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

Vol. 89 Thursday, December 28, 1950 No. 1791

49, Wellington Street, London, W.C.2.
Grams: "Zacatecas, Rand, London"
'Phone: Temple Bar 3951 (Private Branch Exchange)
PUBLISHED WEEKLY: Single Copy, 9d. By Post 11d. Annual Subscription, Home 40s., Abroad 45s. (Prepaid).

American Business Methods

We recently attended a Brains Trust with Mr. Donald McCullough as Question Master in charge of a number of business men and chartered accountants who had formed a team to investigate American business methods. They had visited about 70 works in the States, starting off with a jobbing ironfoundry employing 75 men. The only thing we remember about this was that it operated a market research service. The overall picture left in our minds is of the board of directors devoting its attention to finance and general policy. It receives periodic routine reports but evinces little interest in them, although it may call for a special report each month dealing with some specific activity. There are usually two vice-presidents or managing directors, one of whom acts as purchasing agent. The accountancy differs from British standards inasmuch as the figures are presented very quickly and there is a complete reconciliation between works and financial costs. The speed of producing figures involves some temporary inaccuracies which are adjusted in later documents. These provisional accounts or estimates are got out by the controller or general manager and his worth is often judged by the reliability of his forecasts.

The company reports tend to be much more detailed than is the custom here and often disclose information which would here be regarded as confidential, because of the help it would give to competitors. Yet it is considered to be worth while from a prestige point of view. The controller looks after the actual plant and even such matters as market research. This, one would have thought to be in the hands of the sales department. The executives in that department, however, are given quantities and prices, and it is their job to see that a predetermined quantity is disposed of during a fixed period, the allocation being based on the market survey. The controller is also responsible for production, and this is done not so much by form filling as by personal contact with the foremen, each of whom is responsible for the maintenance of output from his section. There is no such thing—it only too frequently happens in this country—as the foreman personally worrying about one particular job when fifty are being processed. He must pay attention to the fifty and delegate the troublesome one to the methods man. When something goes wrong and a report is required, the man on the carpet gets his chit on the subject twenty-four hours before his immediate superior, so that he has ample time to prepare his case.

We were agreeably surprised at the success of the Brains Trust method, as the quick passing round of the questions eradicated voice monotony, whilst the humour of the question master gave a welcome relief to any tendency to over-seriousness. On leaving the meeting, we shared the views of others that American organisation was purposeful and well worth emulation by the larger concerns of this country.

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Correspondence

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

TRAINING OF CRAFTSMEN

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—I was very pleased to make your acquaintance at the National Foundry Craft Training Centre on October 27, and regret that I was unable to spend more time with you. As you will recall, we were discussing the work done at the Centre, and you expressed satisfaction with the batch of iron castings you saw, which were ready for delivery to Rudge Littley. This idea started as an experiment, as it was felt that psychologically the business of making a casting for the sole purpose of remelting detracted considerably from the amount of effort put into the job. The wisdom of this was soon evident, as the outlook of the apprentices changed from aloof disinterestedness to one of keen participation, and this has been further enhanced by insistence on the highest quality and workmanship. The competitive spirit is aroused, and the would-be laggards have visual proof that their ability is not all they thought it was.

At least one hour a day, usually the first hour every morning, is given over to technical education, and this takes the form of a lecture, during which the apprentices take such notes as they think fit. This is implemented throughout the day by practical demonstrations and discussions as the different occasions arise. This technical education is followed up at the Residential Club, where one hour each evening for three evenings a week is given over to technical matters. This takes the form of individual study from specially prepared study notes for the first two periods in each week —on the third period of each week the apprentices are required to supply written answers to a number of suitable questions based on the subjects they have previously studied; which papers are marked and returned to the apprentices.

At the end of the term, suitable tests are set in both written and practical work, and the marks obtained on the weekly written papers are incorporated in the final assessment of written work. For the practical test, each apprentice is required to produce a casting, from a suitable pattern chosen by myself, commensurate with my assessment of their ability, and marks are awarded for the sand mixture used, the general appearance and finish of the mould and cores, the gating system and, of course, the final casting.

A suitable form of report is now prepared and forwarded to the employers concerned, this report containing detailed results of the foregoing, together with remarks on the apprentices' conduct, both at the Training Centre and at the Residential Club, and any observations we think may be of guidance in the future training of the apprentice.

I hope I have been able to give you a fair overall picture of the methods we use here, and conclude by extending to you a warm welcome should you care to visit us at any time.—Yours, etc.,

F. D. ROPER,
Instructor.

FRENCH CHALK IN THE FOUNDRY

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—After twenty years as a practical foundryman, I am still trying to puzzle out why "french chalk" is used when moulds are made for aluminium castings. The usual practice is to fill a bag with french chalk and shake it over the mould. The highlight of the performance is that the moulder then takes a pair of bellows and blows it off again. The small amount of french chalk left on the mould is supposed to benefit the casting.

One theory is that the castings are much whiter when french chalk is used. If this be correct why not use custard powder and have yellow castings—they would be much prettier.

French chalk in foundries is a waste of time and money; it covers the moulder in dust and enters his nostrils, this then leads to the objectionable habit of spitting. This may have passed unnoticed in the old foundry, but is out of place in the modern mechanised foundry of to-day. The sooner french chalk is banished from the foundry the better it will be for all concerned.

Yours, etc.,

TROUPER.

Dividend Limitation

The question of dividend limitation is referred to by the Federation of British Industries, the Association of British Chambers of Commerce, and the National Union of Manufacturers in statements published last week.

The F.B.I. objects in principle to rigid limitation of dividends, whether voluntary or compulsorily enforced by statute, but adds that a general increase in the aggregate of distributed profits on anything more than a moderate scale would, as with wages, add to inflationary pressures.

The opinion that it is still desirable that increases in personal incomes from earnings or investments should be avoided, except in exceptional circumstances, is expressed by the Association of British Chambers of Commerce, which believes that the distribution of its companies' earnings is a matter for directors.

The National Union of Manufacturers considers that dividend policy is the responsibility of directors, but it urges "prudent restraint" in dividend distribution during 1951.

Latest Foundry Statistics

The Bulletin of the British Iron and Steel Federation for November shows that there was a curious gain in employment in ironfoundries in September. On October 7, the total of all employees was 147,001, as against 146,883 on September 9, representing a gain of 128, but there were 13 fewer males, so that the gain is made up entirely of females.

In steelfounding there has been a relatively much greater gain of 150, bringing the total up to 18,976. The increase in female labour was 14. During the month of October the average weekly amount of metal melted for the making of steel castings was 9,100 tons, as against 8,800 tons in both September, 1950, and October, 1949, representing a 3.4 per cent. gain. The deliveries of steel casting showed the weekly averages in October to be 3,800 tons, as against 3,300 in September.

Crossword Puzzle

We very much regret that in printing the competition crossword puzzle in last week's issue one of the clues—that for No. 11, Across—was omitted. This should have read:—

11. Drab ice as used for welding.

The time limit for sending in solutions is now extended up to the first postal delivery on Thursday, January 11, 1951. Apologies are tendered to Mr. R. H. Brown, who composed the puzzle and to all readers who have been temporarily frustrated.

Moulding Technique*

By W. Pollock

For the benefit of practical men, the Author describes in simple language techniques for the jobbing moulding of a large bulkhead door panel and frame, and a dome-shaped casting, for which latter only strickles and simple tackle are used. Interspersed in the account are many worthwhile hints, and notes are appended on a design of adjustable moulding box suitable for jobbing foundries and on rules to follow when making core grids.

Watertight Door and Frame

AT THE WORKS of John Broadfoot & Sons, Whiteinch, Glasgow, where the Author is employed as a working foreman, a not-uncommon job in the iron-foundry is the moulding and completion of watertight doors; finished castings are shown in Fig. 1. These watertight doors consist of a panel and a frame with the necessary gearing to open and shut the doors. To the uninitiated it can be stated that these castings are of major importance to shipping. Should any part or parts of the body of a ship become damaged at sea, when danger is incurred of flooding or sinking, it is a simple matter to pull a lever to operate one of these doors and shut off the damaged part of the ship, so ensuring the safety of all concerned.

It will be readily understood that the castings must be of special design, and also the metal mixture must be of the very best to withstand the pressure test required. The Author, having worked as a moulder in various foundries on this particular job, and having seen various methods employed, considers that the method to be described is competitive.

Door-panel Casting

The first operation in moulding the door panel and shown in Fig. 2, is to fill a false top-part with green-sand backing; then proceed to scrape off with a special strickle board, to leave an inner bed of sand which corresponds with a recess on the top half of the pattern. This inner bed is essential in good foundry practice to keep the casting alignment. Should this bed be omitted when moulding, the pattern would be rammed down in the centre because there is no support below this section to resist the pressure exerted when ramming.

The Author has a personal preference for sprinkling a handful of parting sand over the false top-part, the advantages of this being that, when the drag is turned over to its correct position, the false top-part can be lifted off cleanly, saving the moulder needless labour in shovelling sand off his joint face before he makes a new parting. After the pattern is placed in its correct position on the false top-part to suit the runners and risers, and also to suit the inlet head box, the drag box-part is fitted, and the moulders then hand-pack specially prepared green-sand facing in the pockets between the strengthening ribs. After the facing sand has been packed firmly up to level of the ribs (as shown in Fig. 3), 4-in. brads are inserted 1 in. apart to reinforce the mould, which is then pricked with a vent rod to allow the gases subsequently to escape freely, so avoiding scabbing. Next, the pattern has to be covered with backing sand, and shovel-shanked. The moulder then hand-rams along the uppermost sides of the ribs, as there is always a tendency for the ribs to swell and lose their profile due to the pressure when cast.

Balanced Ramming

When the drag box is placed in position, more backing sand is shovel-shanked up to the level of the bars. The job has now reached a vital stage in moulding technique where carelessness spells disaster. To prevent soft spots below the bars and to ensure that the backing sand is firm enough to take the pressure when cast, two moulders face the bars with their long rammers, that is to say, one moulder places his rammer on one side of the bar, the other moulder on the other side of the bar, and both then ram the sand simultaneously at exactly the same spot below the bar directly opposite. The last course of sand, which is a 6-in. course, is rammed with the pneumatic rammer, then shovelled off level with the bars.

Some foundries would at this stage use dog rammers to ram between the bars, but the Author is not a supporter of this method, although his staff practises the method of hand tucking. The objection to the dog rammer at this stage is because it compresses the sand below the level of the bars,

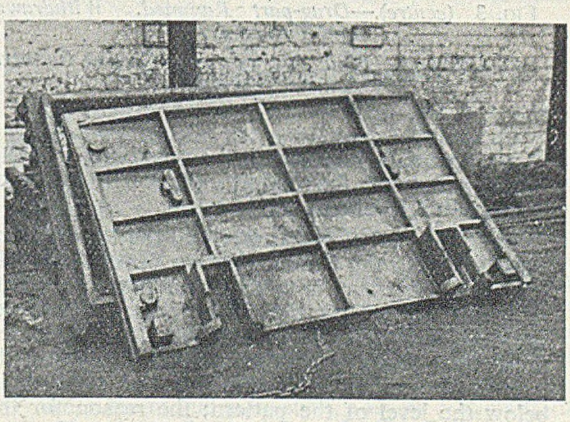
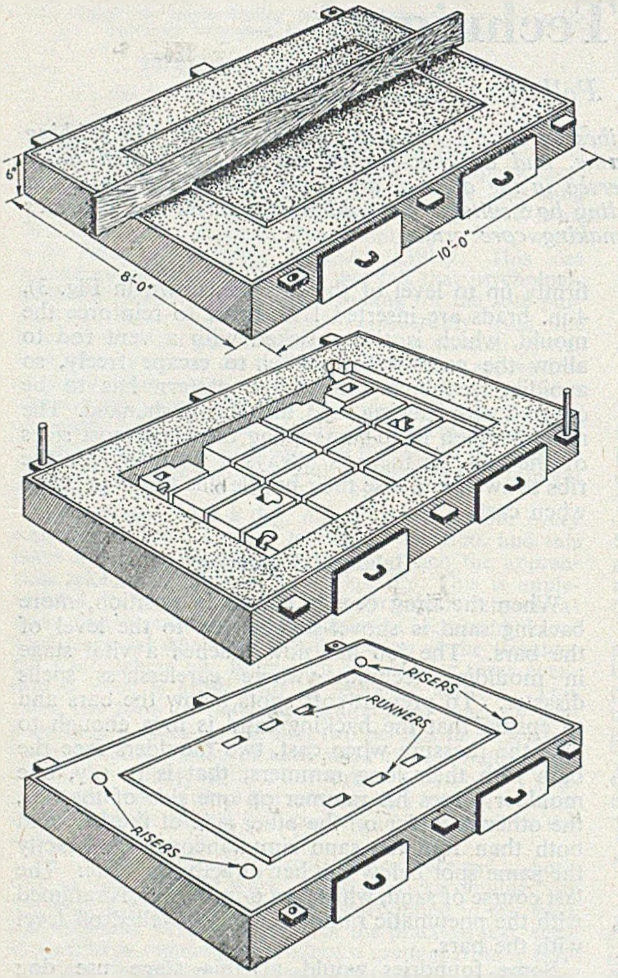


FIG. 1.—*Finished Watertight-door Casting.*

* This Paper, presented to the Scottish branch of the Institute of British Foundrymen, gained for its Author the John Surtees Gold Medal.



Stages in the Moulding of a Watertight Door-panel Pattern, size 8 ft. by 6 ft. 6 in. by 12 in. deep.

FIG. 2 (*upper*).—*Strickle Board for producing a Raised Portion on the False Top-part.*

FIG. 3 (*centre*).—*Drag-part Rammed. Withdrawn and Turned Over.*

FIG. 4 (*lower*).—*Final Top-part after Cutting Runners and Risers.*

so giving a faulty bed, with the possibility of metal bursting through the bottom, whereas the method used gives a level and sounder bed.

The drag is now clamped to the top-part and turned over to the correct position for casting. The moulder's next step is to make his parting or joint with the aid of a short scrape stick, and finish smoothly with his trowel. Not only do the moulders finish their joints smoothly, but on the edges of the pattern the moulder compresses the sand $\frac{1}{32}$ in. below the level of the pattern; the reason for this $\frac{1}{32}$ in. being to yield a casting without a fin or a crush, so saving time and money in the fettling shop.

Parting

The parting sand used on the joints is sea-sand, dried and sieved. The box pins are of the screw-and-nut type, which are fitted in the snugs on opposite corners of the drag moulding box; these box pins are $\frac{3}{4}$ in. dia., 9 in. long overall; 6 in. from the shoulder is plain; the other 3 in. is threaded to allow the nut to be screwed tightly after the threaded part has been passed through the clearance hole in the snugs. The two cores in the drag are tied with wire to the bottom of this part, as there is a lift on the cores. Before the top part is fitted in position, finely sieved parting sand is sprinkled over the joint.

From the bottom side of the bars on the top-part to the recess on the top half of the pattern, there is only 1-in. clearance, but as no unnecessary chances are taken, this top-part is reinforced with gaggers to prevent a draw-down. The gaggers must be below the top-part level. The six runners are flat gate pins, the dimensions being 12 in. by 2 in. by $\frac{3}{8}$ in. thick. They are to ensure an even flow of metal distributed with high casting speed. On each corner of the casting a $1\frac{1}{2}$-in. dia. riser is placed and to get extra pressure a 14-in. deep head box is used. The riser boxes are 9 in. square and 14 in. deep. This makes for a clean casting for machining. Continuing the moulding, a 2-in. layer of coarse facing sand is then filled in the top part to allow the moulders to finger-ram below the bars to give the necessary firmness. All that is then necessary is two 6-in. courses of sand to finish the ramming and, when surplus sand has been shovelled off level with the bars, all the area is pricked with a vent rod.

When the top-part has been removed from the drag (Fig. 4) and turned over for finishing, the moulders, with the usual hand tools, make every effort to complete the mould as neatly as possible. The final sleeking is then imparted to the mould with plumbago, which gives a beautiful finish on the casting.

As there are only two casts per week at present, some moulds are ready the day previous to casting, with the result that they draw dampness, but this is easily got over with a skin-drying torch of the gas and air type. The most important machining face is the 4-in. face on the top half of the casting as cast. It is well known that where there is a machining face on a casting, it is a good practice to cast this face-down. With this particular job, however, the moulding time would be increased 50 per cent. against the method of casting the face-up. The special 14-in. deep head boxes on the inlet runners and risers give an extra pressure, and with it a good machinable casting at a lower cost.

The weight of the panel casting is 11 cwt.; it has to withstand a pressure of 20 lb. per sq. in. and the metal used is a mixture of refined iron and shop returns to give a final composition of T.C 3.2 to 3.4, Si 1.8, Mn 1.0, S 0.08 and P 0.3 per cent.

Moulding the Frame

It is unfortunate that at present the type of frame in production is moulded from a block pattern and cored out. However, the type of frame to be discussed, and shown in Fig. 5, is directly opposed to

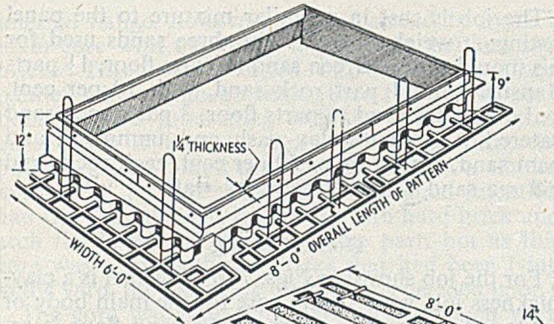


FIG. 5 (*upper*).—*Pattern, 8 ft. by 6 ft. overall and 12 in., tapering to 9 in. deep, for the Watertight-door Frame, showing the Grids alongside.*

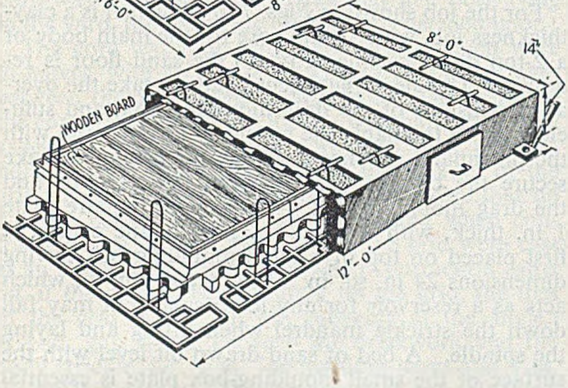


FIG. 6 (*lower*).—*Part Section of the Mould for the Frame, showing the Blocking-off Board and the Method of Securing the Grids. The Box Part used is 12 ft. long by 8 ft. by 14 in. deep.*

the block pattern. It requires skill and ingenuity on the part of the moulder, and is produced at a lower cost for moulding than from the block pattern. Using only a drag box as a top-part and a few inches below the floor level to form the bottom face of the pattern, the job is ready for the first moulding operation. A 4-in. deep bed from the level of the floor is filled and shovel-shanked with green-sand backing to within 1 in. of the floor level to allow for facing sand to be packed below the pattern.

