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

Vol. 88 Thursday, April 27, 1950 No. 1756

49, Wellington Street, London, W.C.2.
Grams: "Zacatecas, Rand, London"
'Phone: Temple Bar 3951 (Private Branch Exchange)
PUBLISHED WEEKLY: 26s. per annum (Home and Overseas)

Overseas Selling

It is essential that we as a nation export to the limit of our capacity, and it is interesting to read in the Press the various methods suggested for accomplishing this object. There is a unanimous agreement as to the desirability of a visit abroad by the managing director or a senior official of each company. Yet this is only possible for the larger concerns, so the pundits then suggest co-operative representation. This is but modern jargon for the substitution of a jack-of-all-trades for the skilled craftsman, and the results will be much the same. Selling is so complicated, nowadays, that a firm making files, tool steel, tramway points and crossings and so forth does not establish one sales representative in Brussels or Stockholm, but two or more, because experience has shown that any agent with a multiplicity of lines to handle concentrates upon what he can sell with a minimum of trouble and neglects those presenting difficulties. One agent abroad was quite good at selling testing machines, but failed miserably to market electric melting furnaces. Thus we are forced to the conclusion that co-operative representation is, to say the least, chancy. This must not be interpreted as meaning that all individual sales organisations should be self contained. They require and get help from the Federation of British Industries as to credit worthiness, customs formalities, as well as a mass of other business information. The British Export Trade Research Organisation now working by arrangement, with the F.B.I., undertakes market research for its members and anybody else seeking such information. Thus, belatedly, earlier overlapping has been eliminated.

Current financial conditions make it easier for directors to travel than in pre-war days. Following the advice of the pundits, one firm in 1929 or 1930 sent out four or five directors to try and get orders from widely dispersed overseas markets. The result was a much heavier trading loss than if they had all stayed at home and played golf. Some of the post-war "stunt" selling abroad is achieving success. By this we mean, for example, the furnishing of a lorry as a demonstration unit and touring the actual works abroad. This for certain lines has much to commend it. After all, fortunes have been built up by Scottish drapers or packmen, and their modern substitute—the fitted-out demonstration lorry—shows equal potentialities.

The major factor in selling is formation of personal friendships and, with it, the creation of mutual respect and trust—a difficult situation to bring about when governments try to sell to governments. The participants of government missions are too handicapped to form true friendships, as they must conserve diplomatic decorum. Exhibitions, properly timed, can be productive of much solid business, and it will be interesting to learn the results of the enterprise shown by a manufacturer of moulding machines who has taken space at the exhibition organised by the American Foundrymen's Society at Cleveland. Where the pundits are failing to give proper advice is due to the non-recognition that every commodity and every firm needs different treatment. The marketing of lipstick and Diesel engines have nothing in common, as the former largely depends on clever advertising and the latter on technical performance. In our own industry, the disposal abroad of valves, stoves, hardware, and cast-iron pipes all call for different techniques, whilst those castings incorporated in machines constitute, *per se*, no direct problem, but merge themselves into a general sales policy. Whether the lead given by one Midlands foundry which reports the receipt of a substantial order from America for sewing-machine components can be emulated by others it is difficult to appraise. This particular order was the result of a personal visit by the managing director, and others seeking similar business will have to do likewise. After all, our industry should now, because of the intense mechanisation which has been undertaken since the war, be in a position to penetrate overseas markets for engineering components.

Contents

Correspondence

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

FOUNDRY LITERATURE

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—I was interested to read the leader in last week's FOUNDRY TRADE JOURNAL on the question of textbooks for the foundry industry. My experience agrees with yours in several directions; for example, I am frequently approached to specify a textbook on a narrowly-defined field, *e.g.*, chilled cast iron; and not only must one reply that such a book has yet to be written, but also sometimes that it is extremely doubtful that such a book ever will be written. This situation is usually met by supplying the enquirer with a bibliography of the literature on the subject published in the technical journals.

Most publishers are aware of the risks of undertaking the publication of textbooks which appeal to a limited audience such as the foundry industry, and these difficulties are enhanced by the added restrictions imposed by present-day delays in publishing and printing and paper controls; thus, while the market is over-stocked with, for example, elementary textbooks on the properties of engineering materials, textbooks on foundry subjects are relatively few and these are frequently out of print.

Only last year during a visit to Dublin I came across the symposium on modern foundry practice edited by E. D. Howard and published in 1944 by Odhams Press, which had been remaindered by the publisher to a Dublin bookseller. I bought his entire stock of about 100 copies and disposed of them at a price considerably less than the published price to members of the Association. I think it probable that I could have disposed of a further 100 copies. This leads one to enquire whether the publisher himself is making use of the right methods to bring a work of this sort to the attention of potential readers.

I am enclosing with this letter a copy of a list of selected textbooks on metallurgy and foundry practice which I have prepared for the use of members. Here again, while all these works can be recommended, a rider must be added to the enquirer that many of the books are out of print and available only from the technical or national libraries, while others have not been revised for a number of years. It is significant that nearly all the new or revised editions appearing in this list are American.

I may add that Dr. J. G. Pearce is editing a series entitled "Manuals of Metallurgical Technology." George Allen & Unwin, Limited, have arranged to publish this series, and the first volume, by W. Westwood and A. Mayer, "Chemical Analysis of Cast Iron and Foundry Materials," will appear this year. The major difficulty in such an undertaking is to persuade already over-worked authorities in the various fields to devote time to complete works on their respective subjects. The methods adopted and the general attitude to publication in Germany would, perhaps, repay examination. Preparation of matter for publication is there regarded not as a spare time occupation but rather as a legitimate charge on the working time of those engaging in research, teaching and industrial activities.

Yours, etc.,

G. R. WOODWARD,
Manager, Intelligence Department.
The British Cast Iron Research Association,
Alvechurch, Birmingham.
April 24, 1950.

Film Review

"And Now"

This film shows the production of spherulitic-graphite cast iron at the Burton-on-Trent foundry of F. H. Lloyd & Company, Limited, of Wednesbury. However, as this is pictorially no different from the manufacture of ordinary cast iron, except for an extra "splutter" over the ladle, something had to be done to interest the audience. This was achieved by excellent photography, clear commentary by Sir Richard Acland, Bt., M.P., the impanelling of the resources of the test-house, and the use of really good trade name "Lloyd's Ductile Cast Iron." The magnesium-treatment process as developed by the International Nickel Company and the Research and Development Department of the Mond Nickel Company, Limited, is being used. The reviewer appreciates the forthright honesty in these matters plus showmanship associated with the ruthless elimination of sloppiness, human interest—unless expertly done—and untidiness. This film is not a documentary in the accepted interpretation of the word; it is, frankly, an advertisement. The audience is left in no two minds, for the pleasing, yet slightly harsh voice of the commentator constantly reminds them of the virtues of the new alloy. The FOUNDRY TRADE JOURNAL has published a large volume of technical data about this new development, but to popularise the alloy amongst buyers, it needed, and now has received, the necessary impulse. The crux of the film is, of course, in the test results, and these are shown in such a manner as to make the audience well aware of their significance. Mr. Edward Cook, the producer, who has now a wealth of experience in the production of industrial films, has never done better, and this indeed is a high compliment. He has had the assistance, as technical supervisor, of Mr. A. B. Lloyd, B.A., and he, too, must take much of the credit. It is a thoroughly good film made in an equally good foundry.

Dinner

Silica and Moulding Sands Association

Mr. Haydn Taylor presided over the first dinner of the Silica and Moulding Sands Association which was held last week at the Savoy Hotel. Amongst those participating were:—Mr. T. Watson; Col. C. E. Ponsonby, T.D., D.L.; Mr. F. W. Rowe, B.Sc.; Mr. D. G. Bissett; Mr. H. Halliday; Mr. F. Schaffer; Mr. D. F. Mann and Mr. Rennis Rider. The function was organised by Mr. G. K. Timperley, the secretary.

THE NEW SCOTTISH LABORATORIES of the British Cast Iron Research Association, at Blantyre Industrial Estate, Blantyre, Lanarkshire, will be officially opened on May 5.

AN INDUSTRIAL ACCIDENT PREVENTION EXHIBITION organised by the Coventry and District Engineering Employers' Association, is being held this week (April 25 to 29) at St. Mary's Hall, Coventry.

A VISIT to Vickers Armstrongs, Limited, Crayford Works, Crayford, Kent, has been arranged by the London branch of the Institute of British Foundryment, to take place next Wednesday, May 3, at 2 p.m.

THE NEXT LUNCHEON MEETING of the North Western Fuel Luncheon Club will be held on May 3 in the Engineers' Club, Manchester, at 12 noon. The guest speaker will be Dr. Franz Kind, and his subject "History and Outlook of Petroleum Refining."

Flow of Metal Through Runner Systems

By D. F. B. Tedds

The flow of metal through the numerous runner systems employed to produce castings has received more and more attention over the past few years. The present article only attempts to discuss the question of turbulence produced in the stream of metal as it enters the mould cavity. By using sectioned moulds made in plaster of paris, attaching a glass front and using mercury, a photographic record of the metal stream as it enters the various designs of runner systems has been obtained. It is concluded that the more general use of a turbulence cushion at the base of the sprue could be practised to advantage.

Introduction

THE importance of the question concerning the manner in which molten metal should flow into a mould is only too well known to every practical foundryman. The design of the runner system exerts a fundamental influence on the quality of the casting produced, and much time and effort has been devoted these past few years to establish infallible rules for correct gating practice which might serve satisfactorily on all classes of castings. Complete unanimity does not exist among foundrymen upon the best method to adopt for a specific casting and the methods employed in the past have been largely a matter of trial and error. The few general principles that are recognised are the result of the foundryman's hard-won experience. It is because of this that the problem of running castings continues to be, and probably always will be, a controversial subject.

I. REVIEW OF THEORETICAL CONSIDERATIONS

One of the main functions of a correctly-designed runner system is the freedom from turbulence, as the stream of molten metal enters the mould cavity. By this means, dirt-, oxide- and gas-inclusions in the resultant casting are minimised. In studying the flow of molten metal, an obvious step is to apply the laws of flow dynamics. It has been found that the nature of the flow of water through pipes differs, depending upon the velocity of the water and the diameter of the pipes.

By conducting flow experiments[1] in transparent tubes, using clear fluids in which dust particles are suspended to make visible the character of the motion, the differences in high and low velocities immediately becomes apparent to the eye. At low velocities the liquid flows in a straight line parallel to the axis of the tube, moving at progressively higher velocity as the centre of the pipe is approached, the curve showing the distribution of the velocity thus being a parabola. This type of flow is termed streamline or laminar (see Fig. 1).

Turbulent Flow

At high velocities, the liquid develops irregular whirling eddies, unstable yet continuously reforming, and the mean velocity is almost constant throughout the entire cross-section of the pipe. This is termed turbulent flow. The effect of these conditions on the flow of metal is rather significant. If the flow of metal through a runner system is laminar or streamline, the thin film of metal solidifying on the sand walls will remain intact, because the velocity of the flowing metal is practically zero along the wall. If the flow of metal is turbulent, the film of solidified metal will be partly detached by the metal flowing along it at a considerable velocity. Thus new metal is continuously coming to the surface of the stream, is oxidising and forming dross. A diagram prepared by Ruff[2] (Fig. 2) represents the way in which individual particles of liquid metal may be imagined to move in a gate when subjected to turbulent conditions.

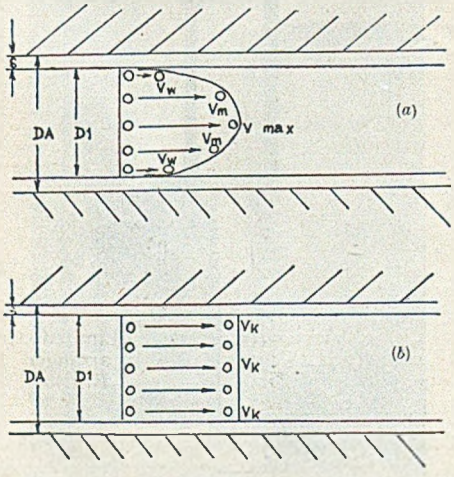

FIG. 1.—(*a*) STREAMLINE AND (*b*) TURBULENT MOTION OF LIQUID PARTICLES.

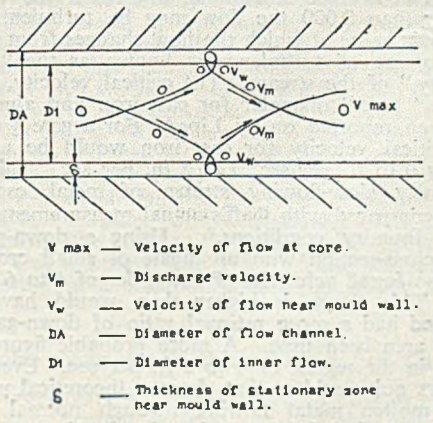

FIG. 2.—TURBULENT MOTION OF LIQUID PARTICLES (RUFF).

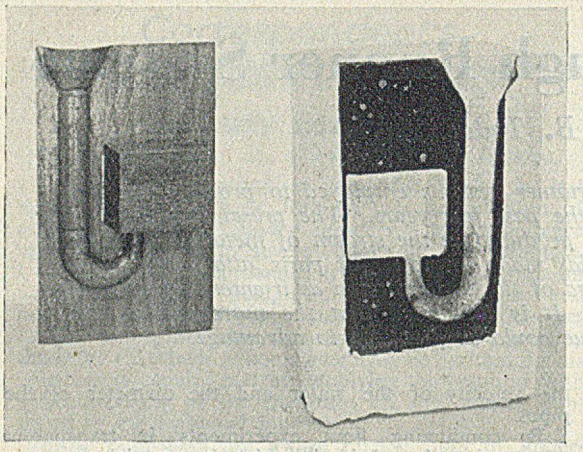

FIG. 3.—WOODEN PATTERN AND COMPLETED PLASTER MOULD.

It is obvious that the velocity of the metal flowing through a "gate" is important, but few investigators actually have made measurements of molten metal entering a sand mould. It usually has been assumed that formulæ for the flow of water in pipes may be applied to molten metals in moulds and a formula often quoted is

$V = K\sqrt{2gh}$ where V = velocity of fluid in ft. per sec.; g = acceleration of gravity 32 ft. per sec. per sec.; h = height of reservoir in ft.; and K = a constant.

Knowing the velocity of a fluid, its viscosity and the diameter of the channel through which it is flowing, it is sometimes possible to calculate whether turbulent or streamline flow is occurring as expressed by its Reynolds number. According to Reynolds' formula

$$Re = \frac{DVP}{\mu}$$

where D = diameter of channel in ft.; V = velocity of fluid in ft. per sec.; P = density of fluid lb. per ft.^{3}; μ = viscosity of fluid in lb. per ft. per sec.; and Re = Reynolds' number.

It has been found[1] that for fluids flowing through pipes, if the Reynolds value is less than 2,000, the flow will in general be streamline, whereas if the value is greater than 2,000 the flow may be turbulent. The Reynolds value at which the flow changes from streamline to one of turbulence is known as the "critical velocity" of the stream. The critical velocity, related to the "gate" diameter for cast iron and aluminium has been reported on by Lips.[3] For a gate ½ in. dia. the critical velocity for cast iron would be approximately 0.16 ft. per sec., *i.e.*, 2 in. per sec. This is an extremely slow-flowing stream of metal, especially when compared with Ruff's actual measurements made under foundry conditions.[2] Using a down-gate of large cross-section with an ingate of small cross section, he found velocities of the order of 4 to 6 ft. per sec. This figure is higher than would have been obtained had a more rational ratio of down-gate and ingate area been used. A more probable figure is no doubt in the region of 1 to 2 ft. per sec. Even so, it appears quite evident that, from a theoretical point of view, molten metal flowing through normal runner systems employed in the foundry is always flowing above the "critical velocity" and is, therefore, in a turbulent condition.

II. PRACTICAL APPROACH

Although the theoretical aspect must be given attention when considering conditions of flow of molten metal, it is obvious that much can be gained from practical observations. In an endeavour to understand a little more clearly the flow of metal and the basic principles underlying the various designs of runner systems, the following work was undertaken and efforts have been made to collate the information, as far as possible, to production problems.

In order that the path of molten metal may be observed, a transparent mould is the ideal tool. This is not only expensive but also presents numerous technical problems. Other methods have been suggested from time to time. Fry[1], whose outstanding Paper was presented before the Institute of British Foundrymen in 1947, used sand moulds into which molten aluminium was poured. By using a cine-radiography technique, pictures were obtained of the molten metal entering the mould cavity. More recently, Johnson and Baker[5], also using cine-photography have photographed molten steel running into mould cavities after passing through various runner systems. Whilst these methods have proved satisfactory for observing the flow of molten metal, it was considered that the results could be observed using plaster as the mould material and mercury as the metal, since the problems associated with fluid flow can be observed equally with any liquid.

Manufacture of Experimental Moulds

Wooden patterns of half sections of the various designs of runner systems were made and moulded in plaster of paris (see Fig. 3). After withdrawing the pattern, a glass plate was fastened to the plaster mould and mercury was poured into the down-gate. In order to standardise the speed of pouring, a glass tube ¼ in. dia. by 18 in. long was arranged over the mouth of the down-gate and filled with mercury (see Fig. 4). This was released and a photographic record, using a standard plate camera and an exposure time of 1/300 sec., was then made of the stream of metal entering the mould cavity.

