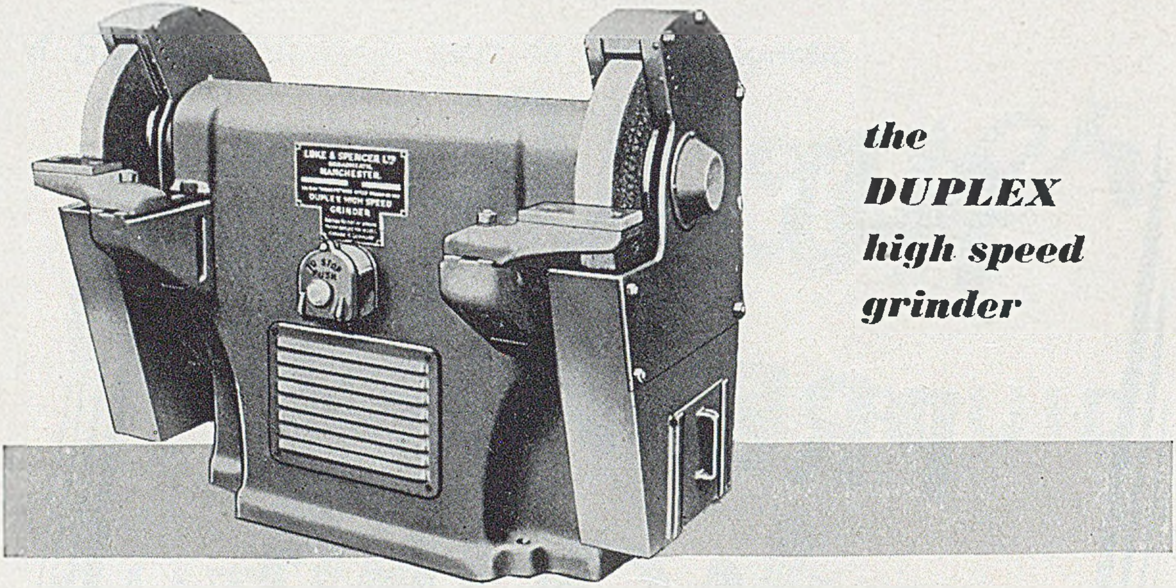

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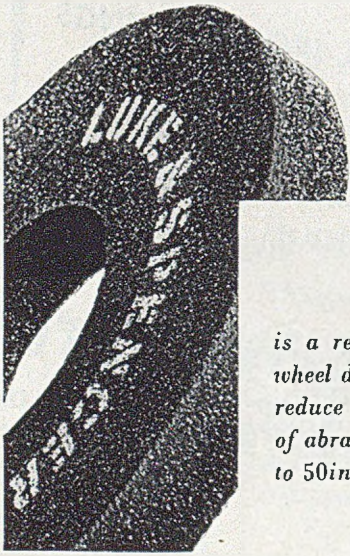

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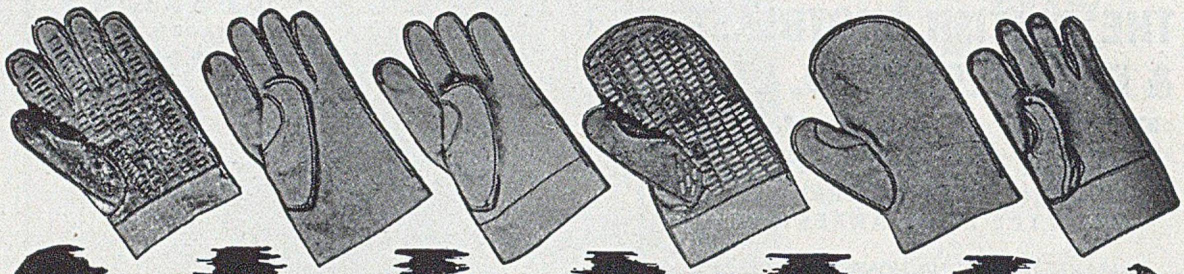

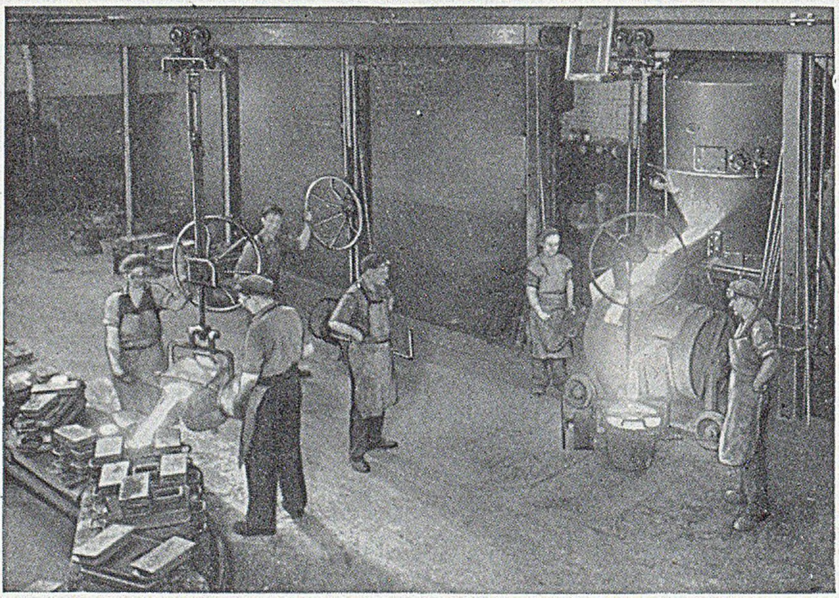

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