Before placing the pattern on the site on which moulding is to take place, fireclay bricks are laid in the sand to the measurements corresponding with the profile of the pattern—that is to say, each corner of the pattern is allowed to rest on a brick. It is a simple matter at this stage to level the pattern without any abuse to it—damage by hammering being a not-unusual occurrence. Should the pattern be high on one side, or running low on the ends, the method is used of striking the brick with the hand-hammer and not hitting the pattern to get the necessary level. As the pattern is levelled, a hand-weight is placed on each corner to maintain the accurate alignment. It will be noticed on this particular pattern that there are split corners on one side, which are used to good purpose as locating points.

Ramming

After the moulders have rammed the 1-in. course of facing sand in the inside and the bottom side of the cope, they lay a specially-made board fitting the top-side of the pattern (Fig. 6). This covers the centre portion which is formed by the core. The purpose of using a board on the top joint of the core is because it is intended to have the core-making as the last operation, not the first, as is done in some foundries. The eight grids, each approximately 3 ft. long by 6 in. wide, are bedded on $\frac{1}{2}$-in. facing sand, using two locking lifters on each grid, keyed to the top-part with pieces of 1-in. dia. bar 9 in. long and, of course, wedged tightly with malleable-iron wedges.

From the grids and close to the lifters, hard bricks are built up to within $\frac{1}{2}$ in. of the bars in the top-part—this $\frac{1}{2}$ in. that is left allows for scotches and wedges, so thus ensuring rigidity between the grids and the bars. A frame of wood the same size as the top-part is at this stage fitted over the pattern to enable the moulder to ram up to the top of the pattern. By this means, the moulder has freedom of movement with no top-part bars to hinder the process of ramming. The frame is then taken off and the proper top-part box fitted. The five runners are drop inlets 14 in. by 2 in. by $\frac{5}{8}$ in. thick, placed along the length of the pattern, that is to say, three runners are spaced 8 in. apart on one side and the opposite side has only two runners, because this particular side of the casting is the lighter. When preparing the head box for casting, there is no difficulty in making the pouring basin on the side with the two runners. Four risers are also prepared, one on each corner. The ramming of the top-part of the frame mould is similar to the ramming of the panel top-part. Before taking the top-part off, the grids are keyed and the top part vented with a rod. The box is then staked at the corners. Finally, where the risers are, a screw is inserted to key the patterns to the top-part, using the same method for the grids.

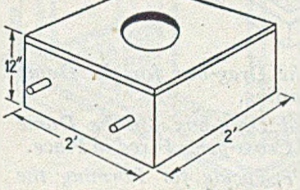
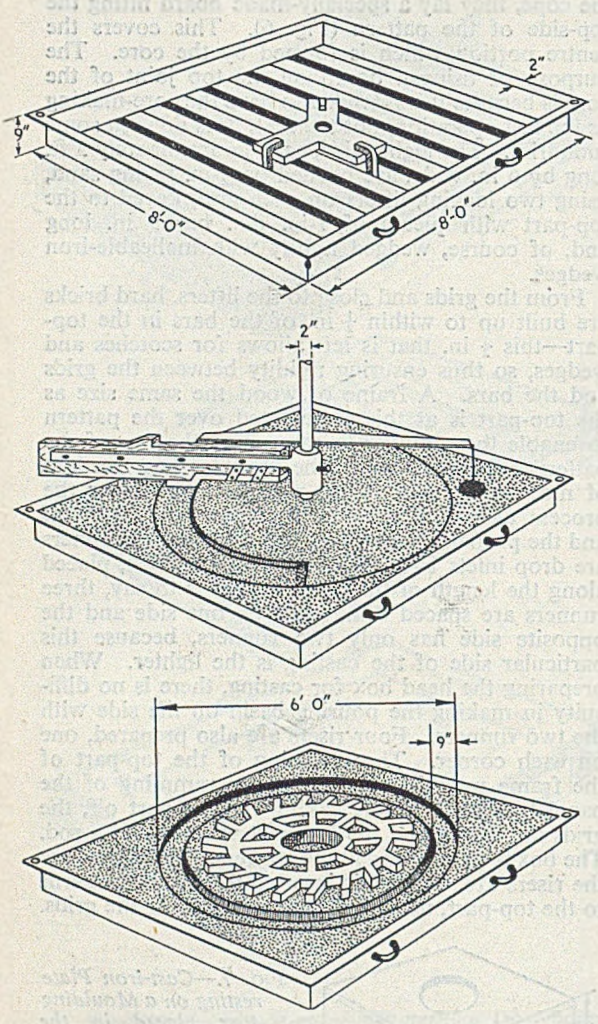


FIG. 7.—*Cast-iron Plate resting on a Moulding Box placed in the Moulding Pit and used as a Support for the Strickle and Receptacle for Loose Sand.*

Turning Over and Finishing

After turning over the moulding box, the screws holding the pattern are withdrawn. Before drawing the pattern, moulders' brads are inserted for reinforcement. Following this, a half-gutter is cut in the mould 6 in. from the pattern on all sides, and led to given points on the centre of the core print with a similar gutter. These gutters are to enable the moulder to vent the core with the vent rod and also to lead the gases to the given exit points. These take the form of two straight holes through the top-part, so taking the gases (generated when casting) freely to the atmosphere.

When the mould is finished, 3-in. by 3-in. gate tins are placed and fixed with brads directly below each runner to prevent scabbing and to resist the down-



Stages in Making up the Drag-box for the Dome Casting.

FIG. 8 (*upper*).—*Flanged Drag-box for the Dome Casting in Position and Cross-piece Fixed in Place.*

FIG. 9 (*centre*).—*Strickle Tackle for Forming the Dome Mould.*

FIG. 10 (*lower*).—*Grid in Position for the Loam Core forming the Internal Flange.*

rush of the molten metal which tends to burst the mould. After top-part is turned over with the overhead crane and placed in position, the head box is fitted, but before ramming this box with packing sand and cutting the path for the metal, the runner pins are inserted in their proper places. A small piece of cotton waste is first pushed lightly into each riser, and a ball of sand on the top of the waste prevents a blow-through. The riser boxes which are now put on are hand-packed with sand in the form of a cup to give a body of metal above the top part. Two 1-ton weights are necessary to hold down the job when casting. These weights, one on each end, rest on smaller hand-weights which are carefully laid across two bars.

The job is cast in a similar mixture to the panel casting; it weighs 9 cwt. The three sands used for this mould are:—Green sand (6 parts floor, $1\frac{1}{2}$ parts Mansfield and 1 part rock sand, with 10 per cent. coal dust); dry sand (6 parts floor, 3 parts rock sand watered with dilute clay-wash and unmilled), and loam sand, consisting of 50 per cent. each rock sand and sea sand watered with clay water.

Dome Casting

For the job shown in Figs. 7 to 14, which is a clay-thickness job, with a loam core for the main body of a 2-ton dome casting, a pit in the sand floor is required. This needs sufficient width to take the overall dimensions of the drag moulding box, and sufficient depth to enable the moulders to ram sand with the pneumatic rammer previous to casting to make secure the bottom joint between the mid-part and the drag moulding box. In the pit, a square plate 1 in. thick, with a 4-in. dia. hole in the centre, is first placed on top of a hand moulding box having dimensions 24 in. sq. by 12 in. deep (Fig. 7), which acts as a reservoir for any loose sand that may fall down the strickle mandrel when lifting and laying the spindle. A bed of sand drawn off level with the surface of the small moulding-box plate is essential before the moulders can proceed with the job.

Strickle Arrangements

When the drag-box (Fig. 8) is placed in position, a cross-piece is laid in the centre of the box with the mandrel passing through the bars and pointing down the hole in the plate. This cross is then clamped loosely to the bars on the drag-box to permit the moulder to fix and level the first strickle board which forms the external flange.

The tackle (Fig. 9) required for fixing the strickle-board includes a spindle 2-in. dia., 6 in. long, and a shear iron with four 1-in. dia. holes which are required to secure the iron to the strickle board, using $\frac{3}{4}$-in. bolts 4 in. long. The shear iron is clamped tightly to the spindle by means of a $\frac{5}{8}$-in. dia. set-screw which passes through the shear-iron collar to the spindle perimeter. When the moulder is satisfied that the strickle board is level and conforms to measurements which the size-stick demands, the cross-piece mentioned earlier is carefully clamped tightly to the box bars and then the whole is checked again with the size-stick supplied for this purpose.

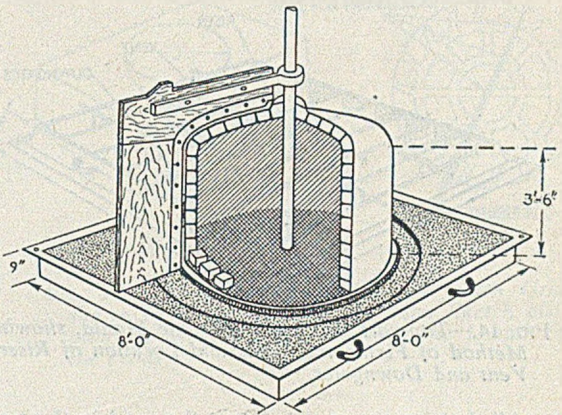
The drag is next rammed up with dry-sand backing and swept out with the strickle board, leaving a profile of sand similar to the contours of strickle, which means that the bottom external flange of the dome is formed and also the bottom face of the internal flange. A fine skin of facing loam is then swept up the sand profile, the purpose being to provide a finely-finished job with a high resistance to the downward rush of metal from the runners. As intended by the patternmaker, the small piece of wood that sweeps the bottom flange should then be removed to allow the moulder to sweep a bed of sand which corresponds with the internal flange that is formed on the underside of the core. Realising the difficulty involved in the moulding of this internal flange, however, it was decided to make a loam core with the aid of a grid (Fig. 10) and soft brick. This core is lifted off, black-washed and painted with plumbago water, then replaced in position. Before proceeding to build the main loam core which is later to form the pattern also, the body strickle is fitted to the shear iron in a similar manner to the first strickle. The original intention had been to build the loam core with hard brick and arch the brickwork for the dome part, but as this core was made with old bricks that had been lying in the yard, the following method was decided upon:

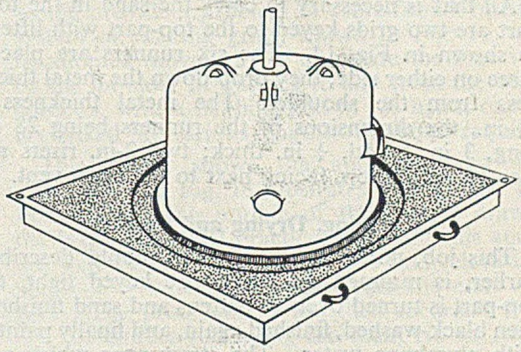
The core was built with hard bricks which were in halves, with an ample thickness of building loam between them to permit contraction. The inside of the core was then packed loosely with half-bricks and ashes, so forming a solid core with high permeability. (Care had been taken in the making of the grid for the smaller cake core to make sure that no damage could be caused to the casting when contraction took place. The toes on the grid were cast at an angle (Fig. 10), so that when contraction came on, if the casting became tight on the grid, the toes of the grid would fall off, breaking at the angle.) A $\frac{3}{4}$-in. gap is left between the brickwork and the body strickle, *i.e.*, $\frac{1}{2}$ in. for building loam and $\frac{1}{4}$ in. for finishing loam. This core is then extracted and dried in a re-circulatory type drying stove.

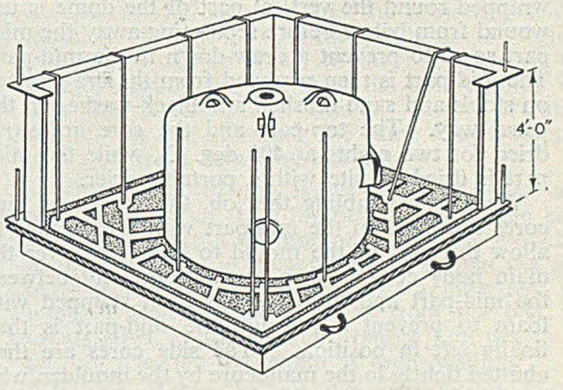
Using Core as a Pattern

When the core is dried, straw rope is wound around the vertical part of the dome and skin coated with loam to make the wall thickness called for (Fig. 11). Before doing this, the core strickle, which is in the form of loose sections screwed on to the main body board, is taken off. The dome metal thickness is put on with dry-sand backing, then finished smoothly by the moulder. This particular operation (Fig. 12) is timed with a view to keep the job moving. A few minutes before the lunch hour, the core is put into the stove to dry during the recess; after resuming work, the core is taken out of the stove to enable the moulders to proceed. Two wire nails projecting $\frac{1}{16}$ in. from the strickle board enable the moulder to inscribe two circles, one on the dome part, the other on the vertical part. These circles are divided with trammels, giving centre lines to correspond with the blue-print, so that the bosses, etc., may be fitted in correct position.

After completion of the core and its replacement as previously described, the joint on the drag is cleaned and parting sand is sprinkled over it before placing the sectional grids for the body of the mould into position. The grids (Fig. 13) are clay-washed and bedded on $\frac{1}{2}$ in. of dry-sand facing, after which the mid-part box is attached. Before putting on the mid-part, however, box-pins matching the holes in the mid-part are screwed tightly on opposite snugs in the corners of the drag. When properly done, this prevents a "sided" casting. The height of this mid-part corresponds with the vertical height of the dome, from the bottom flange to the shoulder. After ramming in this box two 8-in. courses of sand with the pneumatic rammer, the irons that are cast in the grids are bent over (Fig. 13) the top edge of







Stages in Making-up the Main Core.

FIG. 11 (*upper*).—*Part Section showing the Construction and Strickling of the Main Core for the Dome Casting.*

FIG. 12 (*centre*).—*Loam Core after the Metal Thickness has been Applied as Sand, and Built-up to Conform to the Outer Shape of the Casting.*

FIG. 13 (*lower*).—*Mid-part Box in Position (shown in Part Section) with Grids and Carrying Irons.*

the mid-part box. As the courses are rammed, a 2-in. layer of facing sand is included against the surface of the "pattern." When the top level of the mid-part is reached, the moulder makes a horizontal joint which is treated in the usual way. Two box-pins are then fitted in the top side of the mid-part (similar to those in the bottom part) to guide the top-part box into its correct position.

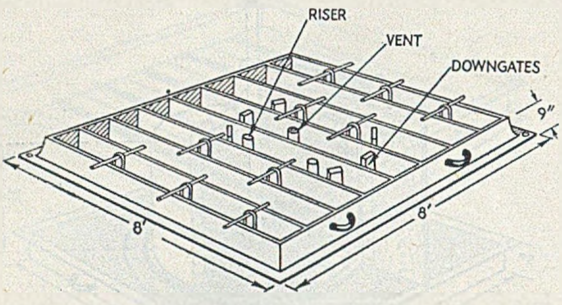


FIG. 14.—*Top-part Box for the Dome Mould, showing Method of Fixing the Grids and Location of Risers, Vent and Downgates.*

All that is necessary to carry the sand in the top-part are two grids keyed to the top-part with lifters, as shown in Fig. 14. The six runners are placed three on either side; they drop down the metal thickness from the shoulder. The metal thickness is 1¼ in., the dimensions of the runners being 28 in. long, 3 in. broad, ¾ in. thick; two 2-in. risers are located on the top, facing next to the main vent.

Finishing, Drying and Closing

This job, unlike the green-sand mould described earlier, is rammed up, lifters are keyed tight, the top-part is turned over on battens and sand finished; then black-washed, finished again, and finally painted with plumbago water. The straw rope which was wrapped round the vertical part of the dome is unwound from below before separating away the mid-part so as to prevent a draw-down in the mid-part. The mid-part is then removed from the drag, rested on stools and sand finished and black-washed in the usual way. The top-part and the core are stove dried for two nights at 400 deg. C., while the mid-part is dried on site with a portable drier.

When re-assembling the job, the two small side cores are fitted in the mid-part with a clearance to allow this part of the mould to be passed over the main body core. When the bottom joint between the mid-part and the drag has been stamped with loam to prevent a run-out, the mid-part is then finally left in position. The side cores are then abutted tightly to the main core by the moulder, who inserts his hand through a hand-hole located exactly behind the core-prints. The vents from these cores are led to the atmosphere through holes in the mid-part. When the top part is in position, the joints are all filled with loam before clamping, prior to casting. The head box is then placed on, and made up ready for casting. The risers are also made up in the inlet head box, close to the vent leading to the main body core, which, in turn, is protected with a steel tube. The weight of this casting is approximately 2 tons.

Adjustable Moulding Box

The moulding box shown in Fig. 15 would be a worthwhile investment for a jobbing foundry which has orders for castings warranting their production. There are no frills about this box, which is easily moulded at a low cost and little space is taken up when the box is dismantled for storage in the moulding-box yard. The sides and ends are extendable as required, and also a bar can be fitted exactly when needed, so eliminating grids, hangers, etc.

Much has been achieved in the light iron casting industry with mechanisation, but very little has been done in the type of foundry making the one-off job of medium size. In this foundry the moulding box is either too big for the job or too small, but if the jobbing moulder is lucky, he gets a box of the correct size yet with only one bar fouling the pattern. The iron dresser, or fettler, then comes into the picture to chip the bar to suit the pattern. As a result, in a few months' time the general run of moulding boxes becomes ruined from a general production point of view because of this chipping practice.

Unlike other moulding boxes, the box described

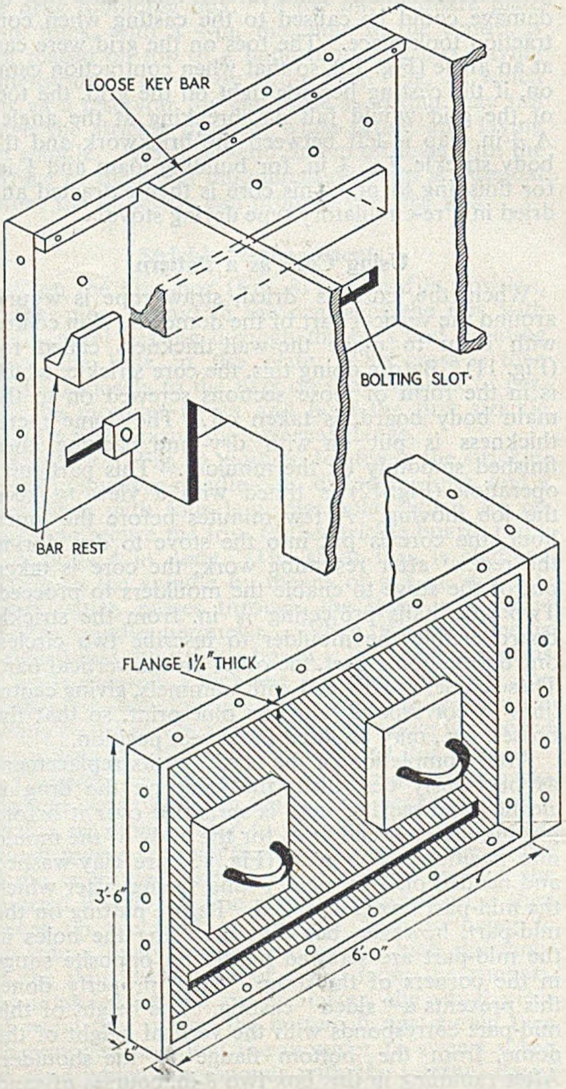


FIG. 15.—*Constructional Details of an Adjustable Moulding Box.*

here is fitted with bars which can be moved to any position and then secured. The separate piece on the top side of the box rests tightly on the top side of the bar before it is bolted to the moulding box. The bar rest in the middle of the box either can be cast as part of the box or moulded separately and then bolted on. The slot hole on the bottom side of the box can be cored out, which gives a moulding box with the bars secured at three points. Should a particular pattern be only half the depth of this moulding box, the men can mould the job to advantage, with this box reduced according to requirements. Holes could be distributed on the side of the box to allow bars to be fixed in position where desired, as Fig. 15 shows. If it be decided to mould a shallow job in the box, shallow bars are then made to suit the pattern, the remaining part of the box being used as a head box, so giving a compact job. The dimensions of the fittings of this adjustable box have been exaggerated in the illustration so as to amplify the subject.