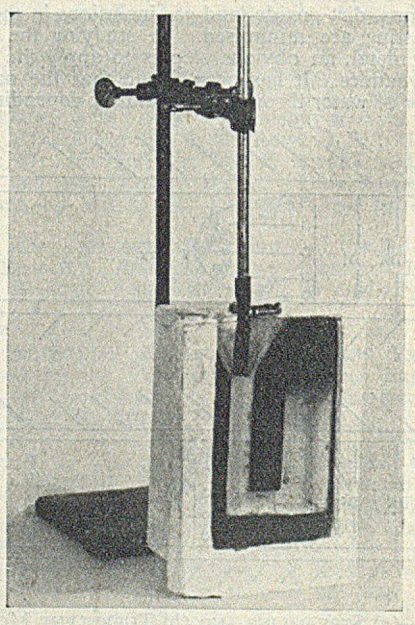

FIG. 4.—ARRANGEMENT FOR CASTING.

Running Methods

The two main methods of introducing molten metal into mould cavities, as practised by most foundrymen, are:—(*a*) bottom running, and (*b*) top running. Bottom running methods have their advantages and disadvantages. The main advantage is that the metal can be introduced into the mould in a tranquil manner with a minimum of turbulence. The principal disadvantage, in many instances, is that it interferes with the ideal "directional solidification" which should commence at the bottom of the casting and progress successively towards the top where the final shrinkage is compensated by liquid metal from the gate or risers. In many instances, the total height, or other condition of the mould forces the adoption of the bottom gate.

Top running methods are, theoretically, the best way to fill a mould since "directional solidification" is assured, the metal cooling progressively from the lower regions of the mould to the risers. The main disadvantage associated with this method of filling the mould is the turbulent nature in which the metal enters the mould cavity. This is particularly so with some of the readily-oxidised alloys, *e.g.*, aluminium bronze, manganese bronze, etc. It is owing to this and also the fact that the majority of foundrymen practise bottom-running methods more frequently, that the main interest of this Paper is centred on the various ways and means was then made of the stream of metal entering the mould cavity.

METHODS OF BOTTOM GATING

Circular Cross-Gate

This system of running with slight variations is the one most universally used for many types of components and different metals. It consists of a single circular down-gate from the base of which leads a cross-gate into the bottom of the casting. In pouring the metal experimentally into such a runner system it was apparent that the filling of the mould could be divided into two stages:

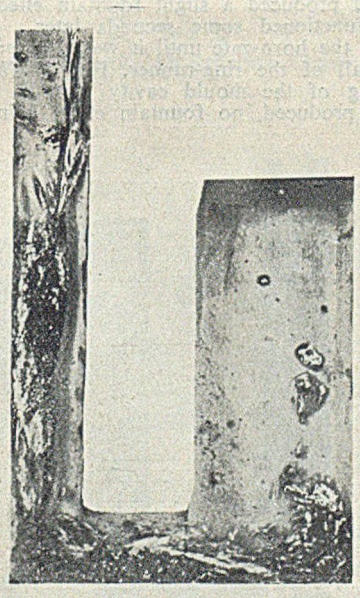

FIG. 5.—INITIAL FLOW OF METAL THROUGH CIRCULAR CROSS GATE.

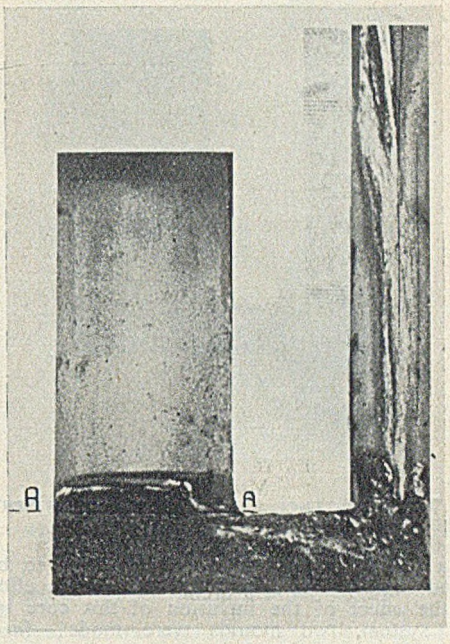

FIG. 6.—METAL RISING IN MOULD CAVITY.

Stage 1.—*Period of maximum turbulence.* This extends from the commencement of pouring up to the instant when the metal attains the level AA, of the upper face of the ingate. The metal strikes the bottom of the down-gate and splashes across the cross-gate, being distributed in the form of rough jets (see Fig. 5), causing turbulence and oxide films.

Stage 2.—*Period of Agitation.* As the metal ascends above the level AA, agitation and turbulence are gradually reduced under the influence of the counter pressure of the metal (see Fig. 6), the metal thereafter flowing quietly.

Circular Cross-gate Incorporating Turbulence Cushion

It is evident that running systems would be much improved if the period of maximum turbulence could be eliminated and the period of agitation reduced to a minimum. As this is impracticable, other means must be resorted to, *e.g.*, the use of cross-gates with a thickness as small as is permissible, to the exclusion of all profiles in height (triangular, etc.). Another means, which can be practised satisfactorily, is the extension of the down-gate below the level of the cross-gate. This forms a well which contains the initial turbulent metal and acts as a cushion for the remainder of the pour, thus allowing the metal to flow quietly into the mould cavity. This is observed in Fig. 7, where the metal is seen flowing in a tranquil manner across the cross-gate.

Circular Cross-gate Incorporating Strainer Core

In an endeavour to trap dross in the gating system and thereby prevent it from entering the casting, a strainer gate, consisting of a sand core containing a number of small holes, is often placed across the ingate or down-gate. It is also sometimes employed

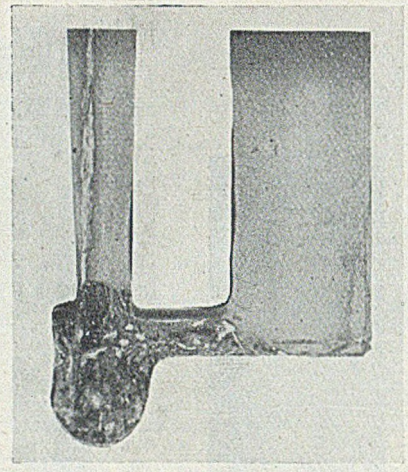

FIG. 7.—TURBULENCE CUSHION AT BASE OF SPRUE.

when a considerable volume of metal has to be introduced rapidly into a thin casting. In an effort to study the effect of the inclusion of this core in the runner system, two moulds were made:—(*a*) The strainer core was placed in the cross-gate in close proximity to the casting, and (*b*) the strainer core was placed at the base of the runner cup.

It will be seen from Fig. 8 that the strainer core placed in the cross-gate holds back the initial inrush of metal and allows, as would be expected, the metal to flow through into the casting in a series of small streams. These flow quite smoothly with very little turbulence, whilst the strainer prevents all dirt and oxide from passing into the mould cavity. Fig. 9 shows the effect of a strainer core placed at the base of the runner cup. In this position, the strainer holds back the dross, oxide, dirt, etc., but the metal, on passing through, falls in a series of streams, creating a considerable amount of turbulence at the base of the down-gate before flowing into the casting. Summarising these observations, Fig. 10 shows the various positions of strainer cores together with their effect upon the flow and cleansing of the metal.

Horn-gate

The horn-gate appears, at first sight, to be amongst the ideal methods of introducing metal in a tranquil manner into a mould cavity. There are occasions when its use *must* be resorted to, *e.g.*, where castings cannot be gated on the edge and conditions are such that top running is inadvisable.

The pattern for a true horn-gate is made to the arc of a circle and is tapered gradually from one end (adjacent to the casting) to the other (which joins the down-gate). On pouring the metal into the down-gate, a considerable amount of turbulence occurs and a fountain or jet of metal shoots into the mould cavity (see Fig. 11). These findings agree with those of Fry[4] and Johnson and Baker.[5] Should this jet of metal produced by the horn-gate be directed against the wall of a mould or core, a decided disturbance takes place with a consequent formation of dross. This point must be continually borne in mind, especially when gating aluminium and aluminium-bronze castings.

A "turbulent cushion" or "well" was introduced at the base of the down-gate in an effort to minimise the turbulence and also reduce the velocity of the stream of metal. That this partially achieved its object is shown in Fig. 12, the height of the jet being considerably reduced and not broken into a series of individual streams as previously shown. Separating the down-gate from the horn-gate by means of a cross-gate, produced a very-quietly-flowing stream of metal with a minimum fountain effect (see Fig. 13).

Further efforts to study the various practical applications of horn-gating were then made. Using the horn-gate to flow the metal into a small-diameter pillar gate, which was connected to a slit-gate before allowing the metal to flow into the casting, produced a jet of metal almost the total height of the mould cavity (6 in.) (Fig. 14). Introducing a turbulence cushion at the base of the down-gate considerably reduced the velocity of the metal and hence reduced the inrush of metal, giving a quieter filling of the mould cavity. (See Fig. 15).

It is commonly believed that reversed horn-gates pass metal with little or no turbulence. Using a reversed horn-gate flowing into a pillar-gate as previously, a jet of metal was again evident but with reduced height. (Fig. 16). This also confirms the findings of Johnson and Baker[5] when casting molten steel into sand moulds.

In casting many components, especially those circular in shape, a ring runner is incorporated in the runner system before the metal is fed into the cross-gates in an effort to distribute the metal into the mould cavity as evenly as possible. In order to examine the effect of using horn-gates for introducing the metal into the mould from the ring runner, two moulds were made as shown in Fig. 17.

For this experiment the mercury was poured into the mould in a steady stream from a crucible. A general arrangement is shown in Fig. 18, part of the mould being cut away to facilitate photographing the result. Taking the horn-gates from the base of the ring-runner, Fig. 17 (*a*), which is common foundry practice, the metal flowed initially through gates 1 and 2, and produced a slight fountain effect. Gates 3 and 4 functioned some seconds later. (Fig. 19). By raising the horn-gate until it was situated halfway up the wall of the ring-runner, Fig. 17 (*b*), a very even filling of the mould cavity through the four gates was produced, no fountain effect being visible. (Fig. 20).

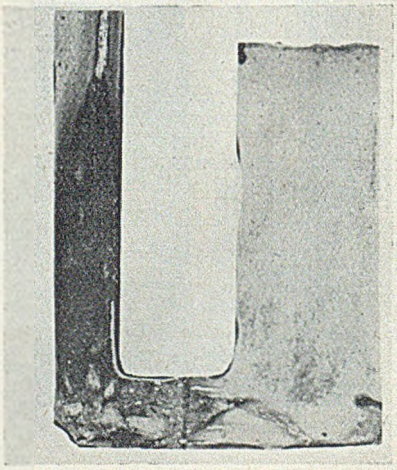

FIG. 8.—STRAINER CORE NEAR MOULD CAVITY.

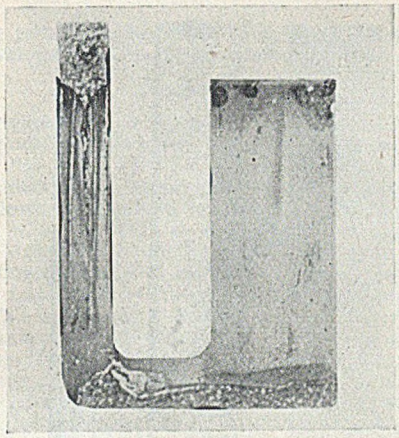

FIG. 9.—STRAINER CORE AT BASE OF RUNNER CUP.

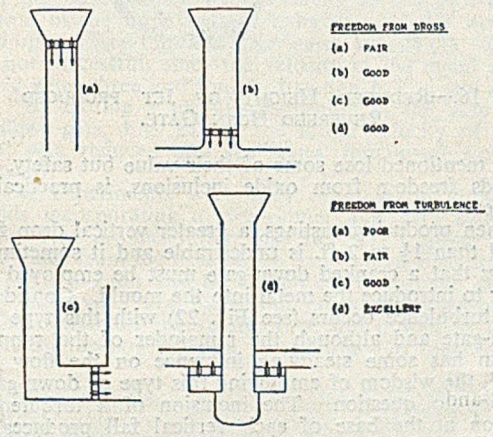

FIG. 10.—POSITIONS OF STRAINER CORES.

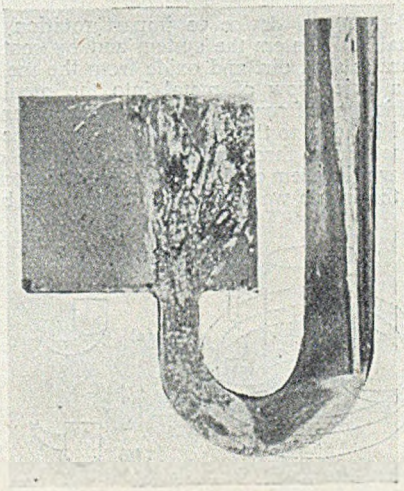

FIG. 11.—JET OF METAL PRODUCED BY HORN GATE.

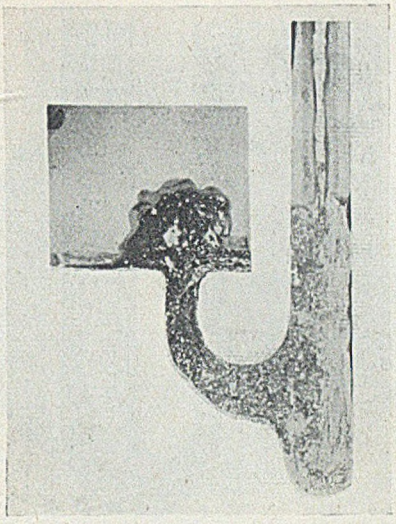

FIG. 12.—HORN GATE INCORPORATING TURBULENCE CUSHION.

Vertical Double Pillar and Slit Gates

The vertical double pillar and slit-gate method of running and feeding is common practice in the magnesium foundry industry. It consists of a vertical pillar or cylinder flanked for its entire height by a narrow gate which leads into a pillar of smaller diameter, also flanked by a narrow slit gate and thence into the casting. From Fig. 21, it will be seen that the turbulence cushion incorporated at the base of the large pillar accommodates the initial fall of metal and the oxide skins thus formed collect and bind together at that point. If the vertical gate does not exceed 0.25 in. thickness there is very little risk of their being carried away. Obviously, the delivery of this runner is very slight at the start. The rate

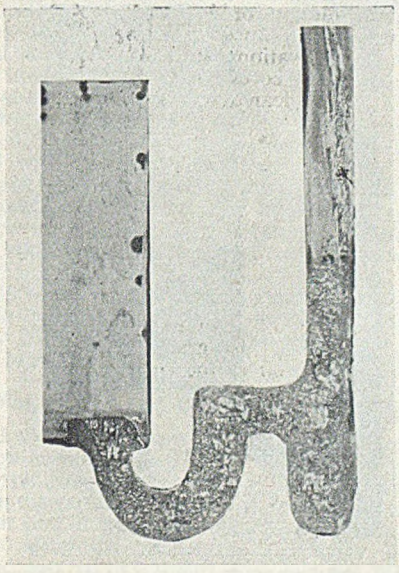

FIG. 13.—HORN-GATE AND SPRUE SEPARATED BY CROSS GATE.

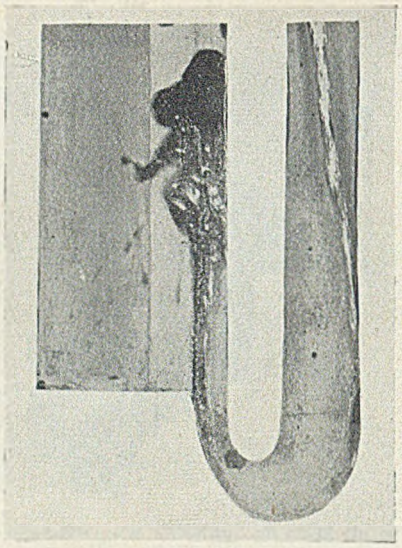

FIG. 14.—HEIGHT OF JET OF METAL PRODUCED BY HORN GATE.

of delivery, however, later increases very rapidly, which fact is of major advantage, since considerations of feeding the casting require that the delivery should increase with the filling of the mould. Another advantage is that the hottest metal is always that which flows into the upper parts of the casting, as distinct from the manner of metal supply in bottom-gate casting.

Pillar-gate running, therefore, combines all the advantages of top-pouring and of bottom-pouring, without the disadvantages. The pillar can itself be fed by top- or bottom-gate pouring. In the latter case the advantages mentioned lose some of their value but safety, as regards freedom from oxide inclusions, is practically assured.

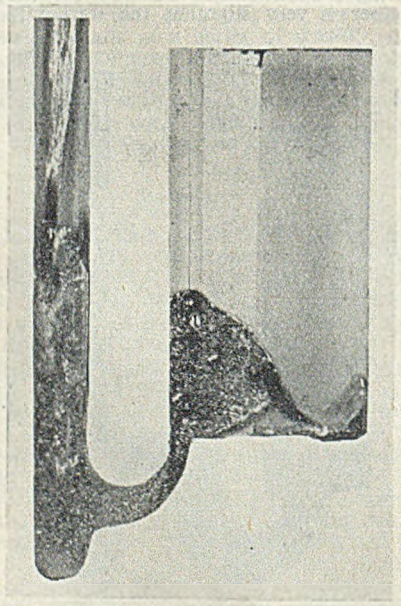

FIG. 15.—REDUCED VELOCITY OF METAL STREAM USING TURBULENCE CUSHION AT BASE OF SPRUE.

