

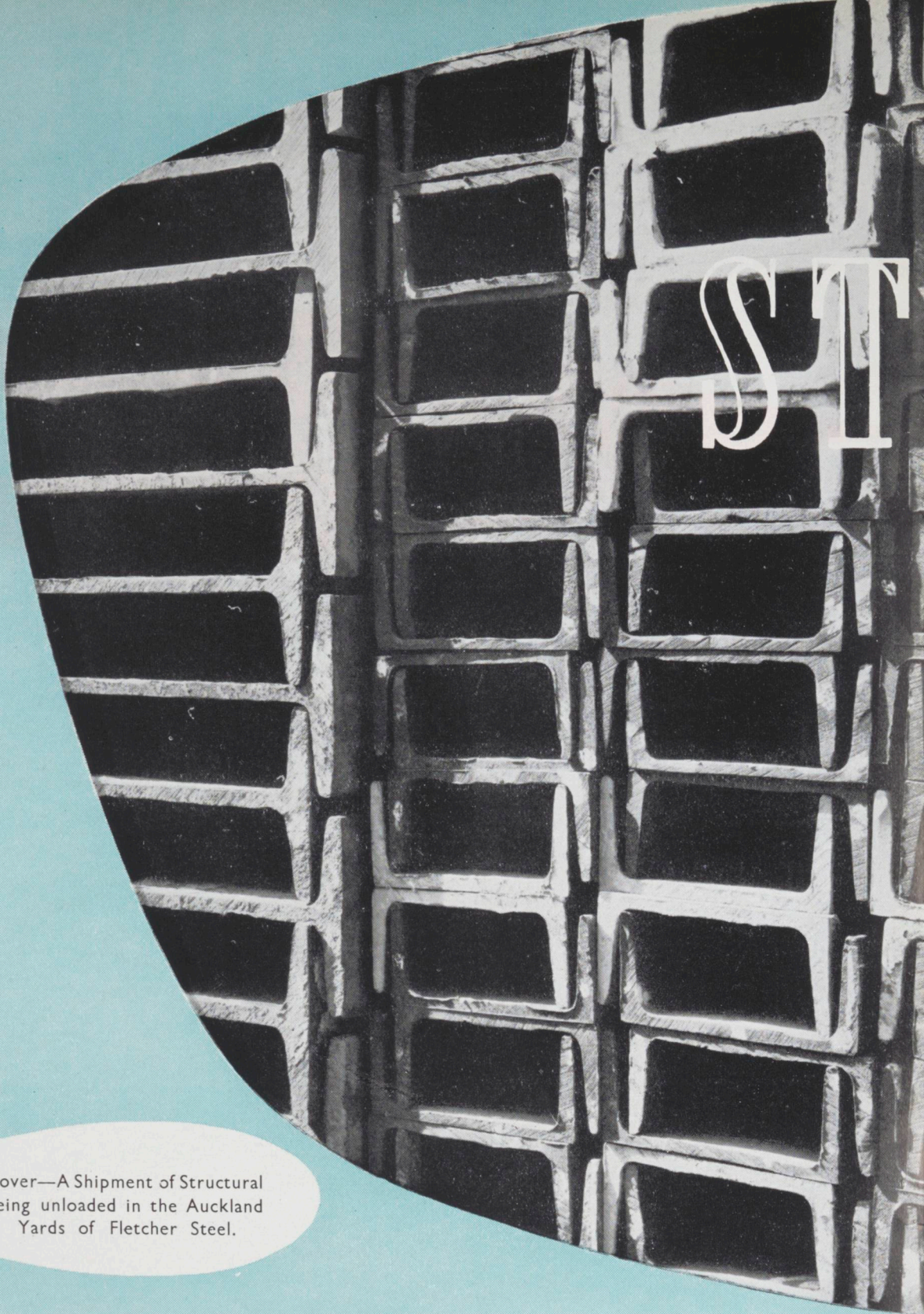
VOLUME ONE NUMBER THREE

PUBLISHED BI-MONTHLY BY FLETCHER HOLDINGS LIMITED

ARROWHEAD



MARCH, 1955



STEEL

Front Cover—A Shipment of Structural Steel being unloaded in the Auckland Yards of Fletcher Steel.

F E L . . .