Art of Making Grids

How many foundrymen say that they can make a grid for a corebox or a mould that, when cast, will fit the corebox or mould to within ¼ in. of the face of the box? It is a simple matter to make a grid without prods, but should a grid be required for a cylindrical core, with prods (or dabbers), this

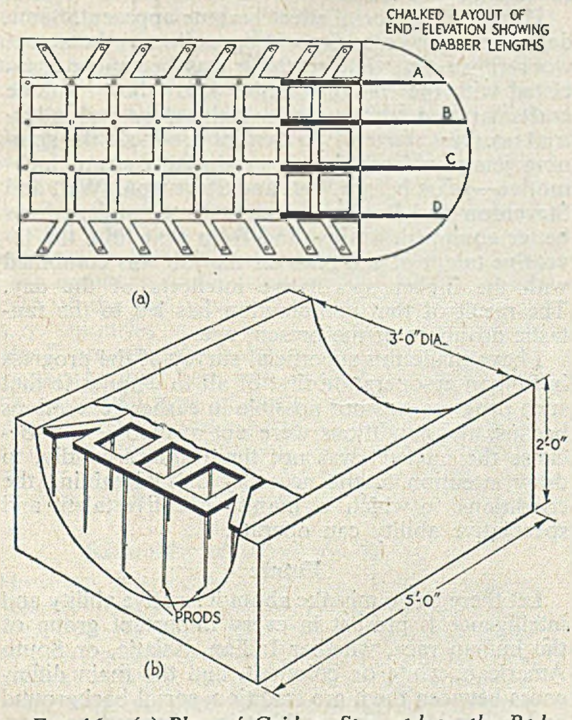


FIG. 16.—*(a) Plan of Grid as Stamped on the Bed, showing (Chalked at A, B, C, and D) the Positions of Dabbers on the End Elevation of the Core-box, together with their Respective Lengths. (b) Core-box with a Section of the Grid in Position.*

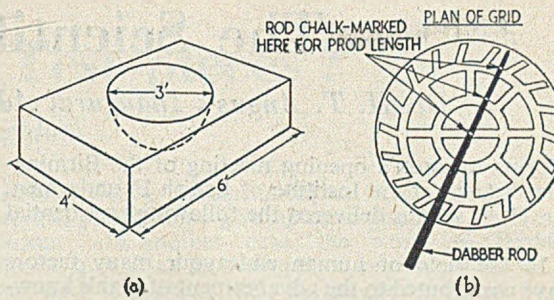


FIG. 17.—*(a) Hemispherical Job for which Grid shown in (b) is required; the latter Sketch also indicates Method of Determining the Length of the Prods.*

would provide a problem to some foundrymen. The system of making grids, shown in Fig. 16, should be adopted universally to eliminate the time wasted by the moulder in walking to and from the bed and corebox, with a dabbing rod in his hand, on which is chalked the various lengths of dabbers required.

This system shows the application of simple geometry, and Fig. 16 illustrates it in greater detail. For example, an outline of the core is drawn on the bed, as is usual practice, the main ribs and toes are determined and marked off, then elevation of the core is scribed outwards from the ends of the grid. The prod lengths are then recorded by laying the dabber rod along the main rib or ribs and projecting into the elevation to within ¼ in. of the contour of the elevation and the projecting length marked. It follows that the prods on the appropriate ribs dabbed down to the mark are of the correct depth. No special tools are required except the common rule and a pair of tramells. Fig. 17 (*a*) and (*b*) show the same system applied to a grid for a hemispherical job.

When some of the larger grids for cores and moulds are taken from the bed in which they have been cast, it is not uncommon to find the moulders waste half a day in breaking prods so that the grid may fit the job. With the system indicated, the moulder never needs to move from the bed for taking sizes, as the sizes are before him drawn on the bed showing the length at each position.

It is good foundry practice, when a job has to be made which has a very thin metal thickness and yet a large body core in the centre, to stamp out the toes of the grid at an angle (as mentioned earlier), so that when contraction takes place, the toes of the grids break off at the angle due to weakness at this point.

The Author concludes this account with the hope that something new and something old has been given which may be of interest. He wishes to thank the management of John Broadfoot & Sons, Limited, for their permission to present the Paper. He also gratefully acknowledges the help given by Mr. J. E. O. Little, of Glenfield & Kennedy, in the furnishing of the illustrations for display.

The Scientific Approach

Dr. H. T. Angus's Inaugural Address to Birmingham Foundrymen

AT THIS SESSION'S opening meeting of the Birmingham branch of the Institute of British Foundrymen, Dr. H. T. Angus delivered the following presidential address:—

In the field of human endeavour many factors have contributed to the advancement of man's knowledge of power: the striking of fire from a flint was the result of accident; the storage of food and the making of clothes were the result of sheer necessity. Mimicry and artistic discernment are apparent in cave drawings and paintings, while family affection is shown in the toys, beads and ornaments found in every prehistoric grave.

Origins

All the raw materials of our present achievements had been available to the æons of previously existing life, but one thing was lacking—the inquiring mind which was immediately receptive of a new idea. Somehow in the last million years the human intelligence emerged, but we need not be too conceited about our unique position; we seem to have advanced not at all in the last ten to twenty thousand years in our brain capacity. Ten to twenty thousand years ago there were men who had a larger brain than ours and perhaps paid the penalty of being too much in advance of their time. It is easy to fall into the error of supposing that sheer mental capacity has caused us to make greater physical strides in the last 150 years than in the previous history of mankind. This is not the case, however; the only difference between ourselves and the men of the earlier recorded civilisations is in our background and our opportunity—not in our ability. Late Stone Age civilisations, such as the Peruvian, could foretell the courses of the stars and predict eclipses with calculating machines of knotted string. The brains which could do this were not inferior to ours. The early civilisations advanced in organising ability, but advanced little in the mechanical arts during the whole of their existence. Ours, in 1,000 years has advanced from the early Iron Age to an ability to destroy, previously assigned only to the gods. The difference lies in the technique of investigation. Pure reasoning is a vain pastime without basic facts, and the haphazard collection of facts without the correlating cement of reason remains rule of thumb.

There are two other vital prerequisites: community resources of traditional knowledge and leisure, the latter being really dependent upon the former. If we look at these last prerequisites, we realise why the combination of fact collection and reasoning did not occur earlier; there were insufficient resources in material and traditional knowledge to spread any appreciable leisure beyond a small number of favoured people. Observation of facts is characteristic of all levels of mankind, but the ability to reason closely is dependent upon leisure enough to think without going hungry.

Development

The sudden upsurge of creative mental activity which commenced in Europe in the 13th century was largely due to the existence of several relatively-stable communities, each with comparatively short histories and therefore not unduly hampered by tradition, on whom the traditional knowledge of the Greeks and Romans was suddenly opened up by an influx of books and scholars from Byzantium, following the sack of that city, first by the Crusaders in the 13th, and then by the Turks in the 15th century.

During the subsequent period until the late 18th century, the intellectual ferment which commenced at the Renaissance continued without much visible effect on the material lives of men, but much basic knowledge was being accumulated and the experimental method was spreading. Thus, Tycho Brahe mapped the heavens with an accuracy previously unknown and an obscure Scottish nobleman, Napier, devised a new system of calculation. Kepler and Newton, using the results of Tycho Brahe's observations, deduced new laws governing the motion of bodies. In this way the basis for accurate navigation and a fundamental understanding of mechanical science was laid.

Then another social effect became apparent. Some degree of social security was spreading to the actual workers, so that time to think was becoming associated with the rule-of-thumb "know how" of the craftsman and labourer, and at this stage real industrial progress started. Arkwright produced the spinning jenny, a Cornishman produced a steam locomotive—years before Watt and Stevenson. Watt and Stevenson and Boulton brought fresh, and perhaps better equipped, brains, and from that time the inventive talent of the man on the job was combined with the higher speculative intellects of the day. The result of that combination has led to the fantastic advances of the present age.

I have made this superficial survey of the progress in human co-operation first of all to emphasise that such progress was not possible in earlier generations because the conditions were not available—not because the intellect was not there and, secondly, to draw attention to the necessity of maintaining the conditions in which a man's inventive talent and speculative ability can operate.

Future

Let there be no mistake about it: native ability and intelligence is present in every important group of the human race, whether Indian, Asiatic, or South American, white or coloured, and the main differences between them are tradition, social background and education. The world is in a ferment comparable with that of the Renaissance, and it may be that out of this ferment the impact of European ideas and culture may induce in some group of peoples

(*Continued on page* 562.)

Long or Short Test-pieces ?*

By H. Jungbluth

WHEN IT IS ASKED whether a long or a short test-piece is desirable for the tensile testing of cast iron, it must be clearly indicated as to whether the tensile-test result is wanted for fundamental research purposes or whether it is required for a more practical application such as routine quality control in the foundry, customers' samples, etc. For purely research purposes the ultimate tensile strength is not the only piece of data required. It is required to evaluate the elastic modulus and the whole stress-strain curve with the elastic and plastic ranges of deformation separated, if metallurgists are to obtain a detailed understanding of the behaviour of a given cast iron under conditions of tensile stress. Such measurements can only be taken properly with the aid of an indicating and recording instrument, and for this purpose a test-piece of sufficient length is essential.

Foundry Control Tests

This is not the case if the test result is required for the more immediate practical purposes such as samples for the customer or quality-control in the foundry. In this instance one is more concerned, and rightly so, with the evaluation of the ultimate tensile strength only. Two points of view then come into the picture, which have been dealt with at length by F. Pisek[1] in his report on the testing of cast iron in Czechoslovakia. A test-piece which can be quickly and easily poured and be free from cavities and blowholes, which will use the minimum quantity of cast material, but which in spite of this will give accurate and reliable results is essential. In such cases one is not particularly concerned with the elongation or reduction of area of the specimen under load and thus the working length of the test-piece may safely be reduced. In many countries a series of special "short test-pieces" are already widely recognised. It is not necessary to enter here into detailed examination of each individual type of test-piece, as J. Léonard,[2] in his voluminous and exhaustive report on the testing of cast iron in different countries, has already given an account of all the test-pieces which are considered here and nothing new is to be added.

Reliability of Short Test-pieces

However, international opinion on the reliability of results from short test-pieces is far from unanimous. For one thing, these test-pieces when under load have, owing to their shortness, markedly less additional bending moment than a long test-piece, so one might expect these short pieces to have greater tendency to breaking in the head, which could be partly attributed of course to the internal stresses already present prior to loading. International publications give no clear guidance on this subject. In another case, the work of Pisek may be quoted as an example of research done on pure short test-pieces, that is, test-pieces which do not have any test-length which is cylindrical. Pisek compared a large number of results taken on the old Czechoslovakian test-piece, which has a cylindrical test-length of 50 mm., with the German D.V.M.-piece[3] which has no cylindrical portion. The D.V.M.-piece always gave slightly higher results for the ultimate tensile figure and showed no tendency to irregular fractures, whereas eight of the Czechoslovakian test-bars broke in the head. On the other hand, in a parallel test on American-type test-pieces 80 per cent. of the samples broke in the intermediate portion between the short cylinder length and the head proper.

The problem of the most suitable test-length for the tensile testing of cast iron as yet remains unsolved. The author of this Paper took up this work where the International Commission for the testing of Cast Iron[1] left off, since the question of international cast-iron standards is so important. The cast-iron sub-committee of the materials division of the *Verein Deutscher Eisenhüttenleute* has subscribed towards the cost and the following work, which was started before the war and which is still incomplete, may therefore be regarded as a piece of joint research.

New Work

The sub-committee were agreed from the start that a survey of the suitability of different test-pieces for proving cast iron could only be properly carried out on the basis of plotting frequency curves. It was therefore arranged for several German works to cast as many test-bars as possible from different varieties of cast iron (about 120 pieces), the test-bars to be cast in cylindrical form 30 mm. (1.18 in.) diameter and 850 mm. (33 in.) in length in dry-sand moulds and fed from below. The survey covered the Swiss, American and the two German types of test-piece (see Fig. 1). It was arranged that out of the same test-bar either only Swiss or only American or only German test-pieces were machined. A single test-bar would thus give three Swiss or six American or German test-pieces.

In the first test a high-tensile cast iron containing 2.88 C, 1.65 Si, 0.76 Mn, 0.07 P and 0.044 per cent S was examined, this iron being melted in a cupola and examined in the as-cast condition. Multiple test-bars were cast from a single ladle so that the iron used was as uniform as possible and the differences in tensile strength recorded could only be due to the different test-pieces and natural variations in the same cast of metal. A total of 194 tensile results on Swiss test-pieces and 198 results on the German type "A" test-piece were taken in this material. Figs. 2 and 3 cover the entire results

*Report No. 716 of the materials division of the *Verein Deutscher Eisenhüttenleute*. Communication from the Institute of Mechanical Technology of the Technical School, Karlsruhe and translated from *Stahl und Eisen*.

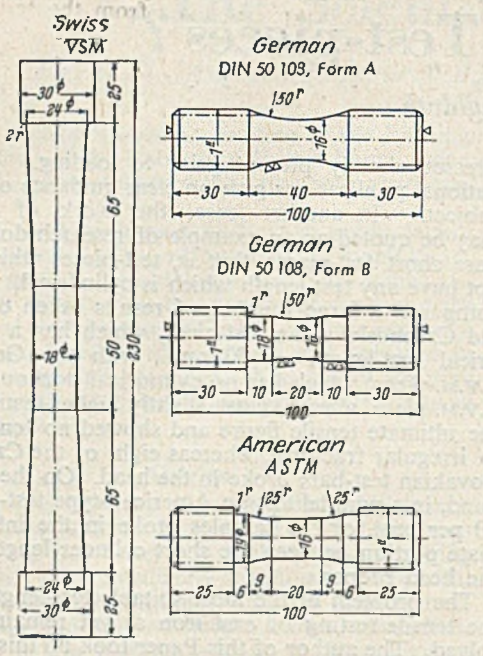


FIG. 1.—*Details of the Four Types of Test-pieces Used.*

obtained in the form of two frequency curves on which the actual values obtained have been plotted as a full line. The " smoothed " curve, extracted by well-known methods,[5] is plotted as a dotted line. The most frequent value obtained when using the German test-piece "A" works out on an average at 32.5 kg. per sq. mm., that for the Swiss test-piece at 31.5 kg. per sq. mm., the root mean square, or " standard," deviation in the two cases being 5.9 per cent. for the German and 5.0 per cent. for the Swiss.

Position of Test-piece in the Bar

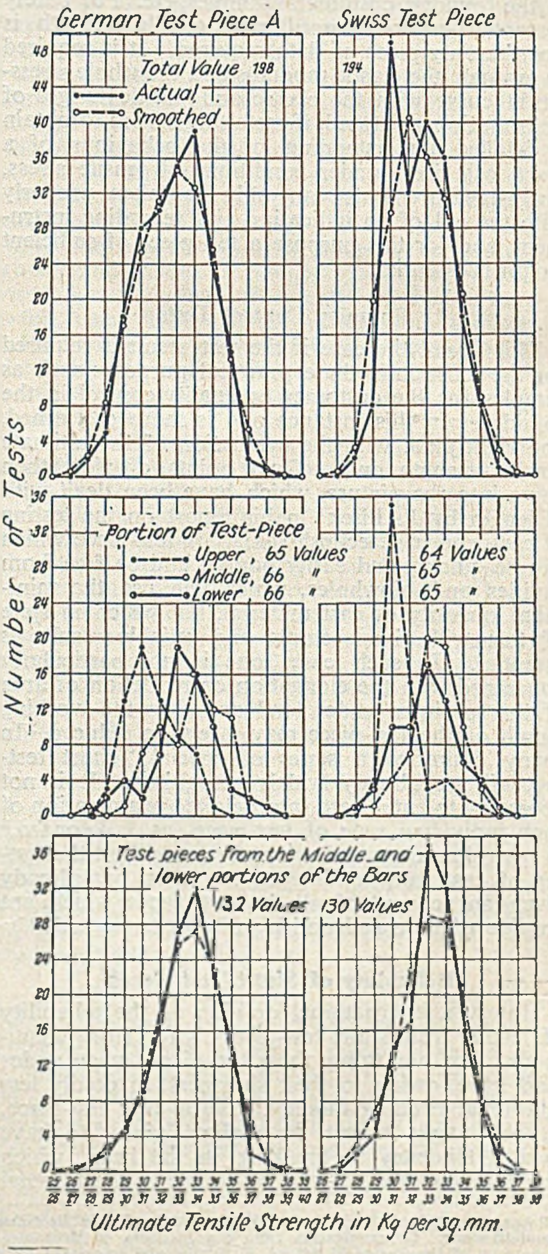
In Figs. 4 and 5 the actual values obtained from test-pieces taken from three different positions in the test-bar are plotted as a frequency curve and the mean values are shown in Table I. These results indicate that the position of the test-piece in the test-bar can play a significant rôle. If the middle and lower parts of the test-bar only are considered,

TABLE I.—*Influence of the Position of the Test-piece in Test-bar for German and Swiss Pieces.*

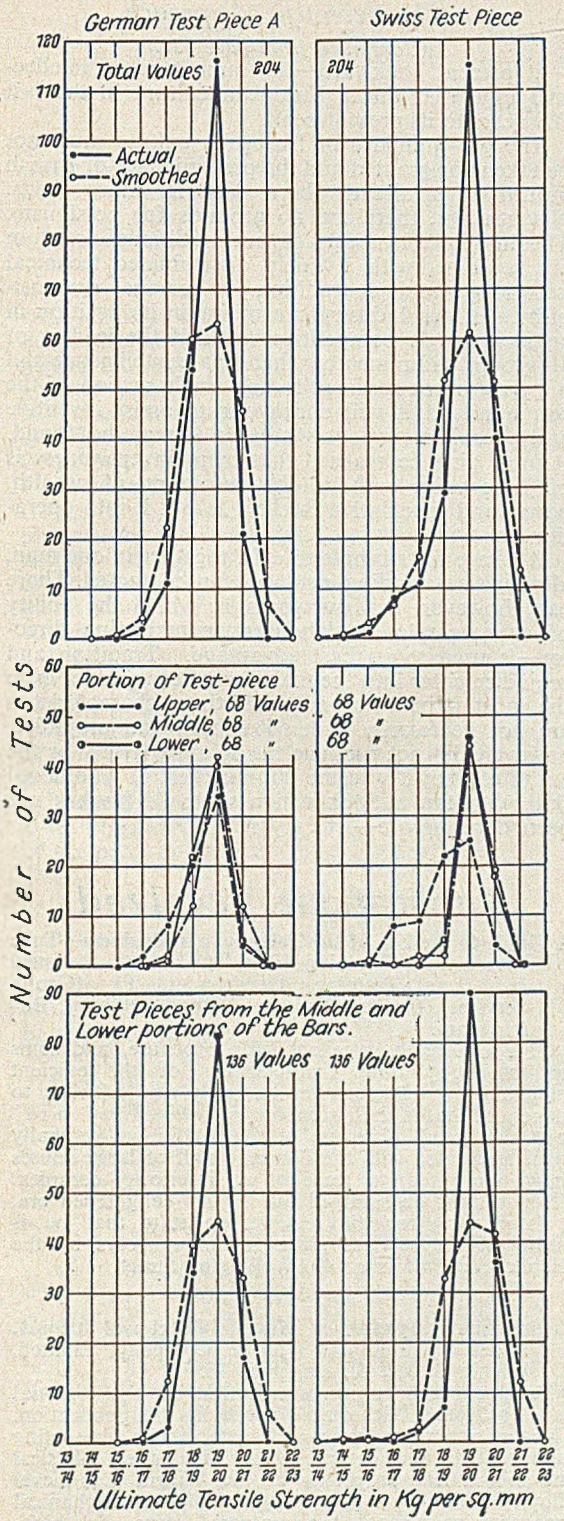
Type of test piece.	Average tensile strength in kgms./mm.2		
	Upper.	Middle.	Lower.
D. & M. Type A	30.5	33.5	32.5
Swiss test-piece	30.5	32.5	32.5

the results are as shown in Figs. 6 and 7. The most frequently recorded value for mean tensile strength using the German test-piece type "A" is 33.5 kg. per sq. mm. and for the Swiss test-piece 32.5 kg. per sq. mm. The standard deviations in these cases are 5.4 and 4.7 per cent.