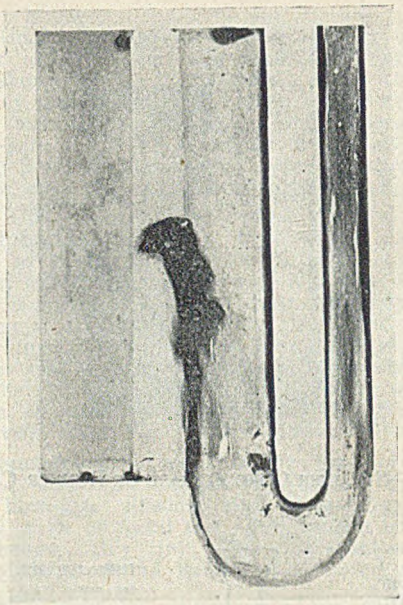

FIG. 16.—REDUCED HEIGHT OF JET PRODUCED BY REVERSED HORN GATE.

When producing castings, a greater vertical drop for metal than 1½ to 2 ft. is undesirable and it sometimes occurs that a cranked down-gate must be employed in order to introduce the metal into the mould. Considerable turbulence occurs (see Fig. 22) with this type of down-gate and although the remainder of the runner system has some steadying influence on the flow of metal, the wisdom of employing this type of down-gate is open to question. The inclusion of a turbulence cushion at the base of each vertical fall produces a steadying influence on the stream of metal with subsequently a much quieter flow and a minimum of turbulence (see Fig. 23).

Whirl-gates

A whirl-gate is a device to impart rotation to the liquid metal as it enters the system and by centrifugal force separates slag, dirt and oxide from the metal and produces a quiet flow of metal into the mould. In studying this type of runner, the ingate was arranged at an angle of 180 deg. to the sprue, Fig. 24 (*a*). The initial flow of metal ran through the gate into the casting before the whirl system could operate. In order to eliminate this, the ingate was raised ½ in. from the base of

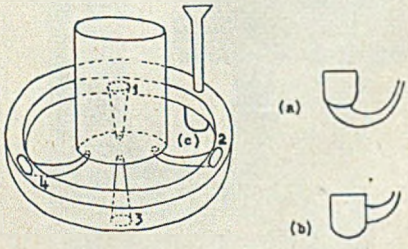

FIG. 17.—RING RUNNER AND HORN-GATES FOR CIRCULAR CASTINGS.

the main pillar (see Fig. 24*b*) so that the whirl became fully developed before metal entered the mould cavity.

Finger-gates

Finger-gates are usually employed to distribute metal into a mould in a horizontal plane over a large area, *e.g.*, for flat plates, etc. The first effort to study the flow of metal using this runner system consisted of a normal down-gate leading into a main channel from the base of which four finger-gates led into the mould cavity. Most of the metal entered the casting through the two fingers furthest from the down-gate (see Fig. 25). The two fingers nearest the down-gate functioned much later. This can be attributed to the metal striking the main channel at the bottom of the down-gate and rushing along it at considerable velocity thus by-passing the two ingates near the down-gate. The practical significance of this point is that the velocity of the metal entering the casting is considerably increased since the effective ingate area is much less than the theoretical requirements.

In order to try and promote a more even distribution of the metal through the finger-gates, these were raised from the base of the main channel to the half-way position in the hope that a reservoir of metal would build up and feed the four finger-gates, Fig. 24 (*b*). This was not successful, since the velocity of the metal still caused gates three and four to function before one and two. By cutting a turbulence-cushion at the base of the down-gate, Fig. 25 (*c*), the initial velocity of the metal was reduced and the gates functioned simultaneously.

These experiments were then repeated on circular moulds incorporating a ring-runner and very similar results were produced (see Fig. 26). (1) Leading the finger-gates from the base of the ring-runner, Fig. 26 (*a*), the first metal ran into the mould cavity through gates three and four. The metal ran down the down-gate, hit the bottom of the runner ring and flowed in two directions, meeting between gates three and four from

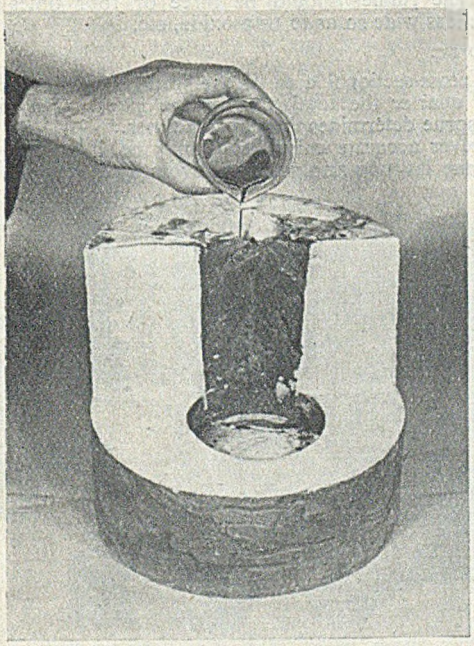

FIG. 18.—ARRANGEMENT FOR POURING RING RUNNER MOULDS.

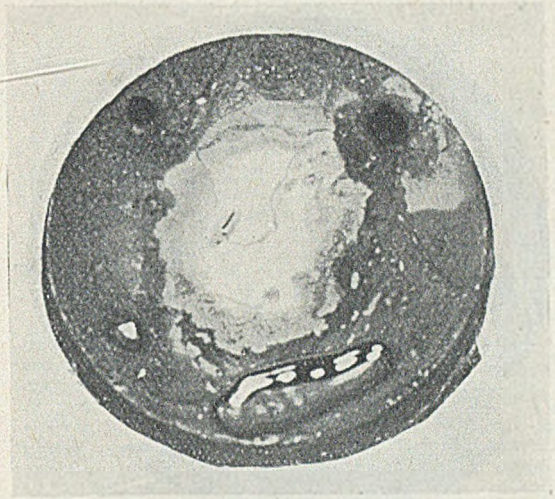

FIG. 19.—GATES NEAR SPRUE OPERATING INITIALLY.

which it then proceeded to fill the mould cavity (Fig. 27).

(2) This procedure was repeated with the ring-runner cut deeper, the finger-gates being then in a raised position, Fig. 26 (*b*). The object was to fill the ring-runner to give more even feeding through the four gates. The result, as previously, was not successful. By placing a turbulence pad at the bottom of the down-gate, as shown in Fig. 26 (*c*), the velocity of the metal entering the ring-runner was minimised and gave equal distribution of the metal through the four gates (Fig. 28).

During all these investigations it was noted that when metal was poured into moulds which were not well vented, it flowed in a less turbulent manner than when the moulds were well vented. Foundrymen seem divided into two schools of thought when the venting of moulds is discussed. Some advocate that all risers should be left open to allow the gases, air, steam, etc., a free exit to the atmosphere. Others are adamant in stating that the risers should be covered to create a slight pressure in the mould, thus giving a quieter flow and less washing action by the molten metal on the surface of the mould.

It is interesting to note that Fry[4] observed a greater tendency for gas bubbles to be present in a casting which was vented, than one which was not. This may be connected with the same problem. Another pointer is mentioned by Dwyer[6] citing F. W. Paine, who introduced a system of pressure casting with highly-gratifying results. His method was to horn-gate (¼-in. dia. or sq.) the metal into the casting, to use no risers, but to employ a 1.0 in. dia. sprue extended 15 to 25 in. above the top of the casting. By this means, solid and hollow bushings up to 18 in. long were made, elevator blanks and valve seats 20 to 30 in. dia. and weighing as much as 650 lb. were also produced.

Pouring Speeds and Dimensions of Ingates

Coupled with the problem of designing runner systems to minimise turbulent flow is the question of sizes of gates and pouring speeds. If the rate of delivery of metal from the various diameters of down-gates, together with height of fall were accurately known, it would be possible to determine reasonably accurately the total ingate area required to run particular castings of reasonably even section. Some writers (Janco,[7] Faber and Doll[8], Benkol[9], etc.) have tried to establish a formula for determining the size of gates for a certain metal in relation to the weight of the castings.

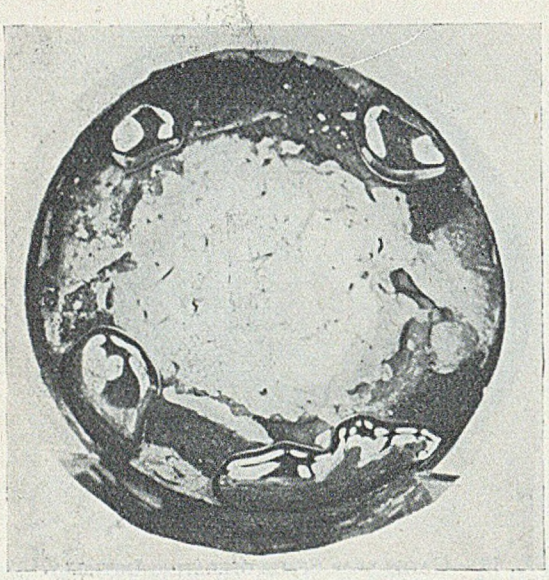

FIG. 20.—GATES OPERATING SIMULTANEOUSLY WHEN IN RAISED POSITION.

According to Measkowski[10], a quietly-flowing gate system for cast iron should have a ratio of sprue to cross-gate to in-gate of 4:3:2 if the flow is unidirectional. If the flow is divided in the cross-gate, then the ratios are 8:3:2 (Fig. 29). Cristello[11] offers the following general rules as being the most suitable guide when finger-gating for magnesium alloys (Fig. 30).

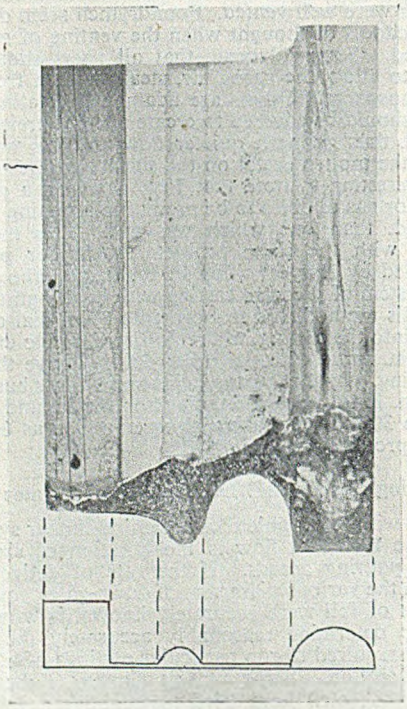

FIG. 21.—VERTICAL DOUBLE PILLAR AND SLIT GATES.

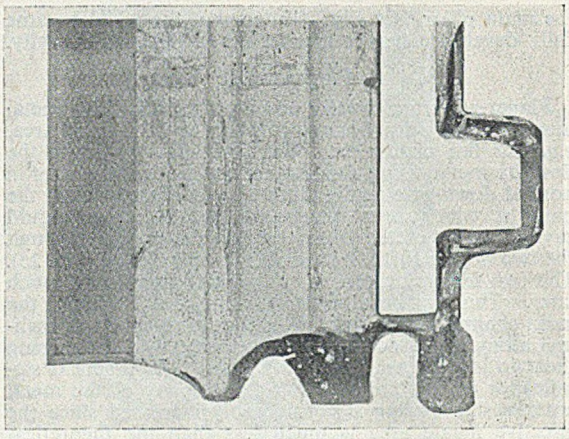

FIG. 22.—TURBULENCE IN CRANKED DOWN GATE.

Size of the Gate.

(*a*) The thickness of the gate should be slightly larger than the wall thickness of the casting where the gates are placed, so that the gate will feed the casting during solidification.

(*b*) The width of the gate should be about three times the thickness of the gate.

(*c*) The length of the gate should be slightly larger than the width of the gate.

Number of Gates.

The space between the gates should be twice the width of the gates, which will determine the number of gates to be applied.

The Runner.

The cross-sectional area of the runner should be the same as the total cross-section of the gates to keep the same volume of metal in the runner as there is in the gate. The runner should be three or four times as high as it is wide so as to trap oxide, etc.

The Sprue.

The cross-sectional area of the sprue should be half to one quarter the total area of the gates. The size of the sprue determines the pouring times.

However accurate calculations may be, it is obvious that some latitude and variation from ideal conditions

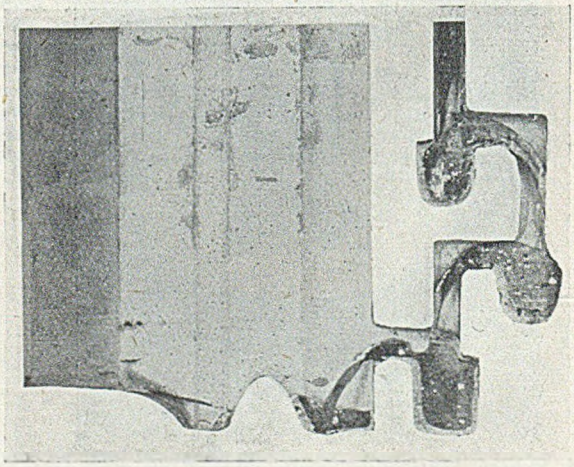

FIG. 23.—STEADYING INFLUENCE OF TURBULENCE CUSHIONS AT BASE OF EACH CRANK.

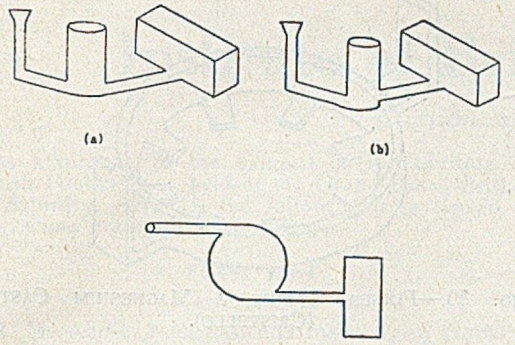

FIG. 24.—WHIRL GATES (180 DEG.).

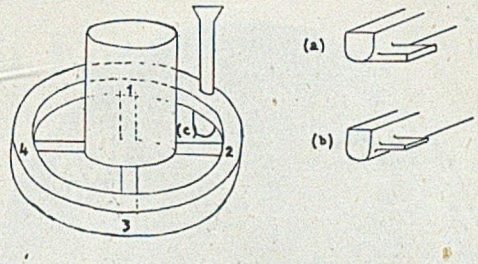

FIG. 26.—ARRANGEMENT OF RING RUNNER AND FINGER GATES.

are necessary, *e.g.*, small parts with thin sections cause rapid cooling of the metal, the delivery (rate of pouring) and hence the cross-sectional area of the in-gates, must be double or treble those used for an ideal medium-size casting of reasonable section (½ in.). At the other extreme (heavy and thick castings), delivery may well be reduced by a half. The fact that a casting must be successfully run has probably led to the use of gates that are more than adequate, thus producing increased turbulence in the stream of metal entering the mould cavity.

Pouring Speeds

The question of pouring speeds is also a measure of control for minimising turbulence in the runner system. As shown from the photographs illustrated earlier, metal travelling at a high velocity can produce excessive turbulence. Slow pouring rates, whilst reducing turbulence, are not always practicable, especially when producing castings of thin section. A formula for determining the duration of pouring for certain weights of cast iron components has been proposed by Dietert[12] and may be applicable to other metals. According to Dietert, the pouring time in sec. is $S\sqrt{W}$ where W= weight of casting in lb. and, S = constant depending upon thickness of section, *e.g.*, 1.1 for 7/16 to 9/64; 1.25 for 10/64 to 20/64 and, 1.5 for 21/64 to 39/64 section.

Formulæ are also given for the effective sprue height and area of the choke.

It is obvious that the section thickness of a casting must be considered in relation to the pouring rate (usually expressed as rise of metal in the mould per second). An average speed of pouring for most large castings is equivalent to approximately one inch rise of metal in the mould per second, but for light sections it is common foundry practice to ensure a much higher pouring rate. Probably, the point which dominates pouring speeds is " pour sufficiently slowly to avoid the formation of oxide and dross, but with sufficient speed to permit the correct feeding of the casting." In the case of flat castings, and those of no great thickness, reconciliation of these conflicting conditions is simple, but it may become impossible as castings become heavier and more especially as they become greater in height. The difficulty is partly overcome by creating a progressively increasing delivery of metal from the moment the molten metal has reached a safety level in the mould cavity, *i.e.*, when the period of agitation is at a minimum.

Conclusions and Discussion

(1) It is evident that any arrangement for pouring, to be certain of success, should not allow anything to enter the mould other than physically sound metal. Dross and oxide inclusions are caused by turbulence in pouring where, as has been shown, the stream of molten metal, by a process of multiplying and rupturing, increases the oxidisable surface and facilitates the transportation of the oxide film. This turbulence is dependent upon the speed acquired by the metal and its effect is particularly intense (*a*) at the base of the sprue, where the velocity is at a maximum and

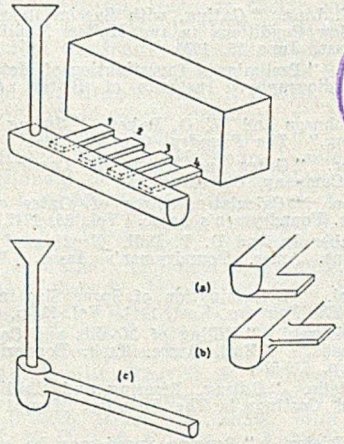

FIG. 25.—ARRANGEMENT OF FINGER GATES AND TURBULENCE CUSHION.