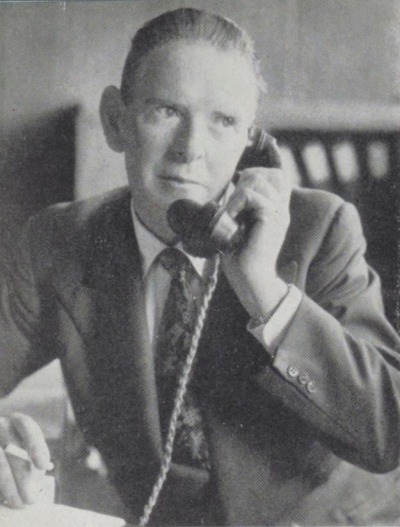
If timber is the skin and sinews of the building industry then steel is its very bone structure; it carries our railways, spans our rivers and makes skyscrapers and huge factories possible. No one knows when iron was first used by man for the very good reason that all the evidence is lost. Books on ancient history declare that the Iron Age followed the Bronze Age, but iron rusts quickly and bronze slowly, so iron may well have been produced during or even before the Bronze Age and since rusted away without trace. The only thing known for certain is that the Egyptians worked in iron 5,000 years ago, because a tool of that age has been found wedged between two stones and covered with sand which kept it dry.

The discovery of iron in prehistoric times was probably quite accidental: a man may have built his fireplace of iron ore and, as the fire died, discovered a crude lump of metal cooling in the embers. Found to be a useful material for weapons and cooking vessels, iron began to be made by primitive means. As one writer put it, "The making of iron and steel began as an accident, slowly developed as an art and has not yet become an exact science." The origins of steel, which is a man-made refinement of iron, are also lost in antiquity. The ancient civilisations of the Orient are believed to have discovered the technique of hardening steel and giving it flexibility. It is known that, while the Western world was still using iron, bronze and brass, the Crusaders met remarkable steel swords made in Damascus and later in Toledo; and yet the secret of steel manufacture was not discovered or used in the West until nearly 500 years later.

We in New Zealand have no known substantial deposits of iron ore and we are dependent on overseas for our supplies. The famous iron sands on our Tasman sea coastline do in fact hold out promise for development, but capital costs would be high and there are still many technical problems to be overcome. Nevertheless, it is not beyond the bounds of possibility that a steel industry based on local materials will one day be established here. New Zealand's requirements of steel are imported from Britain largely, but also from Australia, U.S.A., Belgium, Luxembourg, Germany and Japan, according to availability of both materials and currency. The great Broken Hill Proprietary (B.H.P.), which produces the cheapest steel in the world, is the nearest and most logical source of our supplies, but steel production in Australia is only just keeping pace with the rapid industrial developments in that country. It is hoped that Australian steel will again be imported in large quantities and a brief story about this great Australian enterprise appears in this issue.

With Fletchers' rapidly expanding construction business, it naturally follows that our companies are vitally interested in maintaining adequate steel supplies, thus from very modest beginnings, the Fletcher Steel & Engineering Companies Limited have grown to become one of the largest importers, distributors and fabricators of steel in New Zealand. The turnover of Fletcher Steel, which was nearly £1,750,000 in 1953/54, is almost certain to reach £2,000,000 this year.

This issue of *Arrowhead* is dedicated to our steel and engineering plants, the personalities that have guided its growth and to the men who work in steel.



A. W. CRAIG
MANAGING DIRECTOR

SINCE 1923

The growth of
**THE FLETCHER STEEL &
ENGINEERING COMPANIES
LIMITED**

It all began as a job site service to The Fletcher Construction Company in 1923, when Fletchers were building the Auckland University College. A gang of nine steel workers and one apprentice working on the job were the nucleus of what was to become within thirty years the largest steel company in the Dominion. Their workshop was a rough shed, 24 ft. x 18 ft., put up on the University site for the duration of the contract and, when this was completed in 1926, space was made to accommodate the men and their equipment on the joinery factory premises in Nelson Street. The establishment of the Vulcan Engineering Company in Auckland came as a natural consequence and the story of its spectacular growth is told on another page of this issue.

The Wellington Structural and Reinforcing Steel Company was formed in 1936 under the management of the late Andrew Fletcher. Its purpose was to do the reinforcing steel work on Fletcher Construction Company jobs, but later, as outside contracts were undertaken, the Company branched out into steel fabrication and a sales section was started. Frequent extensions were made from time to time to the Cable Street premises as business expanded, until a patchwork of buildings and sheds necessitated the planning of modern workshops and yards at Gracefield in the industrial area of Lower Hutt. These are now built and occupied, the change-over having taken place without the loss of production at the end of 1954.

Two of the largest engineering companies in New Zealand have grown up in Dunedin which, in the early part of the century, was the leading industrial city in the Dominion. Both were taken over by Fletchers and are now important branches of the re-organised steel companies.