The next trial was carried out on an ingot-mould iron, cupola melted and in the as-cast condition as before. This iron contained 3.48 C; 2.21 Si; 0.53 Mn; 0.089 P, and 0.083 per cent. S. In this trial also, the Swiss and the German type "A" test-pieces were compared, a total of 204 tensile tests being pulled, the results being summarised in Figs. 8 to 13. The mean values of the tensile strength for both the test-pieces are in this case very similar, being 19.5 kg. per sq. mm., the standard deviations being 3.97 per cent. for the German and 5.04 per cent. for the Swiss type. A comparison of test-pieces taken from the top, middle and bottom of the test-bar shows that for the German (Fig. 10) and the Swiss (Fig. 11) test-pieces the



FIGS. 2 TO 7.—*Frequency Curves for Tensile Tests on High-duty Cast Iron.*



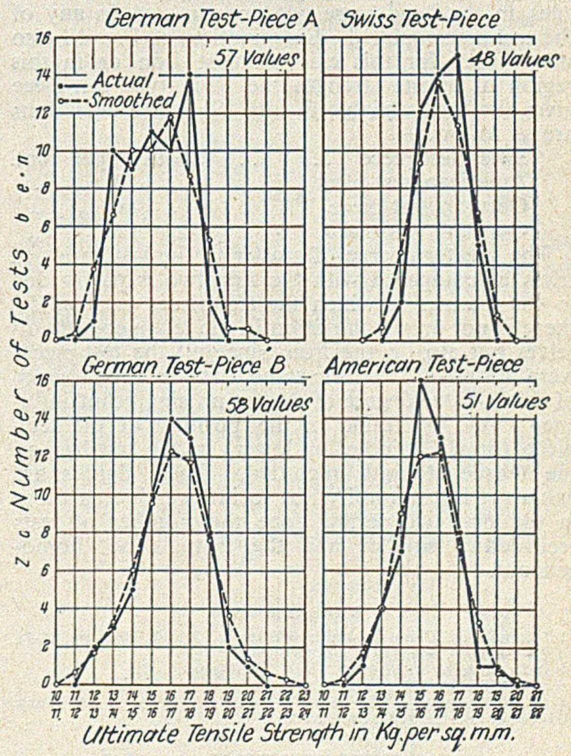
FIGS. 8 TO 13.—*Frequency Curves for Tensile Tests of Ingot-mould Cast Iron.*

results for the middle and bottom of the test-bar are all very similar at 19.5 kg. per sq. mm., while in the case of test-pieces taken from the top portion of the test-bar a marked deviation in favour of lower tensile strengths is recorded in the Swiss-type test-pieces. Figs. 12 and 13, where only the middle and lower sections of the test-bar have been recorded show, as would be expected, that the mean tensile value in all cases is 19.5 kg. per sq. mm. The standard deviations are 3.37 per cent. for the German and 3.42 per cent. for the Swiss test-piece, but the difference between the two is so small as to be statistically insignificant.

Tests on Soft Cast Iron

For the third series of tests a soft cast iron containing roughly 3.18 per cent. C; 2.42 Si; 0.49 Mn; 0.75 P, and 0.10 per cent. S was chosen. Unlike the previous series of trials in this case all the test-bars were not cast from the same ladle and the same melt, but instead several casts were divided among different test-bars and from each bar different test-pieces were machined, the two German test-pieces "A" and "B," the American and the Swiss type. In this case the German test-pieces were not made with threaded heads but were held in grips for the tensile test. The total number of tensile tests performed were as follows: German "A" test-piece, 57; Swiss test-piece, 48; American test-piece, 51; German "B" test-piece, 59.

Figs. 14-17 show the results on the four types of test-piece as before, with the actual values and



FIGS. 14 TO 17.—*Frequency Curves for Tensile Tests of Soft Cast Iron.*

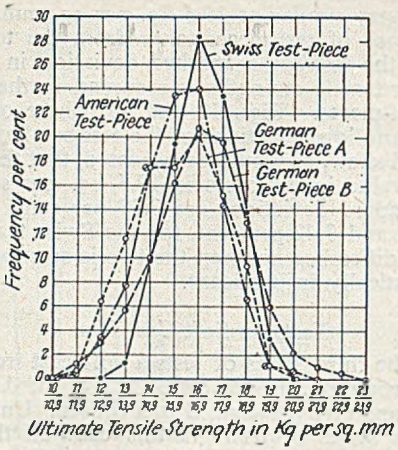


FIG. 18.—*Frequency Curves for Ultimate Tensile Strength of Soft Cast Iron—all Types of Test-piece.*

the smoothed curves included. In Fig. 18, all four smoothed curves are shown plotted on the same basis. It is evident that the values given by the Swiss and the German type "B" test-pieces are very similar and also that the American and the German type "A" test-pieces cover very much the same area, but the general value for the tensile strength is about 1.5 kg. per sq. mm. lower. Breakages in the head were not encountered in any of the test-pieces pulled. Examination of Fig. 18 also shows that for this class of cast iron or in this region of tensile strength the Swiss-type test-piece gives the least variable results. Standard deviations are as follows:—

Swiss test-piece	about 8	per cent.
American test-piece ..	„ 10	„ „
German test-piece "A"..	„ 11	„ „
German test-piece "B"..	„ 12	„ „

The greater degree of scatter in the last series of trials as compared with the first two is partly due to the manner in which the test-pieces were made, there is not only a variation in the test-pieces themselves but also in the iron, since all the test-pieces were not made from the same cast. In consequence of this greater degree of scatter no significant influence could be found in the position of the test-piece (upper, middle, or lower) in the test-bar on the tensile strength recorded. These figures are valuable, but naturally not so informative as those in the first two series, since the number of tests recorded is smaller and the iron is not homogeneous.

REFERENCES

1 International Union for Material Testing. Zurich, 1931, pp. 56-74.
2 *La Fonderie Belge*, 1938, pp. 654-694.
3 Referred to by F. Pisek as "VDI" test-piece.
4 September 11, 1938, in Warsaw.
5 Cf., for example. K. Daeves, Praktische Grobzahl-Forschung. VDI-Verlag, Berlin, 1933, pp. 41-42.

HIGH DUTY ALLOYS, LIMITED, Slough, have appointed Mr. E. A. Gough as advertising and publicity manager.

The Scientific Approach

(*Continued from page* 558.)

—at present backward—the same type of intellectual urge that thrust European culture in the last 700 years to its present peak.

The pre-eminence of European culture must not be taken for granted and the pre-eminence of British industry has already been lost in many fields. Nevertheless, there are no grounds for pessimism. The incalculable assets of our traditional freedom are combined with a widely disseminated technical knowledge and a tradition of personal responsibility. British industry can maintain its position in an increasingly competitive world if the leaders of all groups will remember that innate intelligence and integrity is not confined to any single section of the community and will endeavour to assist inventive and speculative talent wherever it may be found. It must also be realised that mere inventiveness is of little value without the resources of wealth, power and speculative intellect to put it into operation.

It is rare for all these to exist together in one man, although outstanding instances can be quoted. There can, however, be few works in which the ability of every employee—labourer or managing director—is used to its best advantage. Tradition and prejudice enter into the make-up of every man, even the most unconventional, and these characteristics are not necessarily bad. Tradition and prejudice, however, did not produce the spinning jenny or the steam engine; it was the combination of traditional skill with the outlook which said: "This has not been done before—let's try it."

Publications Received

A Guide to the Use of the Telephone in Business—Tube Investments Training Booklet No. 2. Issued by their Training Department T1 (Group Services), Limited, Broadwell Road, Oldbury, Birmingham.

This is a really excellent little brochure, and sums up the outstanding characteristics of the efficient telephonist. The reviewer has only one criticism to make and that is the alternative of "would you mind" for "will you." The use of the conditional generally to be associated with the domestic staff of large houses shows more than a trace of an inferiority complex. Thus it must be stamped out in this enlightened era. It is pleasing for the reviewer to state that he is proud of the services given for many years by the telephone operators at 49, Wellington Street.

Engineering Properties of Monel, Nickel and Inconel. Issued by Henry Wiggin & Company, Limited, Wiggin Street, Birmingham, 16.

Designers and engineers will find all the essential data on Monel, Nickel and Inconel in this publication. This is one of a series of data books presenting authoritative and comprehensive figures on physical and mechanical properties of the Wiggin high-nickel alloys. In addition to the usual tables of mechanical properties at normal temperatures, figures for high-temperature and low-temperature service are included. Copies are available to our readers on writing to Birmingham.

Pressure-cast Aluminium Matchplate Production

Many visitors to foundries in the United States have remarked upon the specialised production of pressure-cast aluminium matchplate patterns. Wha follows is initially an abstract on this subject from the Grey Ironfounding Productivity Report and then a commentary by Mr. B. S. N. Perry, who has experience of the process here and in America. Finally, a note is added on the compositions of the plaster for making the mould.*

THIS METHOD of producing pattern plates involves the casting of aluminium, under pressure, in gypsum plaster moulds. The mixture used is believed to be gypsum plaster mixed with asbestos, producing a high-strength material with a low "setting expansion," and is marketed by the United States Gypsum Company, Chicago.

In some instances, plaster patterns made direct from drawings are used in the production of these plates. As the method of running and strickling patterns of this type is well known, the following description is confined to the production of match plates from normal wood patterns. Essential shop equipment for mould preparation consists of:—

Work table of a suitable size, with a plate-glass top having all faces and edges ground true and parallel (Fig. 1).

A number of semi-spherical bowls (Fig. 2), made of stamped brass or stainless steel, and of sufficient flexibility to facilitate the removal of set plaster.

Various bench stands, as shown in Fig. 1, fitted with adjustable arms and rods, to prevent flotation of the patterns when plaster is poured.

Plant

A number of metal boxes termed "plate boxes" are required (Figs. 3 and 4). These have top and bottom faces ground parallel and are drilled and bushed for locating pins. Perforated cover and bottom plates with attached lugs for clamping are provided. The contact faces of these plates are ground flat and the top plate is ribbed and fitted with a clamping device and locating ring for the runner chamber. This is a steel tube approximately 9 in. dia., having a removable cap which is held in position by a clamp.

Mixing of Plaster

All mixing equipment should be clean, free from set plaster and other foreign material. This is important as "set" plaster will accelerate the "set" of the new mix, thereby changing its period of plasticity. The plaster is then weighed and the water measured or weighed. The plaster should be sifted or strewn into the water evenly. Handfuls of plaster must not be dropped into the water at one time. After soaking for 2 min., undisturbed, it is mixed thoroughly, taking care that no air is beaten into the mix. Each gypsum plaster has its distinct mixing water requirement, known as its "normal consistency," which is defined as the minimum number of pounds of water required for 100 lb. of plaster to produce a slurry that is pourable in a continuous stream after mixing.

Parting Compounds

Petroleum Jelly.—The density of this is reduced with approximately two parts paraffin oil to one of jelly. The mixture is blended by heating and thorough stirring.

Lard Oil.—Density is reduced as above.

Light Lubricating Oil.—This should be used sparingly. Excess oil will produce a soft surface on the mould face.

English Soft Soap.—This is applied with a sponge, using a thick lather. Excess is removed with a clean sponge.

Spirits of Camphor.—For fine detail work, this is the most successful separator.

Stearin thinned with paraffin oil is often used on plaster work, but should not be used for this plaster mixture.

Production of Plaster Moulds

The size of matchplate and number of patterns per plate having been determined, a rough wooden frame of a size to contain the master pattern is constructed. This is placed over one half of the pattern, the joint face of which rests upon the plate-glass table top; pattern and location pieces are held in position by "bench stands" and, if necessary, the wood frame is weighted down.

Prepared plaster is poured at one end of the frame, care being taken to avoid the formation of air bubbles during the process. The pattern is removed from the plaster as soon as possible after setting to prevent distortion due to the heat liberated. This process is repeated as many times as there are patterns required (Figs. 1 and 2).

Plaster moulds thus produced are allowed to air dry and the half-pattern is reinserted in each in turn,

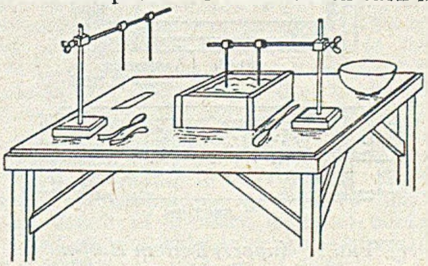


FIG. 1.—*Work Bench and Equipment.*

* Mr. B. S. N. Perry is associated with G. Perry & Son, Limited, patternmakers, of Leicester.

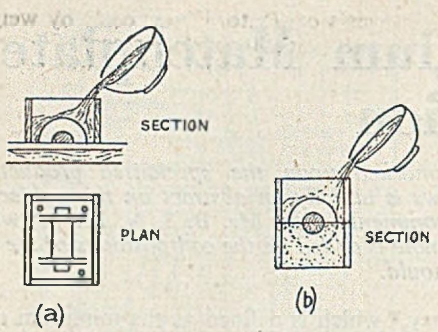


FIG. 2.—*Pouring Prepared Plaster into Frame.*

the other half-pattern placed in position and the top-half moulds made (Fig. 3). It is important that adequate provision should be made for locating the two half-moulds after the pattern is removed, and that the moulds should be correctly paired.

Assembly of Moulds

The required number of half-moulds having been made, and the necessary ingates, etc., cut, the halves carrying the female locations are assembled on the glass table. The bottom half of the plate flask is placed in position around them, and the whole filled with plaster.

After air drying, the other half-moulds are located, the necessary parting applied, and the top-half box placed in position. This is also filled with plaster and allowed to set (Fig. 3).

Accurate location of the patterns has now been transferred to the flask pins and the original male and female locations provided are removed or filled. The two half-moulds are stoved at a steady temperature of 300 deg. F. until moisture content is at a minimum.

After drying, the bottom cover plate is bedded in position, and end and side closure pieces to give the required size of plate are arranged on the mould face (Fig. 4). The end pieces are of metal of the same thickness as the plate required, the sides are of asbestos, and are very slightly thicker to allow for bedding down.

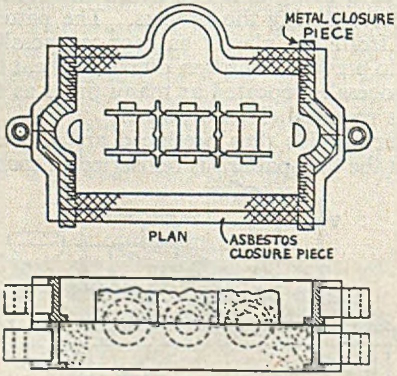


FIG. 3.—*(upper) Bottom Half-mould, showing Position of Runners; (lower) Section of Closed Mould.*

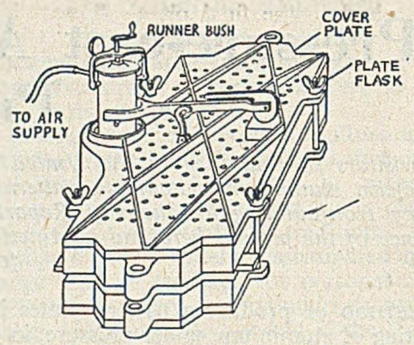


FIG. 4.—*The Assembled Mould.*

It will be seen that by the use of these closure pieces any size of plate within the capacity of the plate box can be made. The top half of the mould and the cover plate are now placed in position, clamped and placed in the oven to dry off the bedding material.

Casting

The runner chamber is now lined with a 1-in. thickness of the plaster mixture, dried and fixed in position as shown in Fig. 4. An asbestos diaphragm is inserted between the runner bush and the top cover plate, which makes an airtight joint and retains the molten metal in the runner chamber.

When the required amount of aluminium has been poured into the runner chamber, the pressure cap is clamped in position and the compressed air turned on. Usually 5 to 7 lb. pressure is sufficient to collapse the diaphragm and admit metal under pressure into the mould. (Note.—In Fig. 4 the recess on the top plate for receipt of the runner chamber is shown larger than the tube, to illustrate the recess and the washer, but the tube should fit the recess with a slight clearance only.)

After cooling, the cast plate readily leaves the plaster, producing a fine surface finish which requires little cleaning, a rotary wire brush being sufficient to tool most surfaces.

Comments on the Process

By B. S. N. Perry

Having worked in two of the leading pressure-cast plate shops in Chicago the Author would like to describe briefly the first-class matchplate service given. Both companies have a standard printed chart on which the customer roughly sketches the layout of the patterns, indicating the size of the finished plate, as well as moulding box or snap-flask size, also the type and shape of the end lugs.