FIG. 27.—GATES FURTHEST FROM SPRUE OPERATE INITIALLY.

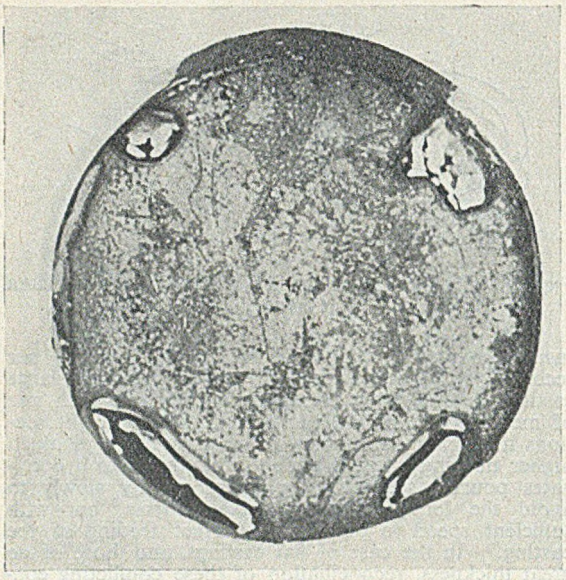

FIG. 28.—GATES OPERATE SIMULTANEOUSLY.

where the energy of the flowing metal is liberated by its impact against the base which causes rupture of the vertical jet and its projection in all directions (see Fig. 5); (*b*) at the cross-gates, where the velocity remaining is favourable to the formation of jets which impinge against the cores and walls of the mould and are favourable to the formation of oxide films.

(2) Although little practical evidence is available, it appears that metal flowing through most runner systems is in a state of turbulent flow when considered from a theoretical aspect. The most important point lies in designing runner systems which reduce the velocity of the stream of metal, thus leading to a more quiet and tranquil flow and avoiding sharp angles and abrupt changes in the direction of flow. The stream of metal should be guided, where possible, tangentially to the vertical walls of the moulds or cores so as to suppress the impact shock.

(3) Top-gating, although practised to advantage on occasions, is the method normally producing the maximum amount of turbulence.

(4) Bottom-gating, using the methods commonly employed, offers the best possibilities for quietly filling the mould cavity. From the tests conducted, the

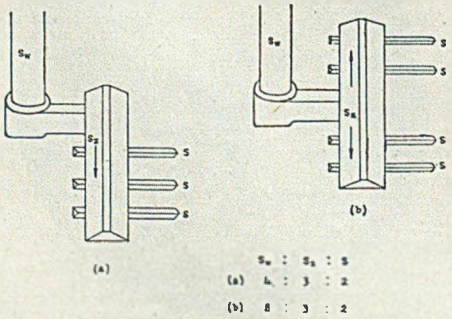

FIG. 29.—QUIETLY-FLOWING GATE FOR CAST IRON (MEASKOWSKI).

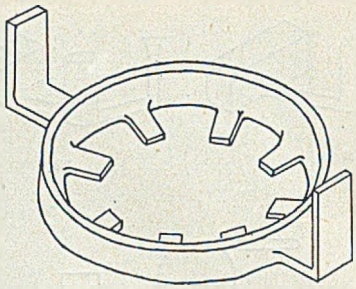

FIG. 30.—FINGER GATING A MAGNESIUM CASTING (CRISTELLO).

inclusion of a well or turbulent cushion at the base of the sprue seems to reduce the velocity of the stream of metal entering the mould and minimises turbulence and could with advantage be incorporated more regularly in practice.

(5) There is no general rule or formula as yet which can be applied to a casting for determining the size of gates and the pouring speeds. These are left to the foundryman's discretion based upon fundamental principles and past experience.

Future Work

The work outlined in this article is considered to be of an elementary and preliminary character. It is obvious that it could be enlarged considerably. At least it has confirmed some already-known phenomena and given added enlightenment (certainly to the Author) on others. Future investigations should take the form of determining the rate of delivery of various diameters and shapes of down-gates for the different alloys cast. The velocity of the metal entering the mould cavity should then be accurately measured when using the accepted gating systems.

The Author expresses his thanks to the Bristol Aeroplane Company, Limited, for facilities to carry out this work and for permission to publish the results; to Mr. C. Knapp for his interest shown, and to Mr. D. E. Priday for the photographs.

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At a meeting of the Council of the Institute of British Foundrymen, held at the Grand Hotel, Bristol, on Saturday, April 15, the following were elected to the various grades of membership:—

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Company, Limited, Sheffield; E. Dyson, manager, J. H. Rothwell & Company, Swinton; H. Foster,* apprentice supervisor, Cochrane (Middlesbrough) & Company, Limited; F. H. Kelly, director, Kelly & Cleaver, Limited, London; E. A. G. Liddiard, director of research, Fulmer Research Institute, Stoke Poges; C. S. Phillpotts, foundry superintendent, Tuberville Bros., Limited, West Bromwich; F. P. Robinson, foundry manager, Hamworthy Engineering Company, Limited, Poole, Dorset; J. E. Scott,* assistant sales manager, English Steel Corporation, Limited, Sheffield; A. T. Timms, production manager (foundry), Vickers Armstrongs, Limited, Newcastle-upon-Tyne; D. A. Ulyate, foundry manager, Union Metal Works Pty., Limited, Germiston, South Africa; J. A. Wellings,* branch manager, High Duty Alloys, Limited, Slough.

As Associate Members

A. Allcock, foundry foreman, Midland Electric Manufacturing Company, Limited, Birmingham; T. A. Aveline, regional foundry foreman, Midland Electric Manufacturing Company, Limited; C. Berry, craftsman moulder, J. Berry, Limited, Swinton; R. M. Cleaver, fettler, Kelly & Cleaver, Limited; F. Clymer, foundry methods engineer, F. H. Lloyd & Company, Limited, Wednesbury; J. Dale, foundry foreman, T. & T. Vicars, Limited, Earlestown; A. C. Daniels, student, National Foundry College, Wolverhampton; H. H. Dickson, technical representative, Heaton Foundry Company, Limited, Newcastle-upon-Tyne; M. J. Doran, loam moulder, English Electric Company, Limited, Rugby; R. Dulché, managing director, Fonderie de St. Genevieve, par Vernon; J. Grice, foundry methods engineer, Tangyes, Limited; J. Good, assistant foundry manager, Curran Steel, Limited, Cardiff; G. L. Harrison,* student, Worshipful Company of Founders; J. H. H. van Huyssteen, pupil engineer, U.S.C.O., South Africa; S. T. Keep, foreman patternmaker, W. H. Allen & Sons, Limited, Bedford; J. Martland, head foundry foreman, Manganese Bronze & Brass Company, Limited, Birkenhead; L. C. Matthews, patternshop foreman, Alliance Foundry Company, Limited, Luton; R. W. Mousley, director, Leamington Pattern Making Company, Limited; J. Musson, chief inspector, Firth Vickers Stainless Steels, Limited, Sheffield; T. Ogden, foundry service engineer, Ferranti, Limited; W. E. Riddy, foundry foreman, W. H. Allen & Sons, Limited; E. L. Robinson, L.I.M., chief metallurgist, Treharne & Davies, Limited, Cardiff; B. K. Sanyal, assistant to foundry manager, Kumardhubi Engineering Works, India; R. C. Siddall, L.I.M., foundry technician, L. Gardner & Sons, Limited, Patricroft; A. Smith, assistant to foundry manager, Howard & Bullough, Limited, Accrington; R. Stanton, foundry inspector, J. Stone & Company, Limited, Charlton, London; W. D. Starkey, student, F. H. Lloyd & Company, Limited, Wednesbury; K. C. Stokes, planning, estimating and ratefixing department, Daimler Company, Coventry; C. W. Stuart, foundry superintendent, J. Stone & Company, Limited; D. J. Winfield, technical representative, British Rollmakers Corporation, Limited, Wolverhampton; K. W. Winsor, director and general production manager, Commonwealth Industrial Gases (Electric Section), Victoria, Australia.

As Associates (*over* 21)

S. Cox, iron moulder, North Eastern Marine Engineering Company, Limited; J. A. Daintith, moulder, E. Newell & Company, Limited, Doncaster; J. D. Flynn, moulder, C. A. Parsons & Company, Limited, Newcastle-upon-Tyne; D. M. Grounds, foundry metallurgist, Midland Motor Cylinder Company, Limited, Birmingham; R. J. Hancock, coremaker, C. W. Taylor & Son, Limited, South Shields; P. G. Cusworth, assistant works manager, Henry Edie, London.

As Associates (*under* 21)

G. D. Baxter, apprentice draughtsman, British Engines, Limited, Newcastle-upon-Tyne; G. Duckett, student foundry apprentice, F. H. Lloyd & Company, Limited, Wednesbury; G. Singh, student, National Foundry College, Wolverhampton; P. A. Smith, apprentice moulder and coremaker, Reavell & Company, Limited, Ipswich.

THIRD LIST

As Members

W. G. Calder, director and works manager, Keith Blackman, Limited, Arbroath; A. Calderbank, designer, Dustproof Industrial Clothing Company, Denton; J. D. Currie,* chief chemist, Enamelled Metal Products Corporation, Limited, Leven, M. Hay, general manager, Scottish Works, A. Cohen & Company, Limited, Glasgow; M. J. Hayden,* senior foundry foreman, Allied Ironfounders, Limited, Waterford, Eire; C. W. Hicks,* foundry metallurgist, Rolls Royce, Limited, Derby; T. R. Miller,* foundry superintendent, Babcock & Wilcox, Limited, Renfrew; D. S. Whyte, managing director, Whyte & Edward (Metals), Limited, Dundee.

As Associate Members

G. H. Bhilotra, university student at John Brown & Company, Limited, Clydebank; T. Canlin, moulder, Pickersgill & Frost, Limited, Langley Mill, Notts.; D. G. Corns, foreman moulder, Stanton Ironworks Company, Limited; A. M. Craig, head foreman (brass foundry), Glenfield and Kennedy, Limited, Kilmarnock; L. Fernley, draughtsman, English Steel Corporation, Limited, Sheffield; J. B. Gray, head foreman (light iron foundry), Glenfield & Kennedy, Limited, Kilmarnock; J. D. Hill, B.Sc., metallurgist, John Gardem & Company, Ripley, Derby; L. Jepson, foundry foreman, Greenside Foundry Company, Limited, near Sheffield; T. Macdonald, sales representative, Carntyne Steel Castings Company, Limited, Renfrew; M. L. Mukherjee, graduate engineer, Babcock & Wilcox, Limited; P. E. Roberts, draughtsman (foundry products), English Steel Corporation, Limited; A. Sumner, foreman wood patternmaker, Sheepbridge Engineering Company, Limited, Chesterfield; W. Taylor, head foreman (heavy iron foundry), Glenfield & Kennedy, Limited; J. D. Thom, managing director, Thom, Lamont & Company, Limited, Paisley.

As Associates (*over* 21)

W. D. Hamilton, metallurgist, Cameron & Roberton, Limited, Kirkintilloch; J. Macleod, heavy floor moulder, Harland & Wolff, Limited, Glasgow; N. A. MacQuarrie, metallurgist, Renfrew Foundries, Limited, Glasgow; R. A. F. Page, inspector, iron castings, Barnards, Limited, Norwich; Miss V. J. Russell, metallurgical student, S. Russell & Sons, Limited, Leicester; K. L. Shanks, trainee executive, Shanks & Company, Limited, Barrhead.

As Associates (*under* 21)

P. L. Nice, metallurgical apprentice, Reavell & Company, Limited; J. Rice, apprentice metallurgist, Babcock & Wilcox, Limited, Renfrew.

* Transferred.

Cleveland Foundry Show Exhibit

New British Turnover Moulding Machine

A British-made moulding machine incorporating a number of special features will be exhibited at the Foundry Congress and Show of the American Foundrymen's Society to be held at Cleveland, Ohio, from May 8 to 10. Known as the "B.T.1," it is an oil-operated turnover-type machine with pneumatic jolt-squeeze, vibrators and pattern draw. The design has been evolved from a long line of successful turnover types manufactured by the British Moulding Machine Company, Limited, at their Weston Works, Faversham, Kent.

At Cleveland, the machine will be engaged on the production of demonstration moulds for brake-drums and similar castings involving deep-draw green-sand moulding. It is expected that considerable interest will be aroused and all possible steps are being taken to bring the machine to the attention of American and Canadian foundrymen. Such is the importance attached to these dollar markets that two members of the company, Mr. V. L. Cashmore and Mr. H. J. Bullock, are visiting the States and will be present at Cleveland to demonstrate the new machine which, it is understood, is already virtually sold.

The British Moulding Machine Company, Limited, have been making turnover-type machines for about twenty years. All their knowledge and experience have been devoted to the production of a machine capable of eliminating the maintenance troubles which can be so annoying, especially in a mechanised foundry. They believe that they have now succeeded in evolving a machine which should be capable of maintaining its efficiency and accuracy with minimum trouble during many years of heavy work. Throughout the design, emphasis has been laid on strength, simplicity, and—above all—ease of maintenance.

The development of the B.T. type of moulding machine has taken eight years. The first prototype was built in 1942 and was immediately subjected to a series of gruelling tests in various well-known iron and steel foundries, after which it was returned to the manufacturers for examination. A second prototype was then put through the same sequence of testing, stripping down and modifying. A third prototype was produced in 1946 and this time three machines were built. These were installed in a mechanised foundry producing up to 900 parts per machine per day. Further refinements were made and many improvements were effected before the final model was jigged-up for production this year. All five of the earlier prototypes after examination were returned at the customers' request and are still in daily use.

Special Features

Special features of the machine, which is illustrated in Fig. 1, include fully streamlined construction, built-in air filters, automatic lubrication, push-button controls, a patented fully-automatic pneumatic anvil, a continuous-type turn-over sprocketed chain, and easy mould removal. Not only is the machine streamlined to prevent the accumulation of dust and dirt, but all parts are highly finished for the same reason. Thus the machine is easy to keep clean, which is an important consideration in a foundry. To overcome the troubles caused by cracked or corroded ferrous pipes and fittings, all pipes in the machine are of brass.

The swing arm operates on particularly ample bearings which combine absolute rigidity during squeeze and pattern draw with smooth and effortless movement. The head itself is split for ease of adjustment and guards have been fitted to exclude sand from the adjusting screw. An important feature is the combined handle and locking lever, which enables the head to be swung round with one natural movement, whether the machine is in the upright or the inverted position.

Inside the trunnion housing, completely protected from dust and sand, is the oil-operated turnover mechanism, which incorporates such notable features as a double sprocket chain, so arranged as to ensure an equalised tension and prevent damage or accident even when the machine is negligently used. The turnover cylinders are hone-finished and the piston heads are always immersed in oil, so that the replacement of packings is unnecessary over many years' service. Fitted to the trunnion housing at the rear end is the main lubricator, which is of an entirely new and patented type and ensures a consistent supply of oil to all air-operated parts of the machine.

The jolt-, squeeze- and pattern-draw mechanisms are contained in the main cylinder and are controlled by three valves positioned on the front of the cylinder. All three valves are "push-button" controlled by means of three steel striking levers which can be operated by the slightest pressure of one finger. Yet the valves themselves will suffer no damage if the levers are struck with a shovel or otherwise ill-used.

One of the most important features is the patented pneumatic anvil, previously mentioned, which automatically lifts the entire jolt unit during turnover operations, but allows it to rest solidly on the base-

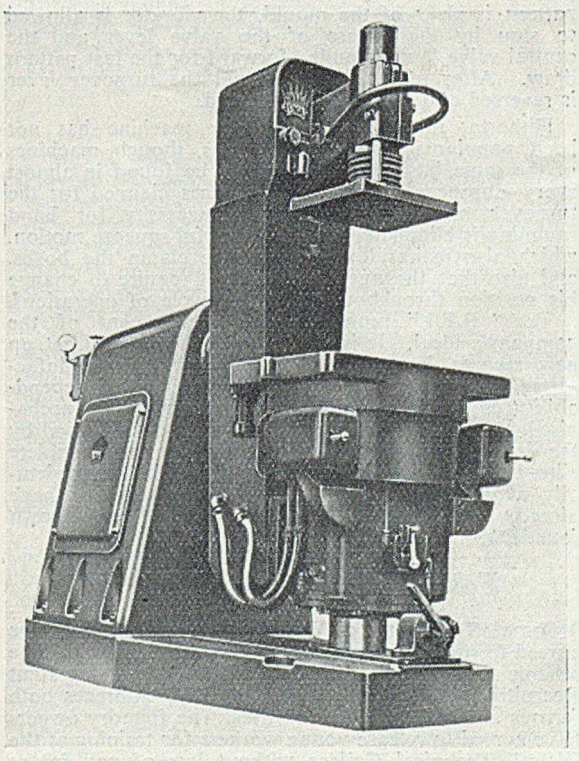


FIG. 1.—THE B.M.M. TYPE B.T.1 WHICH IS BEING SHOWN ON STAND 1203 AT THE CLEVELAND EXHIBITION OF THE AMERICAN FOUNDRYMEN'S SOCIETY.

New Turnover Moulding Machine

plate when jolting. Any sand which falls on to the anvil plate when the machine is turning over is automatically blown clear when turning back. The jolt stroke is long and the impact is positive. It is noteworthy that the three guide rods do not jolt up and down with the table but are brought into use only with the pattern draw.