Stevenson & Cook Engineering Company Limited of Port Chalmers, one of the oldest engineering establishments in the South, has a long history in ship repairing and structural steel fabrication. In their time these foundries have cast 8-ton ships' propellers. The Company was bought by Fletchers in 1941 and during the war was reorganised to build mine sweepers for the Ministry of Defence and cargo ships for the U.S. Navy. The late John Knewstubb, whose sons now hold key positions in the Fletcher organisation, managed the Port Chalmers workshops and repair yards during the war period and deserves special tribute for the great service he rendered under the terrific pressure of those difficult years. He was succeeded by G. J. Bootten, who is still Manager. Ship repairs continue to be a major activity and vessels up to 500 feet in length can be accommodated in the dry dock which has been extended considerably since Fletchers took over. The biggest job in hand at present is the building of a 90 ft. pontoon for Bluff Harbour Board.

The other Dunedin works, formerly Joseph Sparrow & Company Limited, was taken over in 1951 and since then many alterations and additions have been carried out. The workshop space has been greatly increased to enable the undertaking of major contracts. At present the penstocks for the Roxburgh Hydro scheme are being cut and shaped by both the Dunedin and Port Chalmers workshops while, on the site of what is to be the largest dam in New Zealand, a big workshop has been built for the assembly of sections of the 18-foot diameter penstock. An article on another page illustrates the various stages in welding the enormous rings which are fitted together on the site. Young men are to the fore in the Dunedin works; the Manager, R. J. Maindonald, is only 28 and both his Development and Production Engineers are under 30.



S. P. KINGSTON
GENERAL MANAGER



★ 1926 — The Nelson Street premises which housed Fletcher's first steel and engineering workshop. The place was destroyed by fire in 1938.

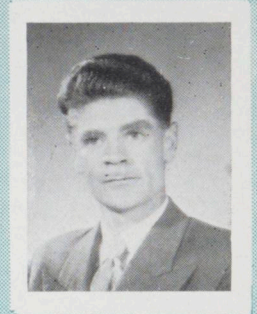
Fletcher Steel is represented in Christchurch by the reinforcing and structural branch established there in 1950. Small by comparison with the premises in Auckland and Dunedin, this branch has expanded to the extent that the erection of new workshops at Hornby, became necessary last year. These are now in production and the Christchurch Manager, A. R. King, is expecting that steel fabrication will soon become an important activity.

The names of Vulcan, Sparrow and Stevenson & Cook belong to the past but their solid reputation carries on.

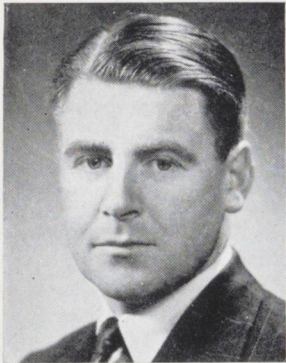
All these subsidiaries were amalgamated in April, 1954, to become The Fletcher Steel & Engineering Companies Limited, with the head office in Auckland. A. W. Craig is Managing Director; S. P. Kingston, who was the one apprentice with the original gang of 10 in the small shed on the University site, has become General Manager of a £2 million a year industrial organisation employing a staff of almost 600. The Assistant General Manager is C. J. Maindonald, who has his office in Dunedin.