The single master pattern is sent along with this chart; from this it is possible to produce a matchplate with up to 40 or more patterns cast integrally. This fact is the unique advantage of this type of matchplate and cost is cut to a minimum (at the time of the writer's visit, 40 dollars, then £10 each, was the average price). Accuracy was maintained for, no matter how many patterns were required in the final plate, all were identical with the master but one aluminium contraction smaller. In almost all cases the plates had gates and runner bars cast on. This service gave prompt deliveries even when the shops were up to capacity, the average delivery time being 5 days. If required in three days, an express " extra " was charged.

Advantages

Comparing a pressure-cast plate with a sand-cast matchplate, the first advantage is that only one master pattern is required. From an accuracy point of view, solidification shrinkage, apart from pre-calculated dimensional shrinkage, is negligible, whereas in sand-cast plates there is always a tendency for " draws " where the patterns adjoin the plate. The cleaning-up time is less; a good pressure-cast plate requires only two or three hours for hand finishing before it can be used. Usually only very fine fins of metal are to be found on these plates after casting, which require removing with a scraper, whereas a sand-cast plate may take up to 15 or 20 hours' work before ready for use. An occasional fault found in pressure-cast plates is that below a very thin skin, air or blow holes may be found. These, however, can readily be soldered up.

The Report of the Grey Ironfounders' team gives very clearly the general procedure, but having tried to produce matchplates in this country and not succeeding until after months of trial and error, the Author's opinion is that the process is not so straightforward as it would appear. To be successful, the technique must be carefully studied and a set of rules, *i.e.*, temperatures, mixing times, moisture contents, etc., drawn up to cover the plaster being used and the aluminium alloy being cast. Heavy sections must be lightened out with cores or chilled as in sandcasting, and the metal must be cast in by pressure at the lowest possible temperature.

For comparing costs, in this country matchplates made by the pressure-cast method from start to finish are cheaper than sand-cast plates, the reason being chiefly that with the latter it is necessary to produce the full number of master patterns and the cleaning up is costly. Despite its lower cost the finished pressure-cast plate is, of course, more accurate. As double-sided matchplates are not used to a great extent in the British foundry industry it is important to point out that single-sided cast plates can be made, as well as core-boxes and small metal patterns for mounting. The great demand for accurate double-sided matchplates in America has been brought about by the large number of light-alloy snapflasks in use, particularly of the Hines " Pop-off " type. All of which, on the correct type of moulding machine, give fast production when using a double-sided matchplate.

* * * *

In a discussion printed in the American journal *The Foundry*, Mr. K. A. Miericke is reported as saying that a suitable plaster mixture for pressure-casting consists of 75 to 80 per cent. by weight of gypsum plaster and 20 to 25 per cent. fibrous talc. To this is added 100 to 180 parts of water and the whole mixed for 4 to 5 min. or until the mixture seems to start to thicken. The more water used, the weaker is the resulting composition.

It is best to find satisfactory proportions for a mix and to standardise on them, as the dimensional changes occurring vary with the proportions used. When the plaster sets, a definite expansion takes place. This can be partially controlled by incorporating chemicals or by using hot-water in the preparation of the slurry (Mr. Miericke recommended hot water). An ideal temperature for drying such plasters is 350 to 450 deg. F. The alloy used for casting the pattern plates should have a long solidification range, *e.g.*, one with fairly high Cu and Si contents and Fe at a minimum; a pouring temperature of 1,080 to 1,150 deg. F. (582 to 620 deg. C.) is suitable, the pressure making up for any apparent lack of initial fluidity.

Book Review

Casting and Forming Processes in Manufacturing. By James S. Campbell, Jnr. Published by the McGraw Hill Publishing Company, Limited, Aldwych House, London, W.C.2. Price 42s. 6d.

Of the 34 chapters included in this book no fewer than 27 are devoted to foundry work, and thus it can be regarded as a textbook on the subject. Moreover, it is distinctly superior to most of those available. It is written by an American professor, who uses the latest quantity-production methods to achieve his purpose of describing foundry practice, yet he never loses sight of the simple basic principles. Great use has been made of illustrations and they are really modern pictures which do justice to a progressive industry. Characteristic of the book, too, is the small amount of space occupied by metallurgy. Cleverly the subject is covered in Chapter 15, "Metals for Sand Castings." With the compass of 15 pages the usual casting alloys, ranging from grey iron through nodular, brass, bronze, to magnesium are all outlined satisfactorily. Thus general acceptance can be given to the recent report of the Productivity Team that moulding, core-making and engineering play the major rôles in the manufacture of cast products in the States. The book well merits the term "comprehensive," for the reviewer can find no gaps in the covering of the subject. The chapter on mechanisation is of major interest to British readers as a number of difficult types of foundries are described and illustrated. Especially does the reviewer appreciate the simple diagram (Figs. 2 and 3) which shows the elements of sand preparation. This type of simplicity permeates the whole book and there is nothing in it which would not be understood by the average intelligent apprentice. The book can be regarded as typifying the new approach to foundry practice, and though perhaps a little elementary for foundry executive, it is an excellent book for the student and all grades up to the foreman. Engineers, too, would derive much advantage from its study. With the existing dearth of foundry technical books, this one fills a real gap and indeed does so in a remarkably attractive manner.

V. C. F.

Production and Distribution Censuses

By F. J. Tebbutt

CENSUSES originally only applied to production, and these were taken every five years. They were brought into operation by "The Census of Production" Acts, 1906, 1917, 1939, now repealed, but the power of taking censuses with other matters, now amplified and with new provisions, is contained in the Statistics of Trade Act, 1947. This 1947 Act provides for censuses of production to be taken every year, and an important innovation is that power is given for censuses of distribution to be taken also, but for these no specific intervals between censuses is laid down in the Act, which gives power to the Board of Trade to decide upon such a census at their discretion and to bring the matter into effect by an Order. After postponements an Order now provides for a "census of distribution" (the first ever) to be taken in 1951 in respect of trading figures in 1950, and there will be a census of production taken in 1951 in respect of production in 1950 likewise (the annual one). A census of distribution covers everything retailed to the public including services such as maintenance and repair work, and applies to both retailers and wholesalers.

At a census, forms are sent out to firms in which particulars are required to be given by the recipient —under penalties—and this applies to both censuses, but the questions, of course, are different. But for the distribution census most of the questions will be the same for particular groups of firms (*e.g.*, retailers, Form 2; wholesalers, including exporters and importers, Form 50), although there may be some questions, answers to which may not be required by some firms. There are nine different forms. For a production census, the forms vary for particular trades (there are nearly 200 separate trades concerned).

Details of Returns

The matters of the schedule concerning which replies may be required are as follows:—The nature of the undertaking (including its association with other undertakings) and the date of its acquisition; the persons employed or normally employed (including working proprietors), the nature of their employment, their remuneration and the hours worked; the output, sales, deliveries, and services provided; the articles acquired or used, orders, stocks and work in progress; the outgoings and costs (including work given out to contractors, depreciation, rent, rates and taxes, other than taxes on profits) and capital expenditure; the receipts of and debts owed to the undertaking; the power used or generated; the fixed capital assets, the plant, including the acquisition and disposal of those assets and that plant, and the premises occupied. There is an advisory committee to advise as to the preparation of the forms.

For the census of production relating to 1950 (taken in 1951) the form will contain sections concerning:—Working proprietors; employment; wages and salaries; materials and fuel purchased; work given out; stock at the beginning and end of the year; output and merchanted goods sold, and analysis of sales. Whereas formerly quarterly figures of wages paid were required, for this census only the year's total will be required. Another change is that firms will be required to give the total sales of merchanted goods and in the output section the total value of sales of own manufacture must be given separately and the total payment received for work done. A voluntary inquiry is proceeding among a sample of industrial firms, as regards capital expenditure, and if this results in a satisfactory response, no questions about capital expenditure may be included for this census of production.

For the census of distribution, the information concerning sales, purchases, etc., will in general cover trading for the whole of 1950 or if more convenient a business year ending between April 5, 1950, and April 6, 1951, can be taken. As regards the number of employees, the yearly figures do not apply as with the other census—a sample week is taken, that is, week ending June 24, 1950, and the particulars required will relate to that week; for wages, etc., the sample week also applies and in addition a lump-sum amount for the year is also required to be given. Required in this answer will be the number of employees (18 years of age and over), male and female, full-time and part-time (including those absent through illness or holidays), and for employees under 18 years old the figures must be divided between (*a*) persons on the pay roll paid a definite wage or salary and (*b*) owners and others working in the business. Both wholesalers and retailers must show numbers engaged in production and those in any separate transport organisation associated with the business. In the sums for wages, commissions and bonuses are to be included, but wholesalers need not include travellers' expenses.

Exemptions

By an Order, the Board of Trade can exempt any person or organisation from the obligation to make returns (mostly these exemptions apply to industries such as gas and petroleum undertakings where the information is supplied to the Ministry of Fuel). Although, as previously mentioned, forms are sent out to firms and individuals at a census, there is always a notice in the *London Gazette* or *Edinburgh Gazette*, as to the classes of undertakings in the census, and this is taken as legal notice to any firm of that class that returns are required, even though no form has been received by any particular firm or individual.

Returns made by particular firms are not made public; those which are published are of the nature of a summary of the particulars provided by the whole of the industry concerned. It may be that there are establishments which do both processing and merchanting or retailing (*e.g.*, constructional engineering; metal scrap and waste processing). In these cases, both distribution and production census returns may be required; but if mainly engaged in one or other branches two returns will not be required, and particulars wanted for distribution on a census of production form will be covered by the analysis of sales requirement.

Alloy Steel Production

Need for Conserving Imported Raw Materials

THERE ARE nearly 170 firms in this country producing alloy and high-speed steels, of which about 30, accounting for nine-tenths of alloy steel production, are scheduled for nationalisation under the Iron and Steel Act, according to the "Statistical Bulletin" of the British Iron and Steel Federation (September-October). It is stated that the variety of alloy steels made by all the firms engaged is very great. Every year new compositions are developed; some are so complex and contain such a large proportion of "alloy" that it is doubtful whether they qualify for the term "steel." Incidentally, the generally accepted definition of alloy steel does not cover this point. The reason is that the doubtful cases represent only an insignificant tonnage and can, therefore, be ignored statistically. Table I shows the production of alloy steel by quality in 1943, 1946, and 1949.

TABLE I.—*U.K. Production of Alloy Steel* by Quality. (Thousand tons.)*

Quality.	1943.	1946.	1949.
Ingots:—			
Nickel	92.5	46.0	72.9
Nickel-chrome	176.1	52.0	64.6
Nickel-chrome-molybdenum† ..	484.1	69.2	130.5
Chrome-molybdenum	255.6	23.3	49.4
Manganese-molybdenum ..	169.9	48.8	88.1
Chrome-vanadium	15.6	6.0	6.2
Carbon-chrome	115.3	102.8	114.3
Corrosion and heat resisting‡ ..	61.4	55.6	74.0
Other qualities	116.0	60.6	90.8
Total ingots	1,486.5	464.3	690.8
Steel for castings:—			
All qualities	109.1	55.0	76.9
Grand total	1,595.6	519.3	767.7

* Other than high-speed steel. † With or without vanadium. ‡ Mostly nickel chrome.

During the war a study was made of the number of alloy steel specifications in use in the U.K. and, including private specifications, it ran into four figures. This is quite apart from the multitude of alloy tool steel compositions made. They were considerably reduced by the introduction of the B.S.970 En. series of specifications, but, since the end of the war, the natural tendency to introduce new specifications, or refinements of standard ones, has shown itself; but, in general, the En. series represents the basic range of alloy steel compositions.

Alloy Conservation

Economy in the use of the high-priced alloys is of national importance at any time, especially in view of the fact that practically all have to be imported. Its attainment is largely dependent on the combined and co-ordinated efforts of steelmaker and user. Some of the ways in which the user can help are as follow:—(*a*) By designing components on the basis of the lowest practicable mechanical properties for any given duty; in other words, not calling for a steel having, say, a tensile strength of 80 tons per sq. in. if 50 tons per sq. in. will suffice; (*b*) by leaving it to the steelmaker as far as possible to decide the composition of the steel which will have the desired properties; (*c*) by segregating alloy steel scrap into compositional categories, for return to the steelmaker.

The main obligation of steelmakers in this field is to make the utmost use of the alloy content of scrap and to design steels which, with the aid of alloy picked up from scrap and with suitable heat-treatment, will give the user the physical properties required with the least expenditure of "virgin" alloys. During the war a joint Anglo-North American committee studied this subject of alloy conservation with considerable mutual benefit. It is perhaps interesting to record that, although the economies achieved on each side of the Atlantic were roughly on the same scale, so far as they could be measured, the U.K. appeared to have made more progress in respect of scrap segregation and utilisation, whereas the Americans showed some superiority on the using side in respect of such factors as (*a*) above. Somewhat over-simplified, the difference might be described by saying that, although the U.K. made a particular quality of alloy steel with less expenditure of virgin alloy, the Americans made a corresponding saving by using for any given purpose steel containing less alloy content overall.

Another purpose in the rationalisation objective of introducing En. series of specifications was economy in virgin alloys, the specifications being specially designed with this in view. In this sense, an "economical" alloy steel cannot be judged solely on its composition. Some compositions can be made by picking up most of the alloy content from scrap.

Possible Effects of Metals Shortage

A statement issued in Birmingham recently by the British Non-ferrous Metals Federation expresses the view that widespread redundancy of labour and a serious decline in production in all metal industries may result from a shortage of non-ferrous metals. Criticising the policy of bulk purchases, the Federation states that the Minister of Supply has not at any time called for the advice of metal consumers in carrying out his bulk-purchasing policy. It was a fact, however, that the industry was being consulted on the existing measures which now had to be taken.

Speaking in Manchester on December 12, Viscount Davidson, president of the Engineering Industries Association, told members of the north-west section of the Association that he did not consider bulk buying would ever be a proper province for Government activity, and claimed that had an unfettered metal market been operated, the present metal shortage would not have been so acute. Stockpiling, both in America and in this country, had contributed to the shortage, he said. Referring to the award of bonus allocations to exporters based on export figures for the preceding year, Viscount Davidson said it was of little use being granted an extra allocation of raw material if that allocation could not be honoured.

Dust Collection. A leaflet received from the Harris Engineering Company, of York Works, Browning Street, London, S.E.17, describes and illustrates a portable dust collector of the cabinet type. A second leaflet deals with gas-heating units for industrial applications.

Notes from the Branches

Newcastle-upon-Tyne Branch

At the November meeting of the Newcastle-upon-Tyne branch of the Institute of British Foundrymen, some eighty members and visitors were present to hear Mr. L. Walker, director of Noble & Lund, Limited, of Felling-on-Tyne, give a Paper entitled "Cast Iron and the Development of Heavy Machine Tools." Reference was made to the heavy demands on the ironfounder in the development of machine tools and how the industry has, at the request of tool designers, produced more complicated castings in spite of a shortage in skilled men available. The close co-operation between the designer and the foundryman throughout the various stages of manufacture has been a major factor in increasing production. This theme was elaborated upon and some excellent slides of machine tools made early this century compared with their present-day counterparts brought a realisation of the progress made.

Earlier Designs

The machine tools of the first world war were of such high quality that some were still in operation to-day, but, at that time, there was almost a complete absence of lubrication technique. The machine-tool mechanics selected the most suitable places in which to put oil holes, oil piping was little used and no attempt was made to centralise the system. Brackets carrying shafts were made as separate units and the gearing was generally of the open type covered by cast-iron or sheet-steel guards. The result of this type of design was that the foundry was called upon to produce a large quantity of comparatively simple castings which after assembly were partially enclosed by loose guards.

A busy period followed the war, and heavy machine tools were then exported from this country to all parts of the world. During the slump which later ensued, many firms went out of existence and those which survived had great difficulty in retaining their design staff. They managed, however, to re-design their machines with a view to being prepared when world markets re-opened.

In due course economic conditions became such as to justify users again considering the purchase of plant and it was during this period that the enclosure of the driving units of machines in separate gear boxes was contemplated. Although the majority of those produced were of the splash-lubricated type with little attention being paid to the bearing lubrication, this progress led ultimately to the totally-enclosed self-lubricated box with automatic pump lubrication to the gears and bearings. The design and production of castings of the more complicated nature resulting from this development brought more problems to the foundry industry, whilst at the same time, improvements in unit design were taking place. The application of more than one electric motor on a machine tool was being considered, and push-button-controlled motors began to appear in place of lever-operated clutches. The second world war put a strain on the industry and the advent of new cutting-steels made many designs obsolete, but by co-operation between the user and manufacturer problems such as work handling, swarf removal, and the minimisation of operator-fatigue were overcome and machines of the finest design were produced.

Castings for Modern Machines

Mr. Walker then referred to the difficulties of design and production of heavy castings needed for machine tools. Lathe headstocks now designed as totally enclosed units gave rise to many problems at the commencement of their manufacture. Contraction stresses in the cooling of castings had to be investigated and data collected in an endeavour to overcome future difficulties.

Mention was made of an instance where a box-bar bed, some 8 ft. wide and 30 ft. long, was required to be increased to 10 ft. wide by splitting it down the middle and inserting loose distance pieces. When the bed was put on the machine and the box bars were split down the centre, the slideways of the bed were found to have distorted ½ in. when the stresses were relieved by splitting the bars. The bed was between 30 and 40 years old, but obviously the casting stresses were still there. Scoring of the slide-ways of the bed was also a serious problem; in many cases customers requested a high Brinell hardness in an endeavour to prevent this, although the speaker expressed his doubt on this point, particularly as the beds of old machines have been found to be soft and yet not unscored. One cause of scoring could be the fact that if operators left the slideways dirty when operating the power traverse, the dirt got between the mating surfaces. Another cause might be that the mating surfaces were apt to bind together and scoring was then due to tearing of the surfaces of the two metals. Investigations being carried out in an endeavour to discover the ideal materials for machine-tool beds so far point to a soft and hard surface mating together as being most successful.

Mr. Walker was of the opinion that the machine tool of the future would have to rely on iron castings as opposed to fabricated-steel units, except perhaps in the case of non-precision machines. An even greater spirit of co-operation between the draughtsman and the foundryman would be the means of overcoming most of the troubles encountered both in the design of castings and their manufacture.

Photographs of castings in various stages of manufacture in the foundry of Noble & Lund were shown at this stage and after a considerable discussion Mr. F. J. Pittaway proposed a vote of thanks to Mr. Walker, which was seconded by Mr. R. M. Ainsley and carried with acclamation.

British Standards Institution

Pneumatic Tools and Accessories (*B.S.* 673 *:* 1950)

The British Standards Institution has recently published a revision of B.S. 673 : 1950, " Pneumatic tools and accessories. This standard deals with the dimensions of shanks for use with the following types of pneumatic tools, which are given with illustrations:—Rock drills; chipping and caulking hammers and stone tools; picks; demolition picks and spades; concrete breakers, and riveting hammers.

In many instances it has only been found necessary to confirm dimensions of shanks which have long been used in the industry and adopted by many of the makers. This standardisation does not, therefore, seriously affect existing tools. For rivet snaps, dimensions for section, cupping or face, and overall length are given in addition to shank dimensions. Details of Parker taper-shank and parallel-shank types of rivet snaps for use in the aircraft industry are also included.