Consistency in the quality of the moulds produced is ensured by a jolt timer, which can be set to stop automatically at any desired number of jolts. The timing mechanism is securely housed in the column, but the adjustment is quickly and easily made from the outside by turning a knurled knob. This very robust device is particularly valuable, since it entirely eliminates the human element. There is a correct number of jolts for every pattern, which can readily be found by making a few trial castings. It is strongly recommended that this information should then be recorded on the pattern so that the automatic timer can be pre-set accordingly.

Operational Sequence

After the moulding box has been filled with sand the left-hand valve lever is pressed down to commence jolting. This operation ceases automatically at the desired number of jolts. The right-hand lever is then pressed down for the squeeze and the turnover valve lever moved with the foot. As the machine reaches the inverted position the (now) right-hand knob is pressed down for the vibrator and the left-hand one pressed to start the pattern draw. As soon as the pattern is clear of the mould, the vibrator is allowed to stop by the release of the valve lever and the central valve lever is pulled forward for the fast pattern draw. After removing the mould the turnover lever is reversed and the cycle is repeated.

Hitherto, this type of turnover machine has not been popular in the United States, though machines of the same basic principle are to be found in almost every European country. Advantages claimed for the turnover machine are that the necessity for hand ramming is eliminated by the powerful squeeze motion, which also makes it unnecessary to clamp the boxes, and also that the operator does not require to change his position throughout the entire cycle of operations.

The "B.T.1" represents the achievement of the company's ideal. It is not claimed that it will set up new records in speed of output, but the manufacturers are confident that its high standard of dependability will be a valuable asset, particularly in mechanised foundries which can be seriously disorganised by the breakdown of a single machine. The complete elimination of the human element has also been virtually achieved. Orders for the new machine have already been placed by a number of well-known foundries.

Foundry Training in Walsall

Some 50 per cent. of Walsall's foundry owners have agreed to support a new industrial training scheme. The scheme was formulated by the Walsall Foundry Joint Recruitment & Training Committee and embraces both ferrous and non-ferrous industries. The foundry owners have agreed to release young workers for training at the Walsall Technical College without loss of pay for at least one day a week, and for four weeks each year for more intensive instruction at the Foundry Trades National Centre at West Bromwich.

Brass-foundry Team for America

The productivity team from the British brass-foundry industry which is visiting American installations sailed from Southampton on April 21. In a six-weeks' tour it hopes to obtain a thorough insight into American processes of casting and manufacturing the exceedingly wide range of the industry's products. The team returns in the Mauretania, sailing on June 6.

The American brass-foundry industry has machine tools and machinery methods which are well worthy of study and, in addition, the team will look into American methods of production control, factory layout, packaging and marketing. In this country in recent years, there have been changes in production and many brass parts, formerly cast, are now made by hot pressing and die-casting operations. Developments of these processes in the United States are likely to be of much interest to those of the team whose firms are members of the National Brassfoundry Association. They will also have a strong interest in machining and finishing methods, including polishing, electro-plating and chemical finishes.

Other members of the team, whose firms are members of the Association of Bronze and Brass Founders, are mainly interested in the production of all types of engineering castings such as centrifugal pump casings and impellers, reciprocating pumps, castings for all types of prime movers and engines, bearings, marine propellers, hydro-electric equipment, chemical and oil-refining plant. They are concerned in the production of castings up to 30 tons. All developments connected with copper-base alloys such as phosphor-bronze, aluminium bronze, bearing bronzes, gunmetal, acid-resisting bronze, and other special bronzes will come within the scope of their inquiries as well as research work on new alloys.

In Britain's economy, the brass and bronze founding industry is important not only because of its size—it employs about 30,000 people—but also because of the variety of essential purposes to which its products are applied in the home, in every sort of craft afloat, and in industry.

During its preliminary tour in this country the team has seen crafts which have been carried on continuously in the same place for two hundred years. But two hundred years is only a short span in the life of an industry which is one of the oldest manufacturing industries in the world and had reached a high standard of craftsmanship in Chaldea five thousand years ago. The arrangements for the tour in America have been made by the Anglo-American Council on Productivity.

New All-carbon-lined Furnace

An all-carbon-lined blast furnace was blown in at the Scunthorpe works of the Appleby-Frodingham Steel Company (branch of the United Steel Companies, Limited), recently. Mr. Matthew Ferguson, of the Explosives Division of Imperial Chemical Industries, Limited, performed the ceremony. Torn down and relined in the record time of 36 days 7 hours by the Appleby-Frodingham Company's own personnel, No. 5 furnace is one of the three furnaces in the world now completely lined with carbon refractories; all three are at the company's Scunthorpe works.

MR. W. TAIT, director, Foundry Equipment and Mechanical Handling Division, Stone Wallwork Limited, left Southampton yesterday in the Ile de France for America where he will participate in the 54th Annual Convention of the American Foundrymen's Society at Cleveland, Ohio.

National Brassfoundry Association

Annual Report of the National Executive Council

The Annual Report of the National Executive Council of the National Brassfoundry Association for the year ended December 31, 1949, was presented at the annual general meeting of the Association held last Tuesday, and what follows is an abstract of this document:—

The past year had been the busiest ever experienced. There had been a substantial increase in the number of meetings, and many major issues had arisen which had required, and received, urgent attention.

Membership

Although membership was slightly less than in the previous year, the Council was satisfied that the reasons for the lost members in no way reflects upon the Association. In one case, two members merged, and in all the others, activities had changed which brought the firms concerned outside the activities of this Association. The resignations were:—

H. W. O'Neill, Limited, Birmingham; Petford & Pountney, Birmingham; Pneumatic Components, Limited, Sheffield; J. H. Rothwell & Company, Swinton, and Whyte & Edward (Metals), Limited, Dundee.

New members enrolled during the year were:—

Petford & O'Neill, Limited, Birmingham; E. F. Tart, Limited, Bilston, and A. E. Townsend & Sons, Birmingham. The membership now stood at 241.

Valete

The Council recorded with deep regret, the passing of the following members, during the year under review:—

Mr. Thomas Ash, of Thomas Ash & Company, Birmingham; Mr. Ernest Chadwick, of Kay & Company (Engineers), Limited, Bolton; Mr. George Lindsay, of Charles Lindsay, Limited, Glasgow; Mr. Wm. McGeoch, of Wm. McGeoch & Company, Limited, Birmingham (Mr. McGeoch was president in 1930); Mr. T. D. Sanders, of Thomas Sanders, Limited, Birmingham; Mr. H. L. Sutcliffe, of Sutcliffe, Wright & Son, Halifax, and Mr. H. I. Watts, of Midland Patent Hinge Supply Limited, Birmingham.

The Council also recorded with great regret the death of Mr. A. B. Williams who, it would be recalled, acted temporarily on the staff in 1947, when he undertook, with outstanding success, much of the work of organisation of the jubilee banquet, and of the first of a successful series of golf competitions.

Meetings

Three general meetings, three of the national executive council, and ten of the president's and finance committee had been held in the course of the year:—

A great deal of the work and responsibility for the work of the Association had fallen upon the latter newly-formed committee, and had been so well discharged as to place the Association under a considerable debt to those who had served upon it. In particular, thanks were recorded to Mr. T. R. Carpenter, who undertook the onerous duties of treasurership, which were formerly discharged by Agar, Bates, Neal & Company.

Sectional Work

Most sections had been exceptionally busy during the year, for a variety of reasons. The "Water and Steam" section had been particularly pre-occupied with the changeover from the M.O.H. tap to the new British Standards, and this had greatly complicated its affairs. In view of the considerable increase in the cost of metal, this introduction of a tap, heavier than that used anywhere else in the world, was economically ill-timed, and had had an adverse effect upon both production and exports. To confound the already confounded, orders for the former specification continued to come in, and it was evident that the water engineers themselves, in many cases, had no wish to make this unnecessary change. There was, however, every hope that arrangements would be made for the retention of the earlier specification, including the "Swan" Trade Mark, for export to those countries still requiring this pattern.

The "Reproduction and Furnishing Brassware" section continued to be handicapped by the numerous anomalies of purchase tax. Not only was this imposition at far too high a rate for the good health of trade, but it was applied in a manner that put design at a real disadvantage. Whereas plain items were tax free, or at lower rates, goods bearing decorative features, although costing no more to produce or using no more materials were chargeable at the highest rate. This was ridiculous from a logical viewpoint and extremely harmful to the export trade.

Exports

Mr. H. Patterson Bone had continued to be at the disposal of members desiring to consult him, and was visiting Canada and the United States in 1950 in the interests of a group of members. The Association had used every endeavour to stimulate interest in dollar markets and progress had been made. Unfortunately, this was not an industry with bright prospects of sales in those markets for most of its products.

The Association was concerned too, with the possibilities of developments in South Africa, where application had been made for increased tariffs against plumbers' brassfoundry and valves, which had for so long been supplied to the Union from this country. This application was ill-advised and earnest representations had been made against it.

Liberalisation of European Trade

As part of the policy of the organisation for European Economic Recovery, import licensing destrictions had been removed from numerous goods, by the various countries comprising Western Europe. Preliminary examination of the first lists showed that this country is now wide open for the importation of cut-price European-made brassfoundry of all types, without compensatory entry of British products into the European markets. Representations had been made, and although the Continental countries had increased the numbers of items of manufactured goods which they were prepared to receive without licensing, very few home products were as yet included. This problem had been added to the many others with which the Association was faced by the policy of the Government to act with-

National Brassfoundry Association

out any form of consultation with industry. It seemed reasonable to expect the Government to have sufficient business sense to have freed goods from restriction of imports only to the extent and categories that the other countries were willing to collaborate on terms of equality. As it was, with the shrinking export markets, the Association found itself up against foreign competition in its own markets, and goods were beginning to enter the home trade, made by hard-working people who suffer no comparable burden of taxation with British producers.

Festival of Britain, 1951

As an industry, it was naturally hoped that, the Festival having been decided upon, it would be enabled to participate adequately and on terms that will permit it to demonstrate its real quality. Every endeavour had been made to that end. Officials of the promoting organisation—the Council for Industrial Design—had addressed a general meeting in November. Earlier, in April, the Association had an address on Industrial Design from Mr. E. C. McKenzie.

Taxation

The Association fully supported the representations made by the Federation of British Industries regarding the burden of taxation, its destruction of incentives and the need for reducing Government expenditure. It had examined with agreement the proposals put forward by the F.B.I., for removal of anomalies in taxation, particularly in regard to the replacement-cost problems, directors' expenses, deferred repairs and the discrimination, through purchase tax, against designed goods and stationery.

Devaluation

The effect of devaluation on the industry had been hard. The main raw materials, although only one-third derived from dollar sources had immediately increased substantially in price, the Government taking a large profit, at the same time issuing a stern warning against industry, lest it increased its prices. No compensating increase in exports had been felt by this industry so far.

Propaganda

The Association had not, perhaps, played as full a part as it might in the counter-campaigns in support of free enterprise. The Association, in common with many, owed its very existence to this traditional system of trade, and its future depends upon the retention of the system as did the restoration of the prosperity of the nation. It was, admittedly, not a political body, but the very existence of its structure was threatened, if not by direct nationalisation, then by being shackled to nationalised suppliers. The work of such bodies as "Aims of Industry" was commended to members, as worthy of support.

Productivity

The Association was at present engaged in discussing the possibility of collecting a team with a view to a visit to the United States, where conditions and methods of production were available for examination, and it was assured of a cordial welcome. The Council hoped that by the time the Report appeared, a team would be formed and would be due to sail at an early date*

The Association desired to express to the United States' Government, as well as to the British, the warmest expressions of gratitude for the generous financial assistance given to these Productivity Teams, amounting to some $500 plus all travelling expenses in the U.S.A. in the case of the U.S. Government, and £132 in the case of the British Government. The examination of the Reports of other teams revealed a most interesting and encouraging outcome. The Association was sure that equally valuable experiences awaited its own delegates.

Brass Saga

The work of the book had progressed far with the appointment of Mr. R. H. Brazier to give it editorial supervision and it was hoped that it would make its appearance in 1950. Like all good things, it would be worth waiting for and would not suffer by reason of the delay that had unavoidably occurred. If anything, members might benefit by the better-quality paper now available.

Mr. Edgar N. Hiley, M.B.E.

It was with especial pleasure that the Council recorded that His Majesty the King had conferred upon the secretary the honour of Member of the Order of the British Empire.

Agar, Bates, Neal & Company

The Report carries an illustration of a plaque presented to this firm which has acted for the Association for over half a century, as secretaries and treasurers from 1897 until 1921, and as treasurers until 1948, and as landlords. The firm will continue, as they remain the Association's auditors.

Liaison

The Association had remained in close liaison with other industries and with kindred associations such as the Non-Ferrous Metals Federation, the Association of Bronze and Brass Founders, the Lock and Latch Makers' Association, the British Valve Manufacturers' Association, the Engineering Industries Association, and was represented on the Foundry Industries Liaison Committee and the West Midlands Foundry Advisory Committee for Recruitment and Training. It was also represented, through the secretary, on the Federation of British Industries, the Birmingham Employment Committee and the Insurance Advisory Committee. Membership of such bodies as the Birmingham Chamber of Commerce, the Industrial Welfare Society, the Engineering and Allied Employers' Association, the Institute of Export, the Secretaries' Club, had been maintained, but it had been decided to discontinue membership of the Australian Association of British Manufacturers. It had also continued to subscribe to the British Standards Institution, and was represented on several committees.

British Waterworks' Association

Mr. C. M. Smith, Mr. C. J. Chapman and Mr. P. N. Dingley had again represented the Association on the relevant committees of this body.

Trade Protection Department

This free service to members had been increasingly used. 171 status enquiries had been issued and 22 debt collections had been handled.

Golf Competitions

Two successful golf competitions had been held; the Annual Golf Competition was held at Brocton Park, and the Jenks Cup was won by Mr. K. G. Thomson. An Autumn competition was tried on alliance lines, with eclectic scoring, and the winners were Mr. A. C. Edwards and Mr. H. M. Moseley.

The Report is signed on behalf of the National Executive Council by Mr. Hedley W. Blake, president, and Mr. Edgar N. Hiley, secretary.

* This has been effected.

House Organs

F.B.I. and B.E.T.R.O. to Render Mutual Aid

With the sanction of their respective Councils, mutual aid has been agreed by the Federation of British Industries and the British Export Trade Research Organisation (B.E.T.R.O.). This collaboration, besides eliminating a certain degree of overlapping of effort and function that has hitherto existed between the two organisations, is intended as a positive move to help British exporters.

B.E.T.R.O. will continue to be an entirely independent overseas research body and, under this new arrangement, will be financed solely by industry through its membership and turnover of work. It will receive a final payment from H.M. Government in respect of the Board of Trade grant-in-aid. This has been enjoyed for the last three-and-a-half years, but, thereafter, no request for Government funds will be made. By the new arrangement the F.B.I. will promote the wider use of B.E.T.R.O. for market survey and research work among F.B.I. members, and B.E.T.R.O., by being given facilities to use the services of the F.B.I. overseas' representatives, will be able to arrange schemes of overseas market research at an economical cost for its own members, for F.B.I. members, and for exporters generally. B.E.T.R.O. will cease to handle export enquiries that are outside the field of market survey and research and which are part of the normal functions of other organisations.

Sir Norman Kipping, director-general of the F.B.I., is going next week to Toronto and New York for the primary object of inspecting and developing the F.B.I. offices there. Mr. Roger Falk, O.B.E., director-general of B.E.T.R.O., is also paying a visit to North America to see the B.E.T.R.O. offices. Advantage will be taken of these visits for Sir Norman and Mr. Falk, with the help of local experts, to prepare the ground for the building up of an economical product-testing service available to British manufacturers. Arrangements will also be made for B.E.T.R.O.'s representatives to be accommodated in the F.B.I. offices.

Pera Bulletin, March, 1950, Vol. 3, No. 3. Published by the Production Engineering Research Association, Staveley Lodge, Melton Mowbray.

The reviewer finds himself holding this bulletin in higher esteem with the publication of each issue. He appreciates the twenty or so abstracts from foundry literature. There is, however, one expression which might mislead some readers. In an abstract of an article on moulding machines a sentence starts "Sand supplies: location of controls . . . ." Now this could be read as to mean sources of sand, whilst actually the phrase intends to convey the servicing of the machine with sand. This might seem a little ungenerous to seize on such a small phrase, but the object of extracts, as the reviewer understands them, is to indicate the source of information on the various subjects covered by the main heading and a person interested in sand resources would be misled.

Heads and Threads, Spring, 1950. Published by the British Bolt, Screw and Rivet Conference from 25, Bennett's Hill, Birmingham, 2.

This is the first issue of a new house organ of a very old and perhaps modest industry. It is a sizeable industry, and like most is made up of both large and small concerns. There are about 120 firms listed, together with their productions—a very useful directory. It is pleasingly jacketed in colour and the contents include two good technical articles.

Institute of Metals Platinum Medal

At a luncheon held in connection with the annual general meeting of the Institute of Metals, the president, Mr. H. S. Tasker, presented the 1950 Institute of Metals Medal in platinum to the distinguished French metallurgist Professor Albert Portevin, in recognition of his eminent services to the science and practice of non-ferrous metallurgy. The French Ambassador was present at this ceremony.