J. LOTHIAN
AUCKLAND



E. G. FLEMING
WELLINGTON



C. J. MAINDONALD
ASSISTANT GENERAL
MANAGER



A. R. KING
CHRISTCHURCH



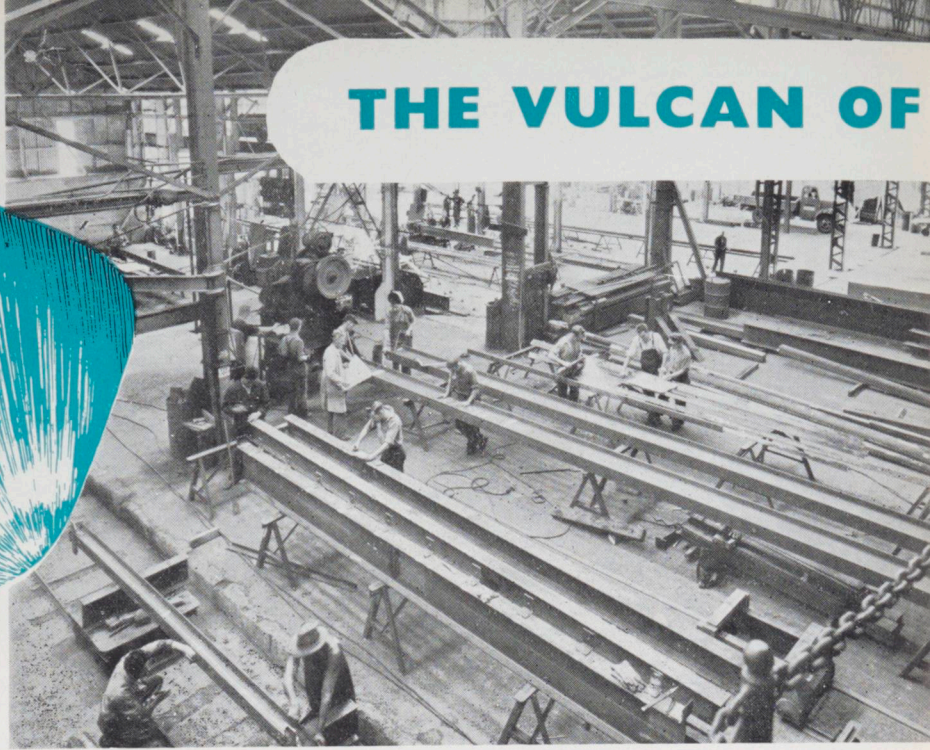
R. J. MAINDONALD
DUNEDIN



G. J. BOOTTEN
PORT CHALMERS

BRANCH MANAGERS

THE VULCAN OF



If all the steel-framed buildings erected by Fletchers in Auckland were placed one on top of the other alongside the Empire State Building, New Yorkers would probably blame the Texans. Earthquake safeguards make really tall buildings out of the question in most parts of New Zealand, and considerable care and skill must go into the design of any of our structures that reach for the sky. The Vulcan Steel Construction Company, now known as the Vulcan Works of The Fletcher Steel & Engineering Companies Limited, has played a major role in Fletchers' construction record in Auckland. Employing 220 engineers, draughtsmen, tradesmen, clerks and labourers, Vulcan of Nelson Street is a husky and important member of the Fletcher team.

On the heights above Freemans Bay in Auckland decaying wooden houses lean in twisted postures, their unpainted timbers bleaching like bones in the hard sunlight. Barefoot children run about streets built broad in the early days of the Colony for horse-drawn traffic; but Nelson Street plunges and falls on two levels where a good wide thoroughfare is most needed. Here, broken-down rooming houses have given way to industrial buildings which sprout incongruously out of the slums. But Nelson Street is to come into its own again — the City Council has ordered the gradual demolition of derelict houses standing on the industrial zone, and blocks of modern flats to house the dispossessed can be seen across the valley through the ugly Victorian tracery of the gasworks.

All is quiet until you pass through the door from which stairs lead up to the Vulcan offices. Then the restless chatter of typewriters and the urgent call of telephones come down to usher you out of Governor Hobson's age into the busy present. Everything still has a makeshift look about it: there has been no time to plan. This door going

to the engineering workshops is half-way up the stairs—a hatchway serving until new facilities catch up with a business that is clearly bursting at the seams. It is dark inside coming in from the bright sunlight and, as you walk through, you are only vaguely aware of men moving among rumbling lathes and other machinery. Then as your eyes become adjusted, you find yourself standing on a high gallery looking down into a crater of activity. This is the heart of the Vulcan—the orchestra pit where the sounds of industry are made as steel rings on steel and girders are squeezed and bent, drilled and bolted, cut and fabricated into beams and trusses.

Below, the scene vibrates in the crackling light of welding arcs. Blue acrid smoke rises to give a lurid quality to the air. There is a cacophony of noise in which can be singled out the roar of a pneumatic grinder, the clashing of chains and the musical ring of hammers. A guillotine thuds heavily, a cold saw rips naggingly and the electric whir of a grantry crane grows louder as a huge steel member swings perilously for a moment and then

alights gracefully on to the waiting bench below.

Over eighty boilermakers, welders and labourers toil in the structural workshops. It is a man's world with no place for foam-rubber physiques. The men seem to have taken on the tough flexible quality of the steel they work in. Look at the reposed profile of the brake-press operator. Years of association with the skilled handling of heavy machinery have tooled lines of character into his face giving it the clean-edged look of the steel press he stands beside.

Solid determination is expressed in the taut stance of the man guiding the "creeper" cutter as it ploughs its way through quarter-inch plate. Even the formidable goggles which, with skull cap and overalls, make him indistinguishable from the engineer hero of boys' books on spacemen, do not conceal the concentration in his eyes fixed on a precision piece of work.

The lathe operator too, is a study in patience and care which the high quality of the job requires. He is an artist in steel, and looks as if he loves the machine which pulsates at high

NELSON STREET



The structural steel workshops and reinforcing steel yard at Nelson Street.

revolutions paring off curling shavings which can be measured in thousandths of an inch. These are the real creators of our time; the craftsmen who, in an age of mass production, can feel the pride of individual performance and the dignity of their jobs.