The standard includes a comprehensive series of definitions relating to rock drills; pneumatic hand tools; attachments for pneumatic hand tools and other pneumatic appliances. Copies of this standard are obtainable from the British Standards Institution, Sales Department, 24, Victoria Street, London, S.W.1, price 3s., post free.

World Iron-ore Resources

A Report on "World Iron-ore Resources and their Utilisation," published by the United Nations Secretariat, states that the basic resources for an iron and steel industry are available and can be assembled economically in a number of localities in each of the major under-developed areas of the world. Iron ores with a metallic content and of a quality comparable with, or better than, those now commercially exploited in the industrialised countries are available in large quantities in undeveloped regions. The known ore reserves are adequate, in each of the more populous under-developed countries, to support a large iron and steel industry. Many of the smaller countries have ore deposits suitable for economical mining. In some cases the deposits are specially rich and are of sufficient magnitude to warrant export without limiting the ultimate availability of the ores for long-range economic development.

The under-developed countries may have an opportunity to promote their economic development by producing ores for export as well as for domestic production of iron and steel, since most industrialised countries have shown an increasing interest in importing high-grade ores. Lack of sufficient coking coal often presents a serious problem in connection with the development of steel production. The development of two-way trade in ores and coking coals would therefore be important for the development of steel industries in a number of under-developed countries, and more generally for the expansion of steelmaking potential throughout the major under-developed areas.

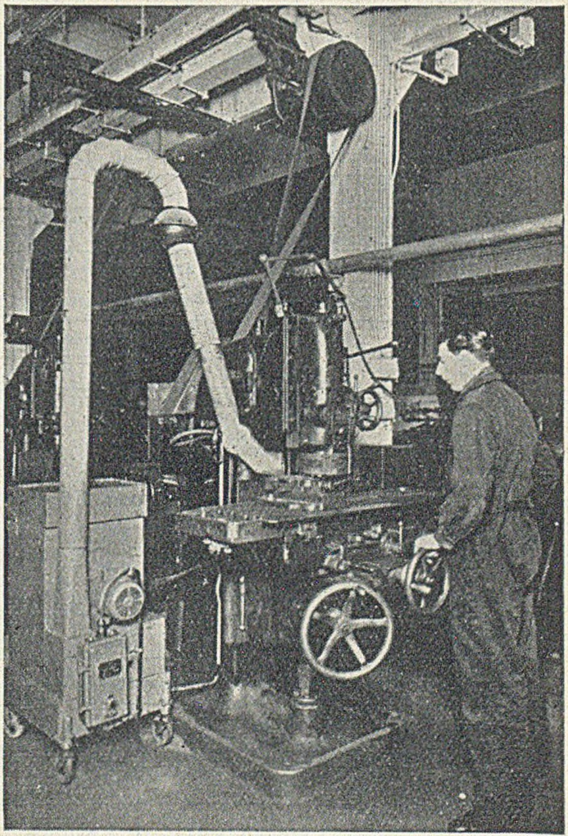
Various methods for reducing the requirements of coking coal for smelting iron ore or eliminating it completely by substituting other coals, oil, natural gas, or electric power are in limited use in industrialised countries. Such methods are likely to find wider opportunities in undeveloped countries. Ultimately, technological advance in this field may be effective in raising the iron and steel potentialities of the under-developed areas in much the same way as earlier developments in the use of coking coal in blast furnaces, and the development of refining processes and rolling-mill equipment, raised the steelmaking potentialities of presently industrialised countries in the preceding century.

For China and India, an annual production rate of 20 million tons, more than 10 times the present levels, appears to be feasible on the basis of their own iron-ore and coking-coal resources; and much more would be feasible on the basis of exchange of ores and coking coal within the region. Production of iron and steel could also be established in a number of other under-developed countries in the Far East, and would be developed to the utmost by two-way exchange of ores from various countries in South-East Asia for Chinese coking coal.

Latin America, which possesses enormous reserves of high-grade ores, has little coking coal of high quality near to ore deposits or markets. Only Mexico appears to have both the ores and coking coal required for steel production. Large-scale utilisation of South American ore reserves depends upon the employment of techniques for reducing ore without using native or imported coking coal. The two-way exchange of rich South American ores for coking coal from Europe, the United States, or the Union of South Africa is, however, on technical grounds alone, feasible and would, in fact, be more economical than the one-way flow of South American ores which now takes place or is planned in the immediate future.

Iron-ore reserves in Africa are extensive in many regions. Coking coal is the limiting resource factor in the development of iron and steel production. However, exchange of ore of North Africa for the coking coal of Europe would not require uneconomic transport. The mills used in underdeveloped countries may often be smaller than those used in the more advanced industrialised countries. Labour requirements would then be increased, while capital outlays would be reduced. The effect of this would not be uneconomic for underdeveloped countries because labour costs are much lower than capital costs there when compared with industrialised countries.

Though the quantity, quality, and location of existing resources and markets are advantageous for establishing or expanding a steel industry in a number of under-developed countries, it is probable that iron and steel production initially will not be as efficient in the under-developed countries as it is now in the industrialised countries. As a consequence, the new steel industries in under-developed countries will probably need some kind of protection against imports similar to those that the steel industries of industrialised countries had in comparable stages of development and still enjoy.



Portable "Drytex" Dust-collector made by Dallow Lambert & Company, Limited, Spalding Street, Leicester. It is being used for the Collection of Cast-iron Dust from a Vertical Milling Operation.

Pig-iron and Steel Production

STATISTICAL SUMMARY FOR AUGUST

The following particulars of pig-iron and steel produced in Great Britain have been extracted from the Statistical Bulletin for September/October, issued by the British Iron and Steel Federation. Table I gives the production of pig-iron and ferro-alloys in August, with the number of furnaces in blast; Table II, production of steel ingots and castings in August, Table III, deliveries, and Table IV a summary.

TABLE I.—*Weekly Average Production of Pig-iron and Ferro-alloys during August. (Thousands of Tons.)*

District.	Furnaces in blast 2.9.50.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derby., Leics., Notts., Northants, Essex	24	—	14.5	23.6	1.1	—	39.3†
Lancs. (excl. N.W. Coast), Denbigh, Flints. and Cheshire .. Yorkshire (incl. Sheffield, excl. N.E. Coast) ..	6	—	6.2	—	—	1.4	7.6
Lincolnshire ..	14	—	23.4	—	—	—	23.4
North-East Coast	23	7.2	35.9	0.2	—	1.4	44.7
Scotland	9	0.8	12.8	2.2	—	—	15.8
Staffs., Shrops., Worcs. and Warwick ..	9	—	9.1	1.5	—	—	10.6
S. Wales and Monmouthshire	7	2.2	18.4	—	—	—	20.6
North-West Coast	6	14.2	—	0.1	—	0.7	15.0
Total ..	98	24.4	120.3	27.6	1.1	3.5	177.0*†
July, 1950 ..	96	20.0	114.9	27.5	0.7	2.8	175.0†
August, 1949* ..	102	25.2	122.0	28.6	1.6	4.9	182.3

* Five weeks. † Incl. 100 tons of direct castings.

TABLE III.—*Weekly Average Deliveries of Non-alloy and Alloy Finished Steel. (Thousands of Tons.)*

Product.	1948.	1949.	1949. Aug.*	1950. July.	1950. Aug.*
Non-alloy Steel:—					
Heavy rails and sleepers	8.9	9.8	7.8	10.4	9.9
Heavy and medium plates	36.1	39.2	36.3	32.9	32.8
Other heavy prod.	34.7	36.1	31.9	35.2	33.6
Light rolled prod.§	59.7 (with hot-rolled strip)	46.4	42.3	43.0	41.5
Hot-rolled strip ..		17.1	14.3	16.6	15.7
Cold-rolled strip ..	4.8	4.9	4.6	5.8	4.2
Bright steel bars ..	6.1	5.8	4.9	6.9	5.6
Sheets, coated and uncoated	26.3	27.6	23.5	30.1	23.3
Tin-, terne- and blackplate ..	13.5	13.7	11.0	14.6	11.1
Tubes, pipes and fittings	15.1	18.5	15.9	19.8	15.0
Wire	12.8	15.0	14.8	14.5	13.8
Tyres, wheels, axles	3.9	4.1	4.1	3.3	3.4
Forgings‡‡	2.4	2.4	2.2	1.9	1.6
Castings	3.5	3.6	2.9	3.2	3.3
Total	227.8	244.2	216.5	238.2	214.8
Alloy Steel†:—					
Tubes and pipes ..	0.4	0.6	0.5	0.6	0.4
Bars, plates, sheets, strip and wire ..	4.7	4.7	3.9	5.5	4.3
Forgings‡‡	0.5	0.7	0.6	0.7	0.5
Castings	0.7	0.7	0.7	0.8	0.8
TOTAL	6.3	6.7	5.7	7.6	6.0
Total from U.K. prod.‡	234.1	250.9	222.2	245.8	220.8
Add from other U.K. sources	11.3	11.7	10.9	6.2	6.7
Imported finished steel	3.4	7.7	7.1	4.2	1.8
	248.8	270.3	240.2	256.2	229.3
Less intra-industry conversion ..	35.0	39.1	29.5	36.3	30.5
Total deliveries ..	213.8	231.2	209.7	210.9	198.8

† Excl. high-speed steel. ‡ Incl. finished steel prod. in the U.K. from imported ingots and semi-finished steel. ‡‡ Excl. drop forgings § Excl. wire rods and alloy-steel bars, but incl. ferro-concrete bars

TABLE II.—*Weekly Average Production of Steel Ingots and Castings in August. (Thousands of Tons.)*

District.	Open-hearth.. Acid.	Open-hearth.. Basic.	Bessemer.	Electric.	All other.	Total. Ingots.	Total. Castings.	Total ingots and castings.
Derby., Leics., Notts., Northants and Essex ..	—	2.8	8.5 (basic)	1.2	0.2	12.2	0.5	12.7
Lancs. (excl. N.W. Coast), Denbigh, Flints. and Cheshire .. Yorkshire (excl. N.E. Coast and Sheffield) ..	0.7	17.5	—	1.2	0.4	19.0	0.8	19.8
Lincolnshire	—	24.5	—	—	0.1	24.5	0.1	24.6
North-East Coast	1.4	60.9	—	0.7	0.4	62.1	1.3	63.4
Scotland	4.4	41.8	—	1.8	0.7	47.0	1.7	48.7
Staffs., Shrops., Worcs. and Warwick	—	12.3	—	0.5	0.4	12.3	0.9	13.2
S. Wales and Monmouthshire	9.2	37.8	5.6 (basic)	0.6	0.1	53.0	0.3	53.3
Sheffield (incl. small quantity in Manchester) ..	6.1	25.0	—	6.2	0.4	36.4	1.3	37.7
North-West Coast	0.4	2.2	3.4 (acid)	—	—	5.9	0.1	6.0
Total	22.2	224.8	17.5	12.2	2.7	272.4	7.0	279.4*
July, 1950	23.6	215.3	20.9	13.3	3.2	268.5	7.8	276.3
August, 1949*	24.0	228.8	18.2	13.7	2.9	270.8	7.8	287.6

TABLE IV.—*General Summary of Pig-iron and Steel Production. (Weekly Average in Thousands of Tons.)*

Period.	Iron-ore output.	Imported ore consumed.	Coke receipts by blast-furnace owners.	Output of pig-iron and ferro-alloys.	Scrap used in steel-making.	Steel (incl. alloy). Imports.†	Steel (incl. alloy). Output of ingots and castings.	Steel (incl. alloy). Deliveries of finished steel.	Steel (incl. alloy). Stocks.‡
1938	228	89	—	130	118	16	200	—	—
1948	252	172	200	178	174	8	286	214	1,028
1949	258	169	199	183	188	17	299	231	1,275
1950—March*	255	174	197	186	212	12	330	252	1,279
April	242	171	196	183	207	11	324	236	1,320
May*	248	172	199	186	204	10	319	240	1,326
June	243	170	194	182	199	12	313	246	1,352
July	243	166	191	175	176	13	276	226	1,162§
August*	239	175	194	177	181	5	279	199	1,187§

* Five weeks. † Weekly average of calendar month. ‡ Stocks at end of years and months shown. § Encl. reinforcement wire, material for drop forgings, bolts, nuts and washers.

Pig-iron and Steel Production

STATISTICAL SUMMARY FOR SEPTEMBER

The September statistics of pig-iron and steel produced in Great Britain have also been extracted from the Bulletin for September/October, and are included to bring the figures up to date. Table I gives the production of pig-iron and ferro-alloys in September, with the number of furnaces in blast; Table II, production of steel ingots and castings in September, and Table III, deliveries of finished steel. Table IV summarises activities during the previous six months.

TABLE I.—*Weekly Average Production of Pig-iron and Ferro-alloys during September. (Thousands of Tons.)*

District.	Furnaces in blast 30.9.50	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derby, Leics., Notts., Northants, Essex ..	25	—	16.1	24.4	1.3	—	41.9†
Lancs. (excl. N.W. Coast) Denbigh, Flints and Cheshire .. Yorkshire (incl. Sheffield, excl. N.E. Coast) ..	6	—	7.2	—	—	1.5	8.7
Lincolnshire ..	14	—	24.1	—	—	—	24.1
North-East Coast	23	7.7	36.4	0.3	—	1.4	45.8
Scotland	9	0.8	13.5	2.3	—	—	16.6
Staffs., Shrops., Worcs., and Warwick ..	9	—	9.0	1.6	—	—	10.6
S. Wales and Monmouthshire	8	4.2	19.7	—	—	—	23.9
North-West Coast	7	15.0	—	0.2	—	—	15.2
Total ..	101	27.7	126.0	28.8	1.3	2.9	186.8†
August, 1950* ..	98	24.4	120.3	27.6	1.1	3.5	177.0†
September, 1949	100	28.6	122.4	29.8	1.7	2.8	185.3

* Five weeks. † Incl. 100 tons of direct castings.

TABLE III.—*Weekly Average Deliveries of Non-alloy and Alloy Finished Steel. (Thousands of Tons.)*

Product.	1948.	1949.	1949. Sept.	1950. Aug.*	1950. Sept.
Non-alloy Steel:—					
Heavy rails and sleepers	8.9	9.8	11.1	9.9	10.7
Heavy and medium plates	36.1	39.2	41.1	32.8	42.7
Other heavy prod.	34.7	36.1	36.4	33.6	41.1
Light rolled prod.§	} 59.7 {	46.4	48.7	41.5	52.4
Hot-rolled strip ..		17.1	18.0	15.7	21.9
Cold-rolled strip ..	4.8	4.9	5.0	4.2	6.1
Bright steel bars ..	6.1	5.8	5.7	5.6	7.4
Sheets, coated and uncoated ..	26.3	27.6	28.6	23.3	32.1
Tin-, terne- and blackplate ..	13.5	13.7	14.5	11.1	14.4
Tubes, pipes and fittings	15.1	18.5	19.9	15.0	20.2
Wire	12.8	15.0	16.2	13.8	18.0
Tyres, wheels, axles	3.9	4.1	4.1	3.4	3.9
Forgings‡‡ ..	2.4	2.4	2.6	1.6	2.2
Castings	3.5	3.6	3.9	3.3	3.3
Total	227.8	244.2	255.8	214.8	276.4
Alloy Steel† :—					
Tubes and pipes ..	0.4	0.6	0.5	0.4	0.7
Bars, plates, sheets, strip and wire ..	4.7	4.7	4.2	4.3	6.0
Forgings‡‡ ..	0.5	0.7	0.7	0.5	0.6
Castings	0.7	0.7	0.8	0.8	0.8
Total	6.3	6.7	6.2	6.0	8.1
Total deliveries from U.K. prod.‡ ..	234.1	250.9	262.0	220.8	284.5
Add from other U.K. sources	11.3	11.7	11.0	6.7	8.0
Imported finished steel	3.4	7.7	8.5	1.8	3.7
	248.8	270.3	281.5	229.3	296.2
Less intra-industry conversion ..	35.0	39.1	42.4	30.5	40.5
Total deliveries ..	213.8	231.2	239.1	198.8	255.7

† Excl. high-speed steel. ‡ Incl finished steel prod. in the U.K. from imported ingots and semi-finished steel. ‡‡ Excl. drop forgings. § Excl. wire rods and alloy steel bars, but incl. ferro-concrete bars.

TABLE II.—*Weekly Average Production of Steel Ingots and Castings in September. (Thousands of Tons.)*

District.	Open-hearth. Acid.	Open-hearth. Basic.	Bessemer.	Electric.	All other.	Total. Ingots.	Total. Castings.	Total ingots and castings.
Derby, Leics., Notts., Northants and Essex ..	—	2.8	10.0 (basic)	1.0	0.2	13.4	0.6	14.0
Lancs. (excl. N.W. Coast), Denbigh, Flints., and Cheshire .. .. Yorkshire (excl. N.E. Coast and Sheffield) ..	1.0	24.0	—	1.7	0.5	26.2	1.0	27.2
Lincolnshire	—	31.9	—	—	0.1	31.9	0.1	32.0
North-East Coast	1.6	61.9	—	0.9	0.4	63.3	1.5	64.8
Scotland	4.3	41.2	—	1.8	0.7	46.3	1.7	48.0
Staffs., Shrops., Worcs. and Warwick	—	16.9	—	0.8	0.7	17.0	1.4	18.4
S. Wales and Monmouthshire	9.0	52.6	5.6 (basic)	0.9	0.1	67.8	0.4	68.2
Sheffield (incl. small quantity in Manchester) ..	9.2	27.1	—	8.1	0.7	43.2	1.9	45.1
North-West Coast	0.5	3.5	4.4 (acid)	—	0.1	8.3	0.2	8.5
Total	25.6	261.9	20.0	15.2	3.5	317.4	8.8	326.2
August, 1950*	22.2	224.8	17.5	12.2	2.7	272.4	7.0	279.4
September, 1949	27.6	239.9	20.4	14.6	3.4	297.3	8.6	305.9

TABLE IV.—*General Summary of Pig-iron and Steel Production. (Weekly Average in Thousands of Tons.)*

Period.	Iron-ore output.	Imported ore consumed.	Coke receipts by blast-furnace owners.	Output of pig-iron and ferro-alloys.	Scrap used in steel-making.	Steel (incl. alloy) Imports.†	Steel (incl. alloy) Output of ingots and castings.	Steel (incl. alloy) Deliveries of finished steel.	Steel (incl. alloy) Stocks.‡
1938	228	89	—	130	118	16	200	—	—
1948	252	172	200	178	174	8	286	214	1,028
1949	258	169	199	183	188	17	299	231	1,275
1950—April	242	171	196	183	207	11	324	236	1,320
May*	248	172	199	186	204	10	319	240	1,326
June	243	170	194	182	199	12	313	246	1,352
July	243	166	191	175	176	13	276	226	1,152§
August*	239	175	194	177	181	5	279	199	1,187§
September	229	179	198	187	207	8	326	256	1,160§

* Five weeks. † Weekly average of calendar month. ‡ Stocks at end of years and months shown. § Encl. reinforcement wire, material for drop forgings, bolts, nuts and washers.