Professor Portevin, who is a *Commandeur de la Légion d'Honneur,* a *Commandeur de l'Ordre de la Couronne de chêne de Luxembourg,* and a *Membre de l'Institut de France,* was trained as an engineer. He was director of the laboratories of the de Dion-Bouton motor works from 1905-1912; lecturer and later Professor at the *Ecole Centrale des Arts et Manufactures* from 1912-1925; and was appointed Professor at the *Ecole Supérieure de Soudure Autogène* (Paris) in 1931. He is technical director of the periodical "Revue de Métallurgie," and is a member of the board of several metallurgical companies. Professor Portevin holds honorary degrees of the universities of Brussels, Cracow, Liège, Pribram and Zürich.

Most of Professor Portevin's work has been on physical metallurgy, particularly of steels. He has made special studies of the processes of fusion and solidification and of transformations in the solid state. He extended Tammann's method of thermal analysis to ternary systems, and, with Professor Chevenard, has perfected methods of dilatometric analysis. Together with Mr. Castro, Professor Portevin carried out important studies of the non-metallic inclusions and of the determination of oxygen in steels, and he has developed micrographic methods for the study of non-ferrous alloys comparable with those used for steels. In collaboration with Cymboliste, he used the method of brittle lacquers for studying the distribution of stress in metal structures under load. Besides determining the equilibrium diagrams of several alloy systems, he has made an extensive examination of the various types of microstructure and has devised means of classifying them systematically. He has carried out extensive work on the transformations of steel and on the light alloys of aluminium. In a series of Papers with Professor Bastien, he showed the principles governing the "castability" of alloys, and has also carried out much work on autogeneous welding. The majority of Professor Portevin's Papers have dealt with steels, but much of the work on foundry problems, on corrosion, and on inclusions is equally of importance for non-ferrous alloys.

Australian Foundrymen Visitors

We have been notified that a number of visitors from Australia will be in this country during the next few months. Mr. J. B. Harcourt, managing director of the James Coppell Lee Pty., Limited, Melbourne, is interested in machinery developments and foundry practice. His London address is c/o The Bank of New South Wales, Berkeley Square, W.1. Mr. H. I. Gregory, of Juleffs Pty, Limited, foundry proprietors, of Sydney, is interested in the subject of the mechanised production of light castings; his address is c/o National Bank of Australasia, 7, Lothbury, E.C.2. We also hear that after attending the American Foundrymen's Society meeting at Cleveland, Ohio, Mr. W. A. Gibson, M.I.B.F., is to visit this country. He is a well-known foundry-plant manufacturer located in Sydney, N.S.W. He can be reached by writing to this office. Mr. Davis, of Davis and Baird, steel founders, should be in London by the time this paragraph is in type.

News in Brief

THIRTY-ONE EMPLOYEES of the Weldless Steel Tube Company, Limited, Richards & Ross, Limited, and Tube Rolling Mills, Limited, members of the Tube Investments group, whose aggregate service totals 982 years, have received presentations for long service.

BREAKING past records, the Ford Motor Company, Limited, Dagenham (Essex), exported 14,800 cars, vans, trucks, and tractors during March. This figure brings the company's exports for the first quarter of this year to 36,982, compared with 26,419 for the last quarter of 1949.

GENERAL IMPROVEMENTS and the installation of two new soaking pits at the Ebbw Vale works of Richard Thomas & Baldwins, Limited, will, it is stated, result in an increase by the end of the year of nearly 17 per cent. in the output of steel ingots. Much larger supplies of steel sheets and tinplate will also become available.

A CARGO LINER of 10,500 tons dw is to be built by Vickers-Armstrongs, Limited, High Walker, for Furness, Withy & Company, Limited. The company already have two vessels under construction at the Walker yards. The latest order is the third one received by Vickers-Armstrongs during the past two months, which means that the firm now have sufficient work to keep them going into 1953.

AFTER 31 YEARS as foundry foreman at Precision Castings, Limited, Wolverhampton, Mr. W. J. Biddulph, of Smethwick, retired on Good Friday at the age of 75. He entered the service of the late Mr. J. S. Ault, then managing director in 1919, after being at some foundries in Birmingham. The present managing director, Mr. S. W. Ault, gave Mr. Biddulph a cheque, and he also received a clock from the workpeople.

FROM INDIA the discovery is reported of 12 new deposits of manganese ore in the Balaghat district of the Central Provinces. The Survey has also undertaken examined sites for oil refineries in the Thana district of Bombay and near Vizagapatam in Madras. It is proposed to double the strength of the Indian Geological Survey by 1951 in order to cope with the increasing number of development projects in India.

THAT A TRAGEDY for the country and for the steel industry would result if the steel capacity of Europe was developed beyond foreseeable needs was forecast by Mr. Lincoln Evans, general secretary of the Iron and Steel Trades Confederation, in a recent speech at Redcar. He said that there was no greater guarantee of unemployment than surplus and unusable capacity, and that the steel industry had had quite sufficient unemployment to last it a lifetime.

THE GOVERNMENT'S interim index of industrial production (1946 = 100) rose to the provisional figure of 137 in January, which was within two points of the November peak of 139. Compared with December there was a rise of six points, but in that month output was affected by the Christmas holidays. In January, 1949, the figure was 124, and the average for the whole of last year was 129. The index figure for February, 1950, is expected to reach the record level of 139-140.

THE FIRST OF A SERIES of exhibitions which are to be staged during the year to show commodities in the 1951 Stock List is being held at the Council of Industrial Design's Murray House Exhibition Hall, Vandon Passage, Petty France, London, from April 26 to May 24. The Stock List is a photographic index of contemporary products which will form the basis of selection for the official 1951 Exhibitions. The exhibition will show only a selection of goods registered in the domestic equipment sections of the Stock List.

Scottish Industrial Prospects

The iron and steel industry of the West of Scotland depends very largely on the requirements of the Scottish and Northern Ireland shipbuilding and marine engineering industries, and therefore, the prosperity of the shipyards is of prime importance to iron founders.

Shipbuilding

Although the new shipbuilding orders booked by Scottish shipyards during the first quarter of this year showed some advance on the tonnage secured in the corresponding period of last year, the position of the shipbuilding industry is still a cause of some concern. The general situation of the various Clyde yards is distinctly unequal. While some firms have as much as two to two-and-a-half years' work on hand, others have already laid the keels of the last order on their books, and one or two of the smaller yards are actually employing their staffs on maintenance and repair work.

One encouraging feature in the first quarter's bookings was the larger proportion of general cargo vessels. Tankers have been representing an unusually large percentage of new shipbuilding business in recent years, but a revival in demand for general cargo and liner tonnage would be regarded as a healthier sign. It is to be hoped that the first quarter orders may be indicative of such a revival.

Pig-iron and Steel

Blast-furnace activity is on the usual lines. Plentiful supplies of iron ore, limestone, and coke assure maximum production from the furnaces in blast, and outputs are satisfactory.

The steel-melting furnaces are also fortunately placed as regards raw materials, with deliveries of scrap from home and abroad ample for the requirements of the melting shops. Production is on a capacity basis. Specifications of plates are abundant and pressure for delivery of ship and boiler plates is strong. Full-time working of the plate mills is assured until the Glasgow Fair holidays at least. The heavy section mills can scarcely see so far ahead, but they are reasonably well supplied with orders for both home and oversea. Allocations of tonnage for export in the second quarter are on a liberal basis, and there does not appear to be any difficulty in finding buyers for the increased tonnages. Demand from re-rollers for slabs and sheet bars is heavy and strong, but for billets is not so good.

Cut Wire as Blasting Pellets

Blasting pellets of cut wire, made of S.A.E. 1065 (C 0.60 to 0.71; Mn 0.60 to 0.90), having a Rockwell C hardness of from 45 to 51, has shown a useful life of from 10 to 15 times that of other types of shot. According to "Steel," January 30, 1950, wheel-blade life is as much as 2,000 hrs. and shot-blast costs have fallen to the extent of 50 per cent. It appears that the small steel wire cylinders after use become hard, tough ball-bearing-like spheres, their uniformity providing an exceptionally high intensity of impact. Pellets are available in standard sizes.

AN EXHIBITION of current house journals, arranged by the British Association of Industrial Editors in conjunction with the Federation of British Industries, will be held on May 4, at the F.B.I. premises at 21, Tothill Street, London, S.W.1. It will be opened at 11 a.m. by Sir Robert Sinclair, president of the F.B.I. Admission will be by invitation, which may be had on application to the F.B.I. Press Office.

Company News

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

Matthew Hall & Company, Limited:—The most coveted air-conditioning contract available during the year was the concert hall, to seat 3,000, for the 1951 Exhibition, which was awarded to Matthew Hall & Company, says MR. BERTRAM BADEN, the chairman. Orders for three district-heating schemes, which will take over two years to complete, were also entrusted to the company. An interesting contract for the company's high-temperature radiant panels was at a large foundry. At an oilfield in the Middle East the company is installing miles of welded pipelines, well manifolds, a 1,800-ton central refrigeration plant for district cooling, cooling units, and general engineering services. At an oil refinery in this country the company is engaged on oil pipelines, fire-fighting and other services, and a good programme for 1950 is on hand. Contracts are being handled in the Middle East for the erection of structural steelwork, gantry cranes, central evaporation plant, pumps, high-pressure pipework, and other engineering work for a generating station to be completed in 1951, and generator sets for another station, including cooling pipework and oil-purifying equipment.

Imperial Chemical Industries, Limited:—The company has made an offer for a controlling interest in Arnold Hoffman & Company, Inc., of Providence, Rhode Island, U.S.A. If the offer is accepted I.C.I. will acquire an interest in the manufacture of dyestuffs and other synthetic chemical products in the United States and a medium through which its dyestuffs and auxiliary products, made in the U.K., can be readily marketed in the U.S. If the offer is accepted, the necessary finance will be provided by bank loans in New York, and the transaction will not, therefore, involve the use of any of Britain's dollar resources. The transaction, which has been approved by the United Kingdom Exchange Control authorities, is expected to result in a substantial increase in the flow of dollar earnings to Great Britain.

It is reported that the minimum requirement by I.C.I. is 66⅔ per cent. of the issued capital of Arnold Hoffman & Company, and the maximum is 70 per cent. If I.C.I. acquires 70 per cent., the amount involved in the deal will be over $3,500,000.

English Steel Corporation, Limited:—The managing director, MR. F. PICKWORTH, states that as a result of the continued drive for orders, all their departments at Sheffield are well filled with work, and the business so far received this year, which includes a considerable volume for export, indicates a continuance of full production for some time ahead. But full advantage cannot be taken of the export possibilities for certain products owing to shortage of labour in some departments and Government restrictions on the export of certain types of steel.

Blaw Knox, Limited, manufacturers of steelworks' and furnace equipment, etc., of Euston Road, London, N.W.1:—A resolution was submitted at the annual meeting held to-day to amend the company's articles. The chairman says that unfilled orders on hand amount to £3,146,000, against the record figure of £3,600,000 at the end of 1948.

Morgan Crucible Company, Limited:—The board has made arrangements for the annual meeting to be held on or about September 27.

Board Changes

BIRMID INDUSTRIES, LIMITED—Lord Burghley has been appointed a director.

PARKINSON STOVE COMPANY, LIMITED—Mr. J. W. Broad and Mr. C. Lobley have been appointed directors.

PARKINSON & COWAN, LIMITED—Mr. Wilfrid H. Dimsdale has been appointed a director. The company holds the share capital of Parkinson & Cowan (Gas Meters), Limited, Parkinson Stove Company, Limited, etc.

W. G. BAGNALL, LIMITED, railway engineers, etc., of Stafford—Mr. W. A. Smyth, a director and general manager of Henry Meadows, Limited, manufacturers of petrol and Diesel engines, etc., of Wolverhampton, has been appointed managing director.

PARSONS ENGINEERING COMPANY, LIMITED—Mr. I. A. Marriott, a director, has been appointed managing director in place of Mr. H. Parsons, who will continue as chairman. Mr. Marriott is also managing director of W. G. Bagnall, Limited, railway engineers, etc., of Stafford.

TRIUMPH ENGINEERING COMPANY, LIMITED—Mr. R. Fearon, for many years associated with Birmingham Small Arms Company, Limited, has been appointed works director in succession to Mr. A. Camwell. Mr. Camwell, who has retired, will remain as a director and will act in an advisory capacity.

PLATT BROS. (SALES), LIMITED—Mr. B. A. P. Dobson has been appointed joint managing director. Mr. E. H. Vlies has relinquished his position as sales manager (export) on being appointed a director. The company is associated with Platt Bros. & Company, Limited, textile and general engineers, of Oldham (Lancs).

Obituary

MR. GEORGE HENRY STRINGER, who for many years was associated with his brother the late Mr. Alfred Stringer, as ironfounders at Cannock, died recently at the age of 80.

DR. JAMES ARNOLD CROWTHER, Emeritus Professor of Physics at Reading University and vice-president of the Institute of Physics, died recently. Dr. Crowther, who was 67, had done much to advance the study of radiology, to which purpose he devoted much of his life.

MR. O. J. WENDLANDT, who after representing Dorman, Long & Company, Limited, Middlesbrough, went to Sheffield to begin a structural engineering department for Thos. W. Ward, Limited, and later became a manager for Herbert Morris, Limited, lifting and transporting machinery manufacturers, of Loughborough (Leics), died on April 14, aged 82.

Wills

REES, G. P., for many years manager of the Lilleshall Company's blast furnaces at Priors Lee £5,155

COLEMAN, J. P. D., of Littlehampton, late a director of Wild-Barfield Electric Furnaces, Limited, Watford, and its associated company, G.W.B. Electric Furnaces, Limited £5,421

SUTCLIFFE, H. L., lately associated with Wright, Sutcliffe & Son, sanitary engineers, of Halifax (Yorks) £19,429

WRIGHTSON, SIR THOMAS GARMONDSWAY, BT., chairman of Head, Wrightson & Company, Limited, Head, Wrightson Steel Foundries, Limited, and other companies, for some years a member of the Tees Conservancy Commission, a Deputy Lieutenant for County Durham and High Sheriff in 1926... £24,540

MADDOCK, DONALD, chairman and managing director of John Maddock & Company, ironfounders, of Oakengates £28,511

PALMER, R. G., managing director of the Eagle Engineering Company, Limited, Warwick, and a former chairman of the Warwick and Leamington Engineering Employers' Association £29,686

Company Results

(Figures for previous year in brackets.)

PICKFORD, HOLLAND & COMPANY—Interim dividend of 7½% (same).

ELMORE'S METAL COMPANY—Loss for 1948, £366 (£256); forward, £11,462 (£11,816).

GLENFIELD & KENNEDY—Final dividend of 15%, making 20% for 1949 (20% for nine months).

CENTRAL PROVINCES MANGANESE ORE COMPANY—Final dividend of 13½%, tax free, on increased capital, making 20%, tax free (final dividend of 17½%, less tax, making 25%, less tax).

STURTEVANT ENGINEERING COMPANY—Final dividend of 11%, making 16½%, tax free, on the capital as increased by a 100% bonus issue. (Final dividend of 11% and bonus of 5½%, making 22%.)

BENTON & STONE—Net profit for the year ended July 30, 1949, after depreciation, etc., £56,572 (£80,302); to taxation, £35,097 (£45,144); final dividend of 10%, making 15%, tax free (same); to general reserve, £5,000 (£20,000); provident fund account, £2,000 (£3,000); forward, £20,993 (£15,891).

LILLESHALL COMPANY—Consolidated trading profit for 1949, £68,337 (£74,859); net profit, after depreciation, tax, etc., £24,933 (£27,219); to preference dividend, including additional 2% (same), £8,085 (£14,700 gross); ordinary dividend of 20% (same), £2,310 (£4,200 gross); tax reserve, £6,999 (nil); forward, £112,570 (£105,031).

ASSOCIATED CLAY INDUSTRIES—Group surplus on trading in 1949, £91,323 (£105,858); net profit, after depreciation, taxation, etc., £29,021 (£38,661); to preference dividends, £11,756 (£8,968); written off new issue expenses out of profits, £13,951; plus £14,025 from surplus on realisation of sinking fund policy; forward, £13,446 (£10,132).

BRITISH OXYGEN COMPANY—Consolidated net profit attributable to parent company, including taxation reserves no longer required of £150,000, £1,055,047 (£1,200,531); parent company's proportion of profit retained by subsidiaries, £251,919 (£239,900); final dividend of 12%, making 20% (same); to general reserve, £350,000 (£439,916); forward, £200,463 (£196,312).

SIR WILLIAM ARROL & COMPANY—Trading profit for 1949—including £75,547 (£166,233) from certain contracts completed in previous years, prices for which were not finally agreed until 1949—£354,507 (£347,151); balance, after depreciation, taxation, etc., £140,405 (£85,623); dividend of 10% on increased capital (25%); to general reserve, £103,020 (nil); contingencies, nil (£50,000); forward, £70,147 (£65,635).

LANARKSHIRE STEEL COMPANY—Trading profit for 1949, £467,846 (£363,010); net profit, after depreciation, tax, etc., £150,461 (£132,846); provisions set aside in previous years no longer required, nil (£129,500); to replacements reserve, £75,000 (£165,000); contingencies reserve, £30,000 (nil); general reserve, nil (£60,000); interim dividend of 20% (same); no further dividend is proposed (same); forward, £100,081 (£84,045).