You go down steps to the level of the structural workshops where the main job in hand is the fabrication of crane beams for the 80-foot span crane-way for the Tasman pulp and paper mills at Kawerau. Rolled-steel girders, joists and channels are brought in from the outside yards on railed trucks and hoisted in position by the 7½-ton crane which runs overhead. There is an irresistible tendency to duck as a thirty-foot long girder measuring 22 in x 7 in. on the cross section slices through the



air above you. The sections are welded together and are then conveyed to the beam straightener. Drilling operations are done in the side bays which house two plate rollers for $\frac{3}{8}$ in. and $\frac{1}{4}$ in. plate, a brake press for forming sections out of steel plates and a guillotine which cuts $\frac{1}{2}$ in. steel. There are shearing and punching machines, a sand blaster and a variety of equipment for shaping and finishing processes. Six large marking-out bays must be traversed before reaching the yards where the structural steel is stored.

A shipment of steel arrives from the port on articulated trucks. They run into the yard under a gantry which unloads their burden, sorting each piece out and whisking it off to its stack. Along the length of the 230-foot runway neat piles of structural steel are stacked according to size, from massive girders to small angles.

The reinforcing steel yard extends at right angles to the structural yard and on a lower level. By walking to the edge you can look along the runway of another 60-foot span gantry which travels up and down the yard casting shadows which ripple over an acre of reinforcing steel stacked in orderly rows.

Under the shelter of a covered bay, men work at benches shaping lengths of round steel in power-benders. Even 2-inch diameter rods yield gently to

Top: Dave Best operating the "creeper" cutter.

Left: Bill Parmenter beside the brake press.

Right: Jim Austin at his lathe.



the pressure of machines which were made by Vulcan for the job. Fifteen steel workers and labourers man the reinforcing yard and another gang works outside on the various sites where reinforced concrete buildings are under construction. The biggest job in hand is bending and fitting up all the reinforcing for the 9-storey M.L.C. Building in Queen Street.

Not much more than a fifth of the steel handled in the yards is supplied to Fletcher Construction Company contracts. The rest is fabricated for other clients or sold to outside construction companies. Altogether, about 4,000 tons of reinforcing steel is handled annually in the yards.

Supplying steel for a major industrial project is not too big an order for Vulcan. Wilson's N.Z. Portland Cement Limited's new plant at Portland took 2,500 tons of reinforcing steel alone, and 1,500 tons of structural steel were used for the 500-foot by 100-foot storage gantry and other buildings which were fabricated in sections in the Vulcan workshops. Both steelyards and workshops are kept busy by the Tasman pulp and paper mill now nearing completion at Kawerau, and other buildings in the Auckland Province requiring considerable tonnages of steel. Apart from fabricating one 80-foot craneway and a larger one (120-foot), Vulcan has contracted to build the steel frame for the sawmill which will be the biggest in New Zealand. The work is being shared with the Cable Price Corporation, not because Vulcan could not cope with it single-handed but because of the time restriction on the contract. Incidentally, the



FLETCHER STEEL MOVES TO GRACEFIELD



New Year, 1955, means a clean start for Fletcher Steel in Wellington. For nineteen years the location of the workshops has been on Harbour Board property in Cable Street, on the narrow crescent of reclaimed land that serves the port of Wellington as a front door step. During these years the growth of overseas trade has caused an overcrowding of warehouses, mercantile offices, depots and port installations. Industrial premises, too, have elbowed for room on the doorstep, but the town planning authorities have wisely taken steps gradually to move factories from land which will be needed in the future for expanding commerce.

The Hutt Valley, ten miles removed from the city's heart is set aside as the new industrial area of the capital, and

Fletcher Steel has now joined the steady trek taking plant and installations into the flat land that offers living room for industry. Evacuation leaves behind an untidy collection of outmoded buildings erected over the years as necessity arose. The new premises at Gracefield which were occupied at the end of last year are planned for smooth flow of work and quick handling. An acre of co-ordinated workshops and administrative buildings comprise two parallel 60-foot bays, each 300 feet in length, roofed over and serviced with a 5-ton overhead crane. There is a block of 4,750 square feet in area housing general offices, draughting rooms and staff facilities. New additions will soon be made to ac-

THE VULCAN OF NELSON STREET (continued)



**HARRY
BRAYNE**
(Auckland
Steel Sales
Manager)



**VAUGHAN
FIELDS**
(Manager of
the Reinforcing
Steel Dept.)

Jack Lothian (Manager) and Jack Atkinson (Chief Quantity Surveyor) examine a blueprint.