Company Meeting

Hale & Hale (Tipton)

Sound and Steady Progress

The 14th annual general meeting of Hale & Hale (Tipton), Limited, was held on December 20 at Dudley, Mr. R. C. Leppington, vice-chairman and managing director, presiding in the absence of the chairman, Mr. W. Edgar Hale.

The following is is an extract from the chairman's circulated statement for the year to August 4, 1950:—

This is the fortieth set of accounts which have been prepared with which I have been associated since this business was founded, and the fourteenth since we became a public company. Even in the worst years of the slump during the thirties, we never failed to make some measure of progress, even though it was small at times, and this year is no exception. We have continued to make sound and steady progress, and at the same time have been able to satisfy ourselves that the future has still better things in store.

The profit and loss account shows a trading profit of £73,162, which compares with £58,026 for the previous year, giving an increase of £15,136. The net profit is £29,748, as against £23,379. Your directors, conforming with the Government's desire not to increase the distribution to shareholders, propose the payment of a final dividend on the ordinary shares of 15 per cent., less tax, making again 20 per cent. for the year, and that an amount of £15,000 be transferred to general reserve.

The consolidated trading profit is £78,362, an increase of £1,540. Group current liabilities total £128,472 against £137,192, while the excess of current assets over current liabilities of £154,680 shows an increase of approximately £22,000.

Production and Sales

We are supplying our "Fine Quality Blackheart Malleable Iron Castings" for the usual purposes, mainly represented by commercial vehicles, motor-cars, railway locomotives, carriages, wagons and track equipment, electrical generating plant and switchgear, agricultural machines, dairy equipment, merchant and naval vessels, and a never-ending multiplicity of traders. This aspect of our industry is very comforting because our net is spread so wide that in the event of one class of demand depreciating, almost for certain a demand for some other branch is developing and, as I have said on many occasions, provided any measure of virility exists in the engineering trade at all, we are always sure of a steady demand.

It is very interesting to give a little thought to the export position of our products because we are not directly concerned with the ultimate destiny of our supplies, as they are mainly in the form of raw material in the hands of our customers, although we do, of course, run quite extensive machine shops and finishing departments. Upon making inquiries, it appears as though 90 per cent. of our turnover finds its way overseas and this figure you will agree, when considering our tremendous output, is a very creditable performance and of great national help.

Of the sales side of our business we appear to have broken all our previous records. Our intake of orders has been at a very high level and in turn our sales have been likewise. It is regrettable that we cannot meet the ever-increasing demands of our product more rapidly.

We are doing everything within our power to remedy this difficulty, but the popularity of our product is so great that in seeking to catch up with the demands we are setting ourselves a very great task.

New outlets for our production make themselves evident almost daily, and there is no doubt that malleable iron of the quality and standard such as your company produces finds itself regarded as one of the cheapest raw materials that it is possible to secure within a reasonable range, embracing its mechanical and physical features.

Chatwins, Limited, have not had as satisfactory a year as they should, due in part to bad management which has now been eradicated. At the time of reporting, the deficiencies have been remedied, and there is every reason to hope that the current year will be no less prosperous than in the past. The order-book is in a healthy condition and has improved week by week, and a most excellent reception is being given to new lines which, as you will be aware, are all concerned with heating and cooking by solid fuel.

J. & J. Whitehouse (Tipton), Limited, are, as you are aware, almost entirely engaged in the production of cooking utensils in cast iron which are of a character exclusively used by native elements in far-off lands, and while they have not had too good a year, due to shipping difficulties, restrictions, and one thing and another, over which we have no control, your board is quite happy about them.

Current Problems—Nationalisation

Unfortunately, to-day, there is a very silly notion, decidedly prevalent, that there is something immoral and wrong about the making of profit from industry. Industry can never be in a worse possible state than when it ceases to make profit. The more that is available is all to the good. It provides the money whereby industry can be extended, and as the result of being provident with resources, any surplus there may be can be invested in other enterprises to start new operations.

During the course of the year, we have seen more Governmental encroachment upon the steel trade, with which industry we, of course, have a number of definite links, and I would not say that I view such encroachment with any measure of equanimity. Unfortunately, that industry has been sorely damaged over a period of many years when we so foolishly allowed those incredible "free trade" principles to permit of free import into the country of steel at prices which were fixed by foreigners at levels, known to be below the cost of production here, which were quite all right for them, as they were only selling "surplus," but since that frightful burden was removed from the industry, it has never looked back, and to-day it can be claimed that nowhere in Europe, or America, is steel being produced cheaper than it is in this country, or the conditions in the works more attractive from the employees' point of view. To disturb, by nationalisation, an industry which is in such fine fettle, I am sure is going to prove disadvantageous, as it takes away that personal element, based upon human understanding, which just makes all the difference to everyone concerned.

Nationalisation of utilities, such as gas and electricity, has much to commend it. Personally, I have always felt, and continue to feel, that it is an experiment which the man in the street demanded, and had the right to see tried.

There appears no doubt in my mind that the most substantial ingredient in the argument, in favour of nationalising steel, which caused the Government to take the step towards nationalisation, was political, and it does seem a shame that so important an industry is being interfered with again for mainly political reasons.

The report was adopted.

News in Brief

MacMillan Foundries, Limited, are planning to erect a new factory at Fitzherbert Road, Farlington, near Portsmouth.

The Council of Ironfoundry Associations has issued Conference Report No. 3 to its members covering conditions in ironfoundries.

The tender of the Pulsometer Engineering Company, Limited, totalling £17,689, for filtration plant at Muirdykes, has been accepted by Paisley Corporation Water Committee. Total estimated cost of the works is £124,000.

Orders worth some £480,000 have been received by F. Perkins, Limited, Peterborough, following the exhibition of the new Perkins tractor Diesel engine P3 (TA) at the Smithfield Show. Many further inquiries are still being received.

Users of pneumatic tools will be interested in the announcement that the medical services centre of the Steel, Peech & Tozer branch of the United Steel Companies, Limited, Sheffield, is to investigate "dead hand," a complaint common to workers using these tools.

As from December 11, licences are required for the export of some additional metals and alloys, specified drugs and chemicals, and certain plastic materials. The changes are effected by the Export of Goods (Control) (Amendment No. 8) Order, 1950, issued by the Board of Trade.

Orders received by members of the Sugar Machinery Export Group during the past two years have averaged over £2,500,000 per annum, and during the six months to September 30, 1950, showed a further sharp increase. Improved shipping facilities have done much to overtake the lag in deliveries.

An order for 16 steam locomotives costing £23,250 each has been placed by the New Zealand Government with the North British Locomotive Company, Limited, Glasgow. The first five locomotives are to be delivered by the end of next year, and the order is to be completed by August or September, 1952.

Meeting at Swansea, last Monday, the Welsh Engineers' and Founders' Conciliation Board considered an application on behalf of 4,000 workmen for a wage increase of £1 a week. It was stated that an offer had been made by the employers, to which the trade union representatives would refer at group meetings.

Birlec, Limited, announce the appointment of Mr. F. Tinker as their northern area manager with headquarters at Surrey House, Arundel Street, Sheffield, 1. Mr. Tinker, who joins Birlec from the associated company, Henry Wiggin & Company, Limited, has been stationed in the Yorkshire area for a number of years.

A marked improvement in output during the past year is reported by Mr. H. F. Smallwood, chairman and managing director of W. H. Dorman & Company, Limited, manufacturing engineers and ironfounders, of Stafford. He said last Friday week that in the last three months direct exports had equalled those of the preceding six months.

The largest Clydeside ship of the year, the 18,500-ton passenger cargo vessel Ruahine, was launched from the shipyards of John Brown & Company, Limited, on Monday. Built for the New Zealand Shipping Company, she will accommodate 250 passengers and have a speed of 18 knots. Her maiden voyage is scheduled for May.

Engineers at the Trafford Park works of the Metropolitan-Vickers Electrical Company, Limited, stopped piecework as from December 11. It is estimated that this will cut production by half. Mr. Bert Brennan, chairman of the works committee, said that pieceworkers had to do half as much work again as day workers, and received an average £6 12s. a week against the day workers' £5 18s.

Successful test-bed trials of the largest Doxford oil engine yet built in this country have been completed by Barclay, Curle & Company, Limited, Whiteinch, Glasgow. With six cylinders, 750 mm. in diameter, and designed to develop 8,000 b.h.p. at 104 r.p.m., it is to be installed in the motor tanker Polarbris for Melsom & Melsom, Larvik.

Mr. Charles E. Wilson, who has accepted the task of running the U.S. defence production programme, is president of the General Electric Company, chairman of the General Electric Supply Corporation, and a director of the International General Electric Company, Inc., and the Canadian General Electric Company, Limited. During the last war he was executive vice-chairman of the war production board.

Asked by Mr. Ian Harvey what steps were being taken to effect the geographical dispersal of industries vital to the life of the community and our armament production, the President of the Board of Trade said that before approval was given to expansion schemes in any key industries, due consideration was given, among other things, to the desirability of dispersal. Plans existed for wider dispersal in the event of war.

The Indian import policy for the January-June licensing period of 1951 broadly follows that for the six months now ending. Machinery essential for the development of the country and industrial raw materials will continue to receive a high degree of priority, while imports of certain essential consumer goods have also been permitted. Whereas in the past licences covered imports by countries, the new policy is to allocate them by currencies.

A Montreal message, in reporting that Mr. Howe, Canadian Minister of Trade, who has just returned from Washington, had announced that all import controls on capital goods entering Canada would be lifted on January 2, says that the announcement is believed to be part of a deal under which the United States will send Canada more steel. Mr. Howe went to Washington in an effort to secure 1,000,000 tons of steel for Canadian manufacturers.

The Engineering Industries Association announced last Wednesday that it had decided to cancel the 3,360 sq. ft. of space it had provisionally reserved at the 1951 Canadian International Trade Fair. The council of the association considered that it was better to do this now than let member firms obtain dollar orders and then suffer the frustrations and irritations caused by raw material shortages and the consequent loss of good will because of inability to keep delivery dates.

The directors of Albright & Wilson, Limited, chemical manufacturers, of London, W.1, announce that the issue of one ordinary stock unit of 5s. for each 5s. stock unit at present held, agreed at an extra-ordinary meeting of stockholders held on September 19 last, can now be effected following the approval of the High Court. The new stock will rank equally with the existing ordinary stock for the final dividend payable in respect of the company's year ending December 31, 1950.

Mr. T. H. Summerson, chairman and joint managing director of Thomas Summerson & Sons, Limited, railway fixed plant manufacturers, of Darlington, speaking at Stockton-on-Tees, said that for many years in Norway, privately- and publicly-owned steel undertakings had been working side by side and competing with one another. This arrangement appeared likely to get the best out of both. Any industry in need of improvement should be examined by qualified unbiased people, and the steps to improve it should be decided on purely technical grounds.

Personal

Mr. R. W. Gregory, lecturer in mechanical engineering, has been appointed to an Imperial Chemical Industries fellowship by Durham University.

Sir Archibald Forbes, the new deputy-president of the Federation of British Industries, has joined the board of the Finance Corporation for Industry, Limited.

Mr. W. Gordon Scott has been appointed secretary of Shanks & Company, Limited, sanitary engineers and ironfounders, of Barrhead, near Glasgow, in succession to the late Mr. William A. Kincaid.

Mr. Richard Perkins, deputy sales manager of F. Perkins, Limited, Diesel engine manufacturers, of Peterborough, has returned from a business tour of New Zealand, Australia, Canada, and the United States. He was married while in New Zealand.

Mr. J. E. Stubbs has been appointed assistant sales manager of the switchgear department of Metropolitan-Vickers Electrical Company, Limited. Much of his career has been spent abroad in connection with hydro-electric and pumping station work on the firm's behalf.

Lord McGowan has relinquished his position as chairman of Imperial Chemical Industries, Limited, because of ill-health. He has accepted the position of honorary president of the company with effect from January 1. Lord McGowan, now 76, was I.C.I.'s first president and deputy-chairman, becoming chairman in December, 1930. The new chairman of Imperial Chemical Industries is Mr. John Rogers.

Wage Increases for Women Engineers

An increase of 8s. 6d. in the minimum weekly time rates of women in the engineering industry and of 9s. 5d. in minimum piecework earnings will be paid under an agreement reached between the Engineering and Allied Employers' National Federation and engineering unions representing women workers.

As in the agreement recently concluded for male engineers, the new time rate will be a consolidated one, and the increase will be limited to lower-paid workers. The minimum weekly wage for a woman aged 21 will now be 75s.

The increases, like those recently agreed for male engineers and shipyard workers, will be retrospective to the first full pay week after November 13.

Coltness Iron Repayment Scheme

Shareholders of the Coltness Iron Company, Limited, are to be asked to approve a scheme involving the repayment of the preference capital and a partial repayment of the ordinary share capital. Meetings have been called for January 5. Details of the scheme were announced last August.

Dinner

Western Foundries Staff

Mr. A. Talbot presided over the third annual dinner of Western Foundries, of Southall, Middlesex, at the Red Lion Hotel. The guests were drawn from the management and included Mr. Le Grand, Mr. Gell, Mr. Sims, Mr. Walrond, Mr. Hetherington, Mr. Marlow, Mr. Fear, Mr. Hodkisson, and Mr. Pateman.

Obituary

Mr. J. Finlayson, who has died in hospital, was a foreman with the North British Locomotive Company, Limited, Glasgow, and was elected to Glasgow Corporation this year.

Mr. Arthur William Snow, of Oswestry, who for 45 years had been the North Wales representative of W. & T. Avery, Limited, weighing machine makers, etc., of Birmingham, has died at the age of 72.

Mr. James Walker, secretary of General Refractories, Limited, Sheffield, for seven years, died recently at the age of 57. He joined the organisation in 1936 as secretary of the Glenboig Union Fireclay Company, Limited.

The death took place on December 7, at the age of 57, of Mr. J. Walker, secretary of General Refractories, Limited, since 1943. Mr. Walker joined the group in 1936 as secretary of the Glenboig Union Fireclay Company, Limited.

From South Africa, the death is reported of Mr. G. S. Graham, managing director of Denham Brass & Iron Foundry (Pty.), Limited, Springs, at the age of 43. He was born in Cumberland and was active in employer, civic and Rotarian circles.

Mr. Cyril Cotton, a director of Midland Iron & Hardware Company (Cradley Heath), Limited, died suddenly on December 7 at the age of 53. He had been connected with the firm for 30 years and was elected to the board three years ago.

The death has occurred, at the age of 74, of Mr. Henry L. Heathcote, M.Sc., F.I.M., the well-known metallurgist. He was educated at King Edwards School, Birmingham. During his academic training he won many scholarships, enabling him to study or undertake research work in London, Birmingham and Leipzig. For over twenty years he was head of the scientific and research department of Rudge Whitworth, Limited. He was on the original committee which formed the British Non-ferrous Metals Research Association. In recent years he had conducted a private consulting practice.

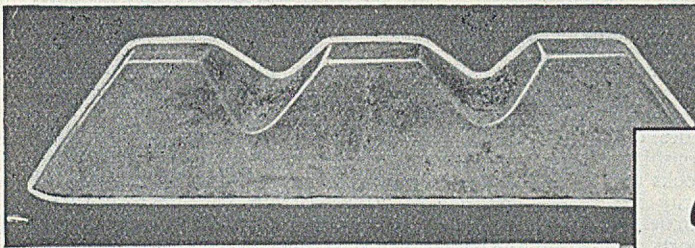
Wills

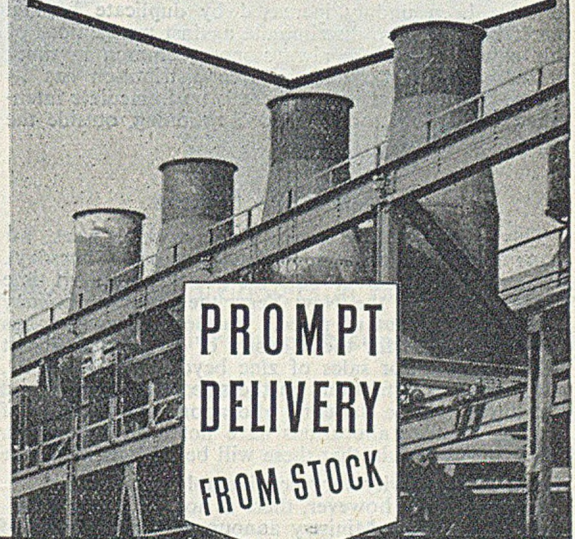
Waters, J. S., managing director of the Johnson Metal Company, Limited, Salford (Lancs) £24,470

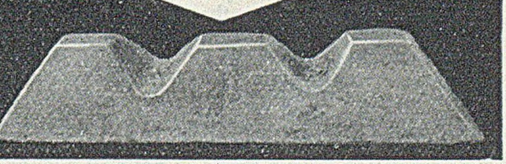
Darrah, A. L., managing director of Baxendale & Company, Limited, lead manufacturers, of Manchester, and a director of F. Parramore & Sons (1924), Limited, ironfounders, etc., of Chapeltown, near Sheffield, and of the Fourness Manufacturing Company, Limited, boilermakers, etc., of Manchester £87,046

Shipbuilding Prosperity Depends on Competition

The immediate outlook for the British shipbuilding industry is summarised as "promising" in a pamphlet dealing with the industry published by the Conservative Political Centre. The pamphlet states that, in spite of the great expansion of American shipbuilding during the war, Britain is easily the largest shipbuilder in the world. For its continued prosperity the industry depends on competition. Nationalisation would be disastrous because centralisation would impair the efficiency of the individual firms and destroy the personal touch between shipbuilder and shipowner which is so vital to the industry. The initiative must remain with the individual firms, as no practical or economic benefits can be derived from nationalisation.







Raw Material Markets

Iron and Steel

Pig-iron production has risen slightly, but has not yet fully overtaken industrial requirements. Prevailing conditions, notably the limited supply of coke, do not permit of further expansion, and consumers have not infrequently to use furnace mixtures very different from those to which they are accustomed. All grades of iron, with the possible exception of Northamptonshire high-phosphorus iron, are fully taken up and stocks at the foundries are so slender that any irregularity in deliveries from the blast furnaces is a source of anxiety. Even refined iron is now eagerly sought and exports of this grade are strictly limited.

Since the end of the summer there has been a marked shrinkage in the intake of semi-finished steel from Western Europe. From Belgium, in particular, imports have dwindled almost to vanishing point, and although British steelmakers are turning out impressive tonnages of billets, slabs, and sheet bars, these do not invariably suffice to meet requirements. This is indicated by the avidity of the demand for defective material. Deliveries of sheet bars and slabs are reasonably adequate, but small sizes of billets are still in short supply. The voluntary restraint upon steel exports, which has been accepted by producers for the period ending on February 28, has not yet visibly reduced the volume of material cleared to oversea destinations, for which shipping space had already been booked. It will be more effective after the turn of the year, when deliveries to home consumers should correspondingly improve. The extent of the home demand is believed to have been unduly increased by duplicate buying, but it is difficult to discriminate against transactions of this nature which are always most common in times of scarcity. The system of free distribution has its critics, but it is learnt that there is no immediate intention of reverting to controls and rationing, outside the sheet trade.