FORD MOTOR COMPANY—Trading profit for 1949, £6,030,300 (£6,284,342 adjusted); balance, after depreciation, etc., £5,219,007 (£5,686,019); to tax, £2,604,776 (£2,763,362); unrequired commodity price reserve, £750,000 (nil); unrequired tax, nil (£500,000); available, £10,278,705 (£7,418,929); to reserve for taxation rectification, £157,250 (nil); replacement of machinery, equipment, etc., and contingencies, £500 000 (nil); dividend of 10% (same); forward, £9,126,455 (£6,923,929).

GLOVER & MAIN—Consolidated trading profit for 1949, (£641,891 (£623,249); net profit, before tax, £585,708 (566,608); to profits tax, £79,282 (£73,064); UK income tax, £225,364 (£229,473); foreign tax, nil (£119); net profit of group, £280,062 (£263,592); adjustments relating to previous years, £13,203 (£20,117); profits retained in subsidiary companies, £176,192 (£182,157); special depreciation, nil (£35,000); net profit of holding company, £117,073 (£66,912); written off investment in subsidiary company, £30,000 (nil); share capital distribution and expenses, £46 532 (nil); dividend of 15% and bonus of 7½% (same), the final dividend and bonus being paid on increased capital; forward, £67,186 (£88,451).

Changes of Name

The following companies have recently changed their names, the new titles being given in parentheses:—

M.M. PURCHASES, LIMITED, Bishopsgate, London, E.C.2 (Midland Metal Spinning Company, Limited).

MIDLAND METAL SPINNING COMPANY, LIMITED, Wolverhampton (Midland Investments, Limited).

AUTOPACK (LONDON), LIMITED, engineers, etc., of Caroline Street, Birmingham (Autopack, Limited).

MECO, LIMITED, engineers, founders, etc., of St. Mary's Road, Sheffield, 2 (Mills Bros. (Sheffield), Limited).

B.S.A. GRINDING MACHINE COMPANY, LIMITED, Marston Green, Birmingham (Leo C. Steinle, Limited).

GREEN LANE FOUNDRY COMPANY, Bott Lane, Lye, Stourbridge (S. Mole & Sons (Green Lane Foundry), Limited).

Increases of Capital

Details of increased capital have been announced by the following companies:—

JOHN HOLROYD & COMPANY, LIMITED, Milnrow (Lancs), increased by £350,000, in 5s. ordinary shares, beyond the registered capital of £150,000.

NORTH BITCHBURN FIRECLAY COMPANY, LIMITED, Darlington, increased by £100,000, in 200,000 shares of 10s., beyond the registered capital of £100,000.

ENGLISH ELECTRIC COMPANY, LIMITED, Kingsway, London, W.C.2, increased by £1,500,000, in £1 ordinary shares, beyond the registered capital of £6,500,000.

LYSAGHT'S (EXPORTS), LIMITED, ironmasters and founders, etc., of Bristol, increased by £15,000, in £1 ordinary shares, beyond the registered capital of £10,000.

STAR ALUMINIUM COMPANY, LIMITED, of Marston Road, Wolverhampton, increased by £30,000, in £1 ordinary shares, beyond the registered capital of £70,000.

H. & J. HILL (WILLENHALL), LIMITED, general iron-founders, etc., of Willenhall (Staffs), increased by £20,000, in 1s. shares, beyond the registered capital of £30,000.

BERYLLIUM SMELTING COMPANY, LIMITED, Southampton Street, London, W.C.2, increased by £4,000, in £1 ordinary shares, beyond the registered capital of £1,000.

GUEST, KEEN & NETTLEFOLDS (CWMBRAN), LIMITED, Smethwick (Staffs), increased by £799,000, in £1 ordinary shares beyond the registered capital of £1,000.

AITON & COMPANY, LIMITED, pipe manufacturers, etc., of Derby, increased by £250,000, in 40,000 preference and 210,000 unclassified shares of £1 each, beyond the registered capital of £100,000.

SANKEY-SHELDON, LIMITED, Bilston (Staffs), increased by £50,000, in £1 ordinary shares, beyond the registered capital of £50,000. Guest, Keen & Nettlefolds, Limited, holds nearly all the issued shares.

M. & W. GRAZEBROOK, LIMITED, ironmasters and founders, etc., of Dudley (Worcs), increased by £130,000, in 80,000 preference and 50,000 ordinary shares of £1 each, beyond the registered capital of £70,000.

MOSERS, LIMITED, iron merchants, etc., of Borough High Street, London, S.E.1, increased by £250.000 ,in £1 ordinary shares, beyond the registered capital of £250,000. Guest, Keen & Nettlefolds, Limited, holds a majority of the issued shares.

JOHN GARRINGTON & SONS, LIMITED, general stampers, etc., of Darlaston, increased by £1,950,000, in £1 ordinary shares, beyond the registered capital of £300,000. Guest, Keen & Nettlefolds, Limited, holds a majority of the issued shares.

BUCK & HICKMAN, LIMITED, iron and steel stockholders, etc., of Whitechapel Road, London, E.1, increased by £480,000, in 320,000 4½ per cent. cumulative preference and 160,000 ordinary shares of £1 each, beyond the registered capital of £160,000.

Gazette

DIECAST ALLOYS (GRAVESEND), LIMITED, is being wound up voluntarily. Mr. T. S. Taylor, 11, Wrotham Road, Gravesend, is the liquidator.

HARGREAVES (METALS), LIMITED, is being wound up voluntarily. Mr. J. E. Sagar, 43, Preston New Road, Blackburn, is the liquidator.

EUROPEAN IRON ORE COMPANY, LIMITED, is being wound up voluntarily. Mr. W. R. T. Whatmore, 11, Ironmonger Lane, London, is the liquidator.

MR. R. E. ETHERIDGE, 8 and 10, Portland Terrace, Southampton, has been appointed liquidator of G. P. Wilson & Son, Limited, ironfounders and engineers, of Northam, Southampton.

HARWOOD ENGINEERING COMPANY, LIMITED, is being wound up voluntarily. Mr. A. C. Unthank, Barton, Mayhew & Company, Alderman's House, Bishopsgate, London, E.C.2, is the liquidator.

JAMES SPREADERS, LIMITED, agricultural-implement manufacturers and engineers, is being wound up voluntarily. Mr. J. White, National Provincial Bank Chambers, 68, High Street, Grantham, is the liquidator.

THE PARTNERSHIP between Richard Percy Lovell, Arthur Frederick Bedworth, and Douglas James Holden Turner, carrying on business as plumbers, brassfounders, and engineers at 179-181, Spon Lane, West Bromwich, under the style of Repco Engineering, has been dissolved. Debts will be received and paid by R. P. Lovell and A. F. Bedworth, who continue.

THE COMPANIES' REGISTRATION OFFICE gives notice that the undermentioned companies have been struck off the register and are thereby dissolved:—CAERLAN COLLIERIES, LIMITED; HYDE & QUINN, LIMITED, precision engineers; MIDLAND PRINTERS ENGINEERS, LIMITED; NATIONAL UNITED LAUNDRIES ENGINEERING COMPANY, LIMITED; NOTTINGHAM DISTRICT COAL SALES ASSOCIATION, LIMITED; STEEL SCREENS, LIMITED; VACK INDUSTRIES, LIMITED, vitreous enamellers.

Raw Material Markets

Iron and Steel

The impressive statistics of a record-breaking output of steel during March have provided a powerful reinforcement of the argument that the rationing of steel is no longer necessary. To this appeal the official journal of the Iron and Steel Trades Confederation now lends its support. "Every scrap of evidence available," the journal says, "points to the fact that the steel shortage, except for sheets and tinplates, is virtually over and the Government should now discontinue, or at least modify, controls for which there is no further need."

Pig-iron production is not expanding in the same ratio as steel, and available supplies barely keep pace with requirements. New and bigger blast furnaces are being built and one or more may be ready for operation later in the year. In the meantime, blast furnaces are promptly disposing of their outputs and there are only trifling parcels available for export. Foundrymen are taking up supplies to the full extent of their allocation and, in some instances, have to be kept waiting for deliveries of low- and medium-phosphorus grades. Demand for No. 3 iron has fallen off owing to the shrinkage in the market for light castings, and refined-iron makers can still promise prompt deliveries.

Notwithstanding the continuous expansion of home steel production, the industry has not yet attained, nor is it likely to attain, complete self-sufficiency in regard to steel semis. Imports have, however, been substantially reduced, and re-rollers, though only moderately employed, are obtaining the bulk of their supplies of semi-finished steel from home services. The demand for sheet bars and slabs remains very steady, but business in the large sizes of billets and blooms is rather quiet and buyers display little interest in defectives, crops, etc.

The strength of the home demand for all descriptions of steel plates is unimpaired, and the volume of inquiries from overseas is also expanding. The outlook for heavy sections, however, is less encouraging. Home sales are restricted by the Government's indisposition to grant licences for constructional work. Fortunately, rollers of sectional material have lately been able to devote more of their capacity to overseas orders. From Canada and Australia some useful contracts have been secured, and the mills are still busily engaged. Wagon and locomotive builders are employed to the limit of their capacity, and have recently added to their order books.

Rail mills, too, are fully employed and the sheet mills have all the orders they can execute for many months ahead.

Non-ferrous Metals

Last week's increase of £9 in the copper price was the first change since early November, when, it will be remembered, there was an advance from £140 to £153. Following a sudden jump of 1 cent in the US quotation to 19½ cents, the Ministry of Supply put up its selling price to £162. Actually a rise of 1 cent is equivalent to £8, but on this occasion the Ministry elected to add £9 to the ruling quotation. It was reported that the initial move from 18½ cents was made by one of the chief copper producers and the others quickly followed suit. As if encouraged by the rise in copper, zinc advanced by ½ cent to 11 cents in New York. On this side there was a rise of £4 to £95 10s., so that in the course of a month this metal has gone up by £10—and it would be wrong to suppose that this is necessarily the end of the appreciation in zinc, or for that matter, that there will not be another rise in copper. To complete the story there was a rise of £2 in lead last Friday to £86, following an increase in the United States to 10½ cents.

On the week tin closed practically without change at £594 5s. for cash and £595 for three months, but during the course of the week's trading there were considerable fluctuations in value. Unfortunately, the contango has narrowed considerably, and at the end of the week was about 15s. The cash and three months prices were level on Monday. There was a very small contango yesterday (Wednesday). At this premium there is certainly not much encouragement to sell forward as a hedging operation.

Metal Exchange tin quotations were as follow:—

Cash—Thursday, £594 5s. to £594 10s.; Friday, £594 to £594 5s.; Monday, £591 10s. to £592 10s.; Tuesday, £590 15s. to £591; Wednesday, £587 5s. to £587 10s.

Three Months—Thursday, £595 10s. to £595 15s.; Friday, £594 10s. to £595; Monday, £591 10s. to £592 10s.; Tuesday, £591 to £591 5s.; Wednesday, £587 10s. to £588.

In consequence of the price appreciations set out above, the current quotations for brass and copper semis were increased. There was, too, a rise in the values of brass and copper scrap, but it is doubtful if much business eventuated, for the secondary metal market seemed to be slow in "finding its feet." It is on these occasions of price alteration in the United States that we miss the hedging facilities formerly provided by the London standard copper market.

Doubts as to what the next move will be made both buyers and sellers of scrap more cautious than usual, and on balance it was found that the volume of business in secondary metals last week was far from large. In fact, the market had hardly recovered from the effects of the Easter holiday when this rise in metal values in New York took place.

It is likely to be some time before the market recovers the poise it enjoyed before the upsurge in America set in.

Israel's Steel Requirements

A report from New York refers to plans of the Israeli Government to purchase quantities of American steel pipe. Mr. R'Uwen Elchanani, a member of the committee of the Chamber of Commerce at Tel-Aviv, has recently visited the U.S.A. Steel pipe is needed mainly for use in irrigation schemes contained in the country's plans for agricultural development, and it is also intended to construct a tube-rolling mill in Israel.

The construction of a steelworks, according to Mr. Elchanani, is not planned for the immediate future, because the country is not in too good a geographical position for coal and iron-ore supplies. Foundry pig-iron is available from Britain, France, and Belgium at what he called "reasonable prices."

The Israeli representative also referred to the loan of $100 million recently obtained from the Export-Import Bank.

The loan has been granted with the provision that Israel buys her needs from the United States, and the following purchases are intended:—Building materials (bars, plates, sheets, wire, rods, and tinplate), $25 million; pipe for irrigation, agricultural machinery, $35 million; industrial equipment, $20 million, and transport and communication equipment, $20 million.

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

(*Delivered, unless otherwise stated*)

April 26, 1950

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £10 4s.; Birmingham, £10 0s. 6d.

Low-phosphorus Iron.—Over 0·10 to 0.75 per cent. P, £11 15s. 6d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si)—North Zone, £12 2s. 6d.; South Zone, £12 5s.

Scotch Iron.—No. 3 foundry, £11 18s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £12 14s. 6d.; South Zone, £12 17s.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £13 4s. 6d.; South Zone, £13 7s.

Cold Blast.—South Staffs, £15 16s. 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, £11 16s. 6d.; Scotland, £12 3s.; Sheffield, £12 9s.; Birmingham, £12 15s.; Wales (Welsh iron), £11 16s. 6d.

Spiegeleisen.—20 per cent. Mn, £17 8s.

Basic Pig-iron.—£9 17s. 6d., all districts.

FERRO-ALLOYS

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

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

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

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

Ferro-titanium.—20/25 per cent., carbon-free, £100 per ton.

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

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

Ferro-chrome.—4/8 per cent. C, £60; max. 2 per cent. C, 1s. 5½d. lb.; max. 1 per cent. C, 1s. 6d. lb.; max. 0.15 per cent. C, 1s. 6½d. lb.; max. 0·10 per cent. C, 1s. 7d. lb.

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

Metallic Chromium.—98/99 per cent., 5s. 1½d. per lb.

Ferro-manganese (blast-furnace). — 78 per cent., £25 14s. 8d.

Metallic Manganese.—96/98 per cent., carbon-free, 1s. 5½d. per lb.

SEMI-FINISHED STEEL

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

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

Sheet and Tinplate Bars.—£16 16s. 6d.

FINISHED STEEL

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

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

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

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

NON-FERROUS METALS

Copper.—Electrolytic, £162; high-grade fire-refined, £161 10s.; fire-refined of not less than 99.7 per cent., £161; ditto, 99.2 per cent., £160 10s.; black hot-rolled wire rods, £171 12s. 6d.

Tin.—Cash, £587 5s. to £587 10s.; three months, £587 10s. to £588; settlement, £587 10s.

Zinc.—G.O.B. (foreign) (duty paid), £95 10s.; ditto (domestic), £95 10s.; "Prime Western," £95 10s.; electrolytic, £96 5s.; not less than 99.99 per cent., £97 15s.

Lead.—Good soft pig-lead (foreign) (duty paid), £86; ditto (Empire and domestic), £86; "English," £87 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, all English destinations, £111 10s.; rolled zinc (boiler plates), all English destinations, £109 10s.; zinc oxide (Red Seal), d/d buyers' premises, £91.

Other Metals.—Aluminium, ingots, £112; antimony, English, 99 per cent., £160; quicksilver, ex warehouse, £18 5s. to £18 10s.; nickel, £321 10s.

Brass.—Solid-drawn tubes, 16⅛d. per lb.; rods, drawn, 23d.; sheets to 10 w.g., 20⅞d.; wire, 21⅛d.; rolled metal, 19⅛d.

Copper Tubes, etc.—Solid-drawn tubes, 18¾d. per lb.; wire, 182s. 6d. per cwt. basis; 20 s.w.g., 209s. per cwt.

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £101 to £115; BS. 1400—L.G.3—1 (86/7/5/2), £110 to £122; BS. 1400—G1—1 (88/10/2), £158 to £200; Admiralty GM. (88/10/2), virgin quality, £185 to £195, per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £162-£210; L.P.Bl, £120-£128 per ton.

Phosphor Bronze.—Strip, 28¾d. per lb.; sheets to 10 w.g., 30⅝d.; wire, 30⅜d.; rods, 28¼d.; tubes, 33½d.; chill cast bars: solids, 28¼d., cored, 29½d. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 1s. 10¼d. per lb. (7%) to 2s. 8½d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 2s. 4¼d. (7%) to 3s. 2½d. (30%); to 12 in. wide, × .056, 2s. 4½d. to 3s. 2¾d.; to 25 in. wide × .056, 2s. 6½d. to 3s. 4¾d. Spoon and fork metal, unsheared, 2s. 2¾d. to 3s. 1d. Wire, 10g., in coils, 2s. 9½d. (10%) to 3s. 8d.; (30%). Special quality turning rod, 10%, 2s. 8½d.; 15%, 3s. 1d.; 18%, 3s. 5¼d.

Personal

MR. CLAUDE A. PARSON, of Guest, Keen & Nettlefolds, Limited, has been re-elected president of the Birmingham Exchange.

MR. and MRS. J. PICKEN have celebrated their golden wedding. Mr. Picken was works manager with the Sinclair Iron Company, Limited, Ketley, Wellington (Salop), with which firm he was associated for 32 years.

MR. J. C. GROOCOCK, a director and chief engineer of Sulzer Bros. (London), Limited, manufacturing engineers, is paying a visit to Australasia in connection with the company's business in traction, land, and marine Diesel engines.

SIR WILLIAM LARKE, director of the British Iron and Steel Federation from 1922 until his retirement in March, 1946, celebrated his golden wedding on April 11. Sir William, who is 75 this month, is still actively engaged in voluntary work.