Non-ferrous Metals

This is likely to be a very short working week, for many factories did not reopen until to-day (Thursday). But with supplies scarce and the prospect of short time being worked in the New Year, the extended holiday does not seem out of place. Business, of course, has been very quiet, for the Ministry of Supply is still out of the market for sales of zinc beyond December 31, and there are restrictions on the sale of copper beyond two-thirds of the January allocation. At the time of writing, the zinc allocations have not been announced, but it seems certain that these will be such as to reduce the level of activity very considerably.

In aluminium, however, there is hope of better times for last week the Ministry announced the purchase of 50,000 metric tons from the Aluminium Company of Canada. This tonnage will be a very useful addition to present supplies, which are at the rate of some 180,000 tons per annum, including 30,000 tons from United Kingdom sources. Moreover, Canada has entered into a long-term arrangement with Britain, under which 200,000 tons per annum will be forthcoming from the Dominion during the next 20 years. The news of this additional metal has cheered consumers considerably, but it has to be borne in mind that defence needs during 1951 are likely to be fairly heavy and these must be met out of the grand total.

At one time last week tin crossed the £1,300 line again, but the close on Friday midday was £1,235 for cash and £1,120 for three months. It is satisfactory to note that on the week's trading the backwardation narrowed to some extent, although remaining very wide.

Metal Exchange official tin quotations were:—

Cash—Wednesday, £1,270 to £1,275; Thursday, £1,205 to £1,215; Friday, £1,225 to £1,235; Wednesday, £1,200 to £1,205.

Three Months—Wednesday, £1,115 to £1,120; Thursday, £1,070 to £1,080; Friday, £1,110 to £1,120; Wednesday, £1,095 to £1,100.

An increase in premiums on imported electrolytic copper in special shapes is reported, which will result in users paying considerably more than they have been doing, although over the past few years there has been a steady upward movement in these extras.

But the most interesting item of news last week was the announcement that consideration was being given to a system of fixing maximum prices for non-ferrous scrap. So far the list of quotations published is tentative and is subject to confirmation by the Ministry of Supply. If the idea is adopted, it will be necessary to promulgate an official Order to enforce the regulation. The marking down is drastic and the limits to be enforced are in many cases something like £40 per ton below the level at which the scrap market has been ruling of late. Further developments are awaited with much interest.

House Organs

Staveley News. Vol. 1, No. 1. Issued by the Staveley Iron & Chemical Company, Limited, near Chesterfield.

This is the first issue of a new house organ by one of the largest foundry and chemical concerns in the country. It is intended for the staff and not for customers. The reviewer was especially pleased with the pastoral treatment accorded to the front cover, and this was enhanced on learning that it was the work of a member of the staff. Good use has been made of illustration, but the clarity of the pictures chosen varies from poor to excellent.

The editing is universally good, though by transferring the small paragraph on page 47 to 46, the longish story of Bradley & Foster's London outing would have started at the top of a page. Finally, we think that somewhere there should have been set out in a prominent position the names of the companies sponsoring the publication.

Craven Machine-tool Gazette. Vol. XI, No. 2. Published by Craven Bros. (Manchester), Limited, Vauxhall Works, Reddish, Stockport.

The reviewer expected to read the chairman's (Mr. J. R. Greenwood) views on Soviet orders for machine tools, but instead he writes very interestingly on Canada as a market for this commodity. It seems that servicing is the outstanding difficulty, as Canadian buyers expect and get this service from American suppliers. The balance of the issue is devoted to decribing and illustrating typical products of the company.

Malleable Iron Facts. The 38th Bulletin issued by the Malleable Founders' Society, Union Commerce Building, Cleveland, Ohio.

The major part of this bulletin describes and illustrates a motor lorry, the cab of which is hinged so that the machinery can be inspected, adjusted or repaired. The brackets being made of malleable are featured in the description. By way of contrast, the last of the four pages shows a 40-year-old buggy step, wherein the steel bolts have suffered badly from corrosion, yet the casting is in excellent condition.

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

(Delivered, unless otherwise stated)

December 27, 1950

PIG-IRON

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

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

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

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

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

Cold Blast.—South Staffs, £16 3s. 3d.

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

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

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

FERRO-ALLOYS

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

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

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

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

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

Ferro-tungsten.—80/85 per cent., 22s. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 24s. per lb of W.

Ferro-chrome.—4/8 per cent. C, £60; max. 2 per cent. C, 1s. 5½d. lb.; max. 1 per cent. C, 1s. 6d. lb.; max. 0.15 per cent. C, 1s. 6¾d. lb.; max. 0.10 per cent. C, 1s. 7d. lb.

Cobalt.—98/99 per cent., 15s. 6d. per lb.

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

Ferro-manganese (blast-furnace). — 78 per cent., £30 5s. 11d.

Metallic Manganese.—96/98 per cent., carbon-free, 1s. 7d. to 1s. 8d. 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.—Ship plates (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, £37 7s. 3d.; nickel-chrome, £55; nickel-chrome-molybdenum, £61 13s.

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

NON-FERROUS METALS

Copper.—Electrolytic, £202; high-grade fire-refined, £201 10s.; fire-refined of not less than 99.7 per cent., £201; ditto, 99.2 per cent., £200 10s.; black hot-rolled wire rods, £211 12s. 6d.

Tin.—Cash, £1,200 to £1.205; three months, £1,095 to £1,100; settlement, £1,205.

Zinc.—G.O.B. (foreign) (duty paid), £151; ditto (domestic), £151; "Prime Western," £151; electrolytic, £155; not less than 99.99 per cent., £157.

Lead.—Good soft pig-lead (foreign) (duty paid), £136; ditto (Empire and domestic), £136; "English," £137 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, all English destinations, £170 7s. 6d.; rolled zinc (boiler plates), all English destinations, £168 7s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £139 10s.

Other Metals.—Aluminium, ingots, £120; antimony, English, 99 per cent., £250; quicksilver, ex warehouse, £42 10s. to £43; nickel, £406.

Brass.—Solid-drawn tubes, 21⅝d. per lb.; rods, drawn, 28¼d.; sheets to 10 w.g., 26d.; wire, 26⅝d.; rolled metal, 24¾d.

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

Gunmetal.—Ingots to BS. 1400—LG2—1 (85/5/5/5), £225 to £260; BS. 1400—LG3—1 (86/7/5/2), £235 to £270; BS. 1400—G1—1 (88/10/2), £300 to £345; Admiralty GM (88/10/2), virgin quality, £310 to £345, per ton, delivered.

Phosphor-bronze Ingots.—P.Bl, £330 to £350; L.P.Bl, £240 to £260 per ton.

Phosphor Bronze.—Strip, 34d. per lb.; sheets to 10 w.g., 35¼d.; wire, 36d.; rods, 33½d.; tubes, 38¾d.; chill cast bars: solids, 34½d., cored, 35½d. (C. Clifford & Son, Limited.)

Nickel Silver, etc.—Ingots for raising, 2s. 3d. per lb. (7%) to 3s. 2d. (30%); rolled metal, 3 in. to 9 in. wide × .056, 2s. 9d. (7%) to 3s. 8d. (30%); to 12 in. wide × .056, 2s. 9¼d. to 3s. 8¼d.; to 25 in. wide × .056, 2s. 11¼d. to 3s. 10¼d. Spoon and fork metal, unsheared, 2s. 6d. to 3s. 5d. Wire, 10g., in coils, 3s. 2½d. (10%) to 4s. 1½d. (30%). Special quality turning rod, 10%, 3s. 1½d.; 15%, 3s. 6¼d.; 18%, 3s. 10½d. All prices are net.

Forthcoming Events

JANUARY 2.

Institution of Production Engineers

Reading Sub-section:—"Nuclear Physics," by Dr. K. Mendelssohn, at the Great Western Hotel, Reading, at 7.15 p.m.

Institution of Works Managers

Sheffield Branch:—"The Works Manager," by J. Ayres, at the Grand Hotel, Sheffield, at 7.30 p.m.

JANUARY 3.

North-Western Fuel Luncheon Club

Colour Film, "T.T. 1950," at the Engineers' Club, Albert Square, Manchester, 2, at 12 noon.

Institution of Production Engineers

Wolverhampton Section:—"Some New Materials and their Applications," by R. F. Archer, at the West Midland Gas Board Demonstration Room, Darlington Street, Wolverhampton, at 7 p.m.

JANUARY 4.

Institute of Metals

Birmingham Local Section:—Discussion on "Temperature Measurements," at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 6.30 p.m.

Leeds Metallurgical Society

"The Uses of Copper Alloys," by C. Breckon, B.Sc., at the Chemistry Department, The University, Leeds, 2, at 7 p.m.

Institution of Industrial Supervisors

Cardiff Section:—"Joint Consultation," by J. L. Hamilton, at Newport Technical College, Clarence Place, Newport, at 7 p.m.

Warrington Section:—"The Foreman and Costing," by S. C. Roberts, at the White Hart Hotel, Sankey Street, Warrington, at 7 p.m.

Institution of Works Managers

Bristol Branch:—"Motion Study," by A. B. Armstrong, at the Royal Hotel, Bristol, at 7.15 p.m.

Institution of Incorporated Plant Engineers

Peterborough Branch:—Film, "Pulverised Fuel," at the Eastern Gas Board Demonstration Room, Church Street, Peterborough, at 7.30 p.m.

JANUARY 5.

Institution of Mechanical Engineers

"Mechanical Handling," at Storey's Gate, St. James's Park, London, S.W.1, at 5.30 p.m. (Joint meeting with the Institution of Electrical Engineers.)

Increases of Capital

The following companies are among those which have recently announced details of capital increases:—

MANCHESTER METAL WORKS, LIMITED, Salford, increased by £4,000, in £1 shares, beyond the registered capital of £8,000.

ST. THOMAS METAL WORKS, LIMITED, Bristol, increased by £4,000, in £1 ordinary shares, beyond the registered capital of £1,000.

LIPTAK FURNACE ARCHES, LIMITED, Victoria Street, London, S.W.1, increased by £5,000, in £1 "A" ordinary shares, beyond the registered capital of £20,000.

BUSWELL & SWEENEY, LIMITED, engineers, etc., of Water Street, Birmingham, 3, increased by £18,000, in £1 ordinary shares, beyond the registered capital of £12,000.

FREDERICK GREENWOOD & SONS, LIMITED, textile machinists, etc., of Hamer, Rochdale, increased by £35,000, in £1 shares, beyond the registered capital of £15,000.

NICKEL ANODES & NON-FERROUS CASTINGS, LIMITED, Sherbourne Street, Birmingham, increased by £49,000, in £1 ordinary shares, beyond the registered capital of £1,000.

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.

SITUATION WANTED

METALLURGIST (33), fully experienced in grey and malleable foundry work, heat treatment of iron and steel and engineering workshop practice, seeks managerial or similar position.—Box 436, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

CASTINGS INSPECTOR (ferrous and non-ferrous) required for responsible post in Wolverhampton. Good salary and prospects for qualified foundryman with knowledge of machine shop requirements.—Write full particulars, age, experience, etc., to Box 7662, c/o WHITE'S, LTD., 72, Fleet Street, London, E.C.4.

VACANCY exists for young FOUNDRY METALLURGIST in modern special steel Foundry, N. Notts area. Experience of H.F. and preferably arc-furnace melting, sand control, etc. Reply, stating age, experience and salary required, to Personnel Manager.—Box 430, FOUNDRY TRADE JOURNAL.

CHIEF ASSISTANT METALLURGIST, age 21-25 years, required for Steel Founders in the Manchester area. Applicants will be required to undertake investigational work on foundry problems and some knowledge of open-hearth furnace is required. Good prospects for suitable type of applicant and Staff Pension Scheme operating.—Full particulars, stating salary required, to Box 434, FOUNDRY TRADE JOURNAL.

CHEMIST, 21-23 years, required for Foundry in the Manchester area. Applicants must have experience in general iron and steel works analysis, and preferably some knowledge of open-hearth furnace operation. Progressive position. Good prospects for suitable type of applicant, and Staff Pension Scheme operating.—Full particulars, stating salary required, to Box 432, FOUNDRY TRADE JOURNAL.

STANDARDS ENGINEER

VACANCY for young man, age 25/30, to be trained for above situation in large modern foundries in Yorkshire, producing high-class steel, iron and non-ferrous castings. Knowledge of foundry practice essential. Good prospects for person with ability.—Apply, giving details of age, education, salary, etc., to Box 346, FOUNDRY TRADE JOURNAL.

DRESSING SHOP FOREMAN for small Steel Foundry. Must be young, willing and experienced man. Good house provided after 3 months' trial period.—Apply Box 428, FOUNDRY TRADE JOURNAL.

MACHINERY FOR SALE

FOR DISPOSAL.—One 6 ft. dia. PNEULEC Sand Mill, complete with 15 h.p. Squirrel Cage Motor.—Box 422, FOUNDRY TRADE JOURNAL.

MOULDING MACHINES. — Two Coleman No. 24A Davenport Type Machines. Jarr, Roll-over. Pattern draw 12 in.; 1,100 lbs. working capacity. Suitable for boxes up to 40 in. by 24 in. Price £350.—Box 288, FOUNDRY TRADE JOURNAL.

FOUNDRY PLANT FOR SALE

SAND PLANT

No. 1 Pneulec Royer Machine.

No. 2 Pneulec Royer Machine.

"BM2 SAND MILL," 6 ft. 10 in. dia. 4 tons per hr. Motorised. 400/3/50. By Foundry Equipment.

"AUGUST" Sand Mill Hoist. Motorised, 400/3/50.

MOULDING MACHINES

2 Type ATO Pneumatic Jolt Squeeze Turnover British Moulding Machines.

CUPOLAS

One 15-cwt. brand new Cupolette, complete with Motor Blower, Staging. Ready bricked. By Constructional Eng. Co.

One Ditto, secondhand, reconditioned.

One 2 ft. 9 in. Roper Cupola, reconditioned.

Two 6 ft. Cupolas, with Charging Hoist and Staging.

CONVEYORS

One Pallet Mould Conveyor, 30 Pallets, 3 ft. Pitch, 18 in. wide. New condition.

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

IN STOCK AT SLOUGH FOR IMMEDIATE DELIVERY.

STEEL MOULDING BOXES. 3,000 pairs, at £1 per pair; send for list.

31 in. CUPOLA complete, by "Constructional," with spark arrester, Keith Blackman Blower and new lining—all at £250.

48 in. ditto complete, for £375.

ADAPTABLE MOULDING MACHINES. £45 each.

SAND MILLS, by Jas Evans. 4 ft. diam., £48; 5 ft. diam., £120.

TITAN CORE BLOWER, as new, 150 lbs. £285.

Several WEIGHING MACHINES, by Avery. Type 282, as new, cheap.

Large stock new Broomwade Compressors, new. A.C. Motors and Keith Blackman Fans.

Immediate attention all enquiries.

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

MACHINERY FOR SALE—*Contd.*

ALBION WORKS

BLOWING and EXHAUSTING FANS

BLOWING FANS:

SEVERAL NEW ELECTRIC FORGE BLOWERS, 125 c.f.m., 3 in. w.g., 2½ in. inlet, 2 in. outlet, wound for 400 volts, 3-phase, 50 cycles.

SEVERAL NEW KEITH BLACKMAN BLOWING FANS, 10,000 c.f.h., 13 in. w.g. 1 h.p. Motor, 400 volts, 3-phase, 50 cycles. Blast gate and starters.

TWO SIROCCO MOTOR DRIVEN BLOWING FANS, by Davidson, 6 in. inlet by 3⅝ in. outlet. 1½ h.p. Motor, 400 volts, 3-phase, 50 cycles, 2,800 r.p.m. 490 c.f.m., 6 in. w.g.

CYCLONE MOTOR DRIVEN BLOWING/EXHAUST FAN, type L5, 14 in. dia. inlet, 9½ in. by 13½ in. outlet. 2½ h.p. S.C. Motor, 440 volts, 3-phase, 50 cycles, 1,450 r.p.m. Approx. 450 c.f.m., 12 in. w.g.

ONE MOTOR DRIVEN BLOWING FAN, by Air Control Installation, 5 in. inlet by 4¾ in. by 3⅝ in. outlet. 2 h.p. Motor, 440 volts, 3-phase, 50 cycles, 2,850 r.p.m. Approx. 4/500 c.f.m., 10 in. w.g.

KEITH BLACKMAN MOTOR DRIVEN BLOWING/EXHAUST FAN, 21 in. inlet, outlet 18 in. by 14 in. Driven by 3¼ in h.p. Brook S.C. Motor, 400/440 volts, 3-phase, 50 cycles, 750 r.p.m.

NEW SIZE 20 MULTIVANE STEEL-PLATE PRESSURE FAN, 1,500 c.f.m. against 18 in. w.g. Direct coupled to 10 h.p. S.C. Motor, wound for 400 volts, 3-phase, 50 cycles.

NEW SIZE 24 MULTIVANE STEEL-PLATE PRESSURE FAN, 2,820 c.f.m. against 22 in. w.g. Direct coupled to 20 B.H.P. S.C. Motor, wound for 400 volts, 3-phase, 50 cycles.

SEVERAL BELT DRIVEN FANS, by KEITH BLACKMAN, size 14, type 9, 5 in. inlet, outlet 3 in. by 3½ in., 330 c.f.m. at 8.5 w.g., 2,900 r.p.m. or 560 c.f.m. at 14 in. w.g., with vee rope pulley 3½ in. diameter.

VEE BELT DRIVEN STEEL PLATE CASING FORCED DRAUGHT FAN, by STANDARD PULVERISED CO., 16 in. dia. suction, 12 in. dia. discharge; capacity 5,000 c.f.m. at 15¾ in. w.g., requiring 21 B.H.P., 1,450 r.p.m. Grooved pulley 11 in. dia.

EXHAUST FANS:

NEW SIZE 9 PADDLE BLADE FAN, 450 c.f.m. against 3 in. w.g. Driven by .75 h.p. Motor, 400 volts, 3-phase, 50 cycles, inlet 5¾ in. dia., outlet 5¾ in. by 5¼ in.

SIZE 12 PADDLE BLADE STEEL-PLATE FAN, capacity 1,000 c.f.m. against 5 in. w.g. Driven by 2 B.H.P. S.C. Motor, 400 volts, 3-phase, 50 cycles.

MOTOR DRIVEN PADDLE BLADE EXTRACTION FAN, of steelplate construction, 14 in. flanged inlet, 14 in. by 10½ in. outlet. Driven by 7½ h.p. S.C. Motor, 400 volts, 3-phase, 50 cycles, 1,500 r.p.m. Approx. 3,600 c.f.m., 5 in. w.g.

THOS W. WARD LTD.
ALBION WORKS : SHEFFIELD
Phone 26311 'Grams: "Forward."

Remember . Wards might have it!