MR. E. V. PARKINSON, lately technical adviser to the Tata Iron & Steel Company, Limited, India, and more recently a director and technical adviser to Tata, Limited, Grosvenor Place, London, S.W.1, has relinquished his appointment with the latter company. He will, however, continue temporarily to be associated with the company in a consulting capacity.

MR. D. CHERRY PATERSON, managing director of Paterson Hughes Engineering Company, Limited, has left this country for a business tour of South Africa. He will be away three months, during which period he will be based on the company's South African subsidiary, Paterson Hughes Engineering S.A. (Pty.), Limited, P.O. Box 811, Johannesburg.

MR. JAMES STEEL, assistant managing director of Steel & Company, Limited, founders, heating, etc., specialists, of Sunderland, has returned to Britain after a three-months' business visit to India and Malaya, where he obtained orders for cranes and other handling equipment worth about £500,000. MR. J. E. STEEL, his brother, has been on a visit to Canada, where he obtained several orders.

PROF. E. K. RIDEAL was elected president and PROF. R. P. LINSTEAD vice-president of the Chemical Society at the annual general meeting of the Society held in Edinburgh recently. Members of Council elected were:—DR. J. S. ANDERSON (Harwell); PROF. L. HUNTER (Leicester); PROF. F. E. KING (Nottingham); and DR. L. N. OWEN (London Imperial College). PROF. IAN HEILBRON, who retires from the presidency, becomes a vice-president who has filled the office of president.

MR. J. P. MCMURRAY, chief works accountant, and MR. J. H. WEARS, works manager, of the English Electric Company, Limited, at Stafford, have retired. Mr. McMurray was with the Metropolitan-Vickers Electrical Company, Limited, at Sheffield before going to Stafford. Mr. Wears joined the English Electric Company in 1928 as superintendent of the switchgear department, and in 1934 was appointed chief superintendent at the Stafford Works. During the war, Mr. Wears was responsible for tank production.

MR. J. B. DEAKIN, works manager at the East Moors Works, Cardiff, of Guest, Keen Baldwins Iron & Steel Company, Limited, has retired after nearly 40 years' service. He joined Guest, Keen & Nettlefolds, Limited, in 1912 as coke-oven manager at Cwmbran and held this position until 1930, when he was appointed fuel technologist to Guest, Keen & Nettlefolds & Baldwins, Limited. Mr. Deakin took a considerable part in the reconstruction of the East Moors Works in 1934-35 and, on the completion of the works in 1936, he was appointed deputy works manager, becoming works manager in 1947. Mr. Deakin is succeeded by MR. W. C. SMITH, the assistant works manager.

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

INVESTMENT (Lost Wax).—CASTING EXPERT, A.I.M., M.I.B.F., desires position of responsibility; energetic, enthusiastic, and capable of controlling mixed personnel.—Box 360, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN (aged 40) (Aluminium) seeks position; able to take full control; 18 years' experience, 10 years executive, machine casting billets for extrusion, rolling slab production, ingot casting.—Box 392, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST (25), due from Australia in October, requires further experience in Iron and Steel Foundries; part experienced in acid and basic open hearths, high-frequency furnaces, annealing control, roll manufacture, refractories.—Box 384, FOUNDRY TRADE JOURNAL.

KEEN ratefixing and incentive bonuses on mechanised and floor; production scheduling, cost control, progressing; experienced man seeks position, preferably Midlands.—Box 404, FOUNDRY TRADE JOURNAL.

METALLURGIST, age 33, experienced in all aspects laboratory and plant control of grey iron, non-ferrous and malleable castings, seeks post as CHIEF METALLURGIST or ASSISTANT FOUNDRY MANAGER with progressive company, Box 366, FOUNDRY TRADE JOURNAL.

QUALIFIED METALLURGIST (B.Sc. Lond. Ext., silver medallist London City and Guilds), desires change; 25 years' experience laboratory, iron and steel foundries, open hearth and ancillary plant, converter, cupola and foundry management.—Box 352, FOUNDRY TRADE JOURNAL.

VITREOUS ENAMEL CHEMIST AND TECHNOLOGIST, highly qualified and well known in Institute, seeks position of greater scope and responsibility, preferably in London area; 12 years' experience in Midlands includes enamel development for group of companies using own frit.—Box 400, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

FOUNDRY FOREMAN required; must have extensive experience of floor and machine moulded castings in grey iron up to 5 tons; for Foundry in the Midlands; good salary and prospects for right man.—Box 390, FOUNDRY TRADE JOURNAL.

WANTED.—Experienced CLERK, to take charge of progressive Foundry Office in Swansea area; state experience and salary required.—Apply Box 270, FOUNDRY TRADE JOURNAL.

MANAGER required for Non-ferrous Foundry in Middlesex; must be first-class man, capable of dealing with castings up to 15 cwt.—Apply in first instance to Box 394, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

WORKS MANAGER for small Foundry, Manchester area; good opportunity for progressive man.—Apply, stating age, experience, and salary required, to Box 402, FOUNDRY TRADE JOURNAL.

BRITISH ELECTRICITY AUTHORITY

SOUTH WALES DIVISION

APPLICATIONS are invited for the following appointments at Divisional Headquarters, at salaries in accordance with Class AX/CX of the Revised National Joint Board Schedule :—

(1) METALLURGIST. Grade 4 (£684-£864 per annum).

All candidates should possess a University Degree, and preference will be given to those who have done some research in metallurgical subjects. Consideration will be given to offering Grade 3 (£737-£921) to those also having extensive experience.

(2) COMBUSTION ENGINEER. Grade 3 (£737-£921).

Applicants should have obtained the Higher National Certificate or equivalent, and have had extensive experience in the operation and efficiency control of high pressure steam plant.

(3) STATISTICIAN AND RECORDS ENGINEER. Grade 5 (£579-£753).

Candidates should be University Graduates, and have specialised in statistical subjects. Some practical experience in the Electricity Supply Industry would be an advantage.

(4) STEAM ENGINEER. Grade 3 (£737-£921).

Considerable experience of plant erection and operation essential, and applicants should be Corporate Members of the Institutions of Mechanical or Electrical Engineers.

(5) TECHNICAL ENGINEERING ASSISTANTS. Grade 3 £737-£921).

Applicants should have had considerable experience in the design and testing of one of the following types of equipment :—

(*a*) A.C. rotating machinery.
(*b*) Switchgear (from 33 kV upwards).
(*c*) Transformers with on load tap changing equipment.
(*d*) Cables (from 33 kV upwards).

In addition to their work on equipment on which they have special knowledge, the successful applicants will be expected to take part in the general technical work in the Division.

The above appointments are superannuable under the British Electricity Authority and Area Boards Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below, to whom completed applications should be returned not later than 10th May, 1950, in sealed envelopes endorsed with the appointment sought.

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport, Cardiff.
19th April, 1950.

SITUATIONS VACANT—*Contd.*

AN old-established Iron Foundry requires a GENERAL MANAGER; applicants should be between, say, 35 and 50 years of age; they should have a first-class technical background, have the ability to make developments, and to be solely responsible to the Board for the total economic operation and capital expenditure of the foundries.—Full details, including salary bracket, in confidence, to Chairman, Box 378, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required for East London Jobbing Grey Iron Foundry; only men with first-class experience need apply; must be capable of controlling and training labour, and have a sound and practical experience.—Write, giving details of proven ability; salary £550 per annum; good prospects for the right man.—Box No. 185, W.B.G., 39, Cheapside, E.C.2.

FOUNDRY SUPERINTENDENT, with commercial experience, age 35/45, for 50/60 ton per week Foundry in North-West; must be fully experienced in semi-repetition, loose and machine moulding up to 1 ton; excellent opportunity for good organiser in addition to above qualifications.—Write in confidence, stating age, experience, salary expected, to Box 368, FOUNDRY TRADE JOURNAL.

MANAGER for Foundry required by Indian Textile Machine Company; applicants must have had experience of mechanised foundry production, skilled and semi-skilled floor moulding and general foundry organisation, including control of a metallurgical laboratory; give full details of experience and qualifications, age and salary required; the successful candidate will be required to pass a medical examination.—Box 380, FOUNDRY TRADE JOURNAL.

METALLURGICAL ENGINEER (age 30/35 years) for Alloy Steel Foundry, Sheffield district, engaged in the production of High Quality Corrosive and Heat-Resisting Steel Castings, by Static and Centrifugal methods; the position is progressive, and offers good prospects; initiative and energy are essential; commercial experience an advantage.—Write, stating full details of career, etc., qualifications and salary required, to Box 374, FOUNDRY TRADE JOURNAL.

REQUIRED for Blackheath, Birmingham. ASSISTANT MANAGER, 30/35 years of age, for Alloy Steel Foundry; must be accustomed to the production of High Quality Corrosive and Heat-Resisting Steel Castings, by Static and Centrifugal methods; initiative and energy are essential; commercial experience would be an advantage.—Write, stating full details of career, etc., qualifications and salary required, to Box 376, FOUNDRY TRADE JOURNAL.

STEEL Founders require two full-time SALES REPRESENTATIVES, preferably with knowledge of Steel Founding and Engineering industries.—Write, stating age, qualifications, etc., to Box 396, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*Contd.*

FOUNDRY SUPERINTENDENT required by North-East Coast Jobbing Foundry making approximately 100 tons castings per week in green sand, dry sand and loam; only those with first-class practical experience all branches need apply; the post is permanent and progressive.—Apply Box 382, FOUNDRY TRADE JOURNAL.

BUSINESS WANTED

BLACKHEART Malleable Iron Foundry required, with capacity for subcontract work or willing to dispose of part or whole of output or business.—Write Box 388, FOUNDRY TRADE JOURNAL.

BUSINESSES FOR SALE

FOR immediate SALE by PRIVATE BARGAIN as GOING CONCERN owing to death of surviving partner, FOUNDRY BUSINESS in BUSY INDUSTRIAL CENTRE of Fife, Scotland, producing grey cast iron, etc., castings with all usual offices, shop, stores, and buildings, cranes and equipment. Buildings and yard occupy 3 acres, and ample additional ground for development. Railway siding in yard for loading and unloading. Capital required £10,000.—Further particulars from D. M. FERGUSON, Solicitor, 24, Queen Anne Street, Dunfermline (Tel. 751), with whom offers should be lodged.

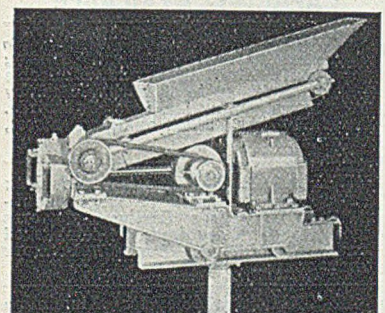
PATENT

THE Proprietors of Patent No. 579,556, for "Protective Covering for Metal Articles and Method of Applying," desire to secure commercial exploitation by licence or otherwise in the United Kingdom.—Replies to HASELTINE, LAKE & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

MACHINERY WANTED

WANTED

One or two Single arm Sandslingers as illustrated.



Condition no objection

Reply Box 960, Foundry Trade Journal, stating price, general condition, motor particulars, location for inspection.

MACHINERY WANTED—*Contd.*

CORE BLOWER wanted; Demmler, Osborn, International or Titan; any condition.—State size, type, and full particulars, Box 962, FOUNDRY TRADE JOURNAL.

STEEL Foundry required Straight Jarr or Jolt Rollover Machine, having capacity over 2,000 lbs; please give complete details of style, capacity and price required.—BOX 398, FOUNDRY TRADE JOURNAL.

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

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

WANTED

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

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

WANTED

CUPOLAS of all sizes, also Cupolettes; cash waiting.

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

MACHINERY FOR SALE

FOR SALE.—One TRAYCOR Double Chamber Modern Furnaces & Stoves Core Stove, coke breeze firing type, complete with re-circulating motor and fan; also spare motor and fan; motors wound for 440 volts, 3-phase, 50 cycles supply; all in good condition; inspection invited.—Box 386, FOUNDRY TRADE JOURNAL.

FOR SALE.—Morgan Tilting Furnace; 250 lbs. C.A., coke fired, in perfect condition, with fan.—SANDERSON, 4, Alpha Street, Leeds, 11.

FOR SALE.—Roots Positive Blower; 3 in. outlet; sound condition; cheap for quick sale.—SANDERSON, 4, Alpha Street, Leeds, 11.

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

DELIVERY EX STOCK

New shot blast cabinets complete with Dust Extractors, etc., size 5ft. × 3ft.

Also new 8ft. cube room Plants Low prices.

Illustrated catalogues free on request from :—

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MACHINERY FOR SALE—*Contd.*

SCOTTISH FOUNDRY SUPPLIES CO.

MOULDING Machines, Heavy Duty Grinders, Coke, Oil, Gas Fired Furnaces, Fluxes, Sairset, H.T. Cement. Cupola and Ramming Plastics, Straw Rope, Moulding Boxes, Core Gum, Plumbago, Parting Powder, All Foundry Requisites, mostly ex-stock.

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FOR SALE

PORTABLE Sand Mill, in new condition, fitted 5 ft. under-driven revolving pan and towbar. Can be motorised.

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

MISCELLANEOUS.

SHOT-BLASTING PLANTS; Room, Cabinet, Barrel Types. Can be supplied with Air Compressor, Air Receiver, Dust Extraction Fans, Dust Collecting Units, Electric Motors, etc. All types of Air Compressors in stock, with or without electric motors.

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FOUNDRY Equipment Type HRO, with hand rollover table and pneumatic pattern draw.

F.E. Jolt Squeeze Type CA1.

F.E. Hand Ram Pneumatic pattern draw size PRO. No. 5, turnover table.

F.E. Hand size AB2 swing head pin lift.

Nicholls Jolt Squeeze pillar type swing head-press, type 10.

Mumford Type plain Jolter PJ4.

B.M.M. Hand Squeeze SF1.

Jackman Squeeze Pneumatic Pattern Draw.

B.M.M. Type AT4 Pneumatic Jolt Squeeze.

Pneulec Herman Jarr Rollover, 750 lbs. capacity.

Coleman Type CNS, Pneumatic Squeeze.

Standard size Adaptables, modern type.

B.I. Magnetic Moulding Machines; types SS960 and DFB; 240 volts d.c.

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

MACHINERY FOR SALE—*Contd.*

FOR SALE

TUMBLING BARREL, 4 ft. long by 2 ft. 6 in. Motorised, heavy duty. 400/3/50 supply. As new. £150.

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

FOR SALE

TILGHMAN Wheelabrator Shot Blasting Machine; room 9 ft. by 6 ft. by 8 ft.; rotating table 7 ft. dia.; complete in every detail.

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

600

AIR COMPRESSORS

1,500 C.F.M., ALLEY & McLELLAN, type 31B, size 12, vert., 2-crank, double acting, enclosed, 2-stage, w.p. 100 lb., 293 r.p.m., with automatic unloader, hand unloader and cylindrical intercooler, driven from 300-h.p. slipring English Electric motor 2,500/3/50, which can be rewound for standard voltages.

1,500-c.f.m., BELLISS & MORCOM, 2-stage, 2-crank, w.p. 100/110 lb., 325 r.p.m., complete with intercooler, valves and accessories. Can be offered for belt drive to motor or direct coupled to Belliss engine as steam driven unit.

490-c.f.m., BROOM & WADE, maker's No. 23022, vert., 3 cyl., single stage, watercooled, 30 lb. w.p., 323 r.p.m., direct coupled 55-h.p. auto. synch. Crompton motor 400/3/50.

400-c.f.m., TILGHMAN, type GB3, vert., 2-stage, watercooled, 100 lb. w.p., 320 r.p.m., with intercooler.

300-c.f.m., ALLEY & McLELLAN, type 23B, vert., single crank. 2-stage, watercooled, 100 lb. w.p., 360 r.p.m., directly mounted intercooler, vert., floor mounting aftercooler, "V" belt driven from 67½-h.p. B.T.H. slipring motor 400-440/3/50, 965 r.p.m.

Two 300-c.f.m., BROOM & WADE, type EH240, vert., twin cyl., single stage, watercooled, 100 lb. w.p., 310 r.p.m., arranged vee belt driven from 65-h.p. Crompton slipring motor 400/3/50.

150-c.f.m., TILGHMAN, 2-stage, watercooled, truncated piston type, 350 r.p.m., 100 lb. w.p., arranged flat belt drive from 35-h.p. slipring motor 400/3/50.

Four 140-c.f.m., FULLERTON, HODGART & BARCLAY, 2-stage, 2-crank, watercooled, 100 lb. w.p., 600 r.p.m., fitted intercooler, and with automatic unloader, arranged vee rope drive from 30-h.p. Alpha Harris slipring motor 400/3/50.

124-c.f.m., REAVELL, 2-crank, 4-stage, watercooled, 365 r.p.m., 4,000 lb. w.p., with intercoolers and aftercoolers. Also complete with Air Bottle 5 ft. by 8 in. tested to 6,000 lb. w.p.

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SONS & CO., LTD.
WOOD LANE, LONDON, W.12
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and STANNINGLEY nr. LEEDS
Tel: Pudsey 2241

MACHINERY FOR SALE—*Contd.*

SAND MIXERS and DISINTEGRATORS for Foundry and Quarry; capacities from 10 cwts. to 10 tons per hr. —W. & A. E. BREALEY (MACHINERY), LTD., Station Works, Ecclesfield, Sheffield.

FOR SALE.

AIR COMPRESSORS.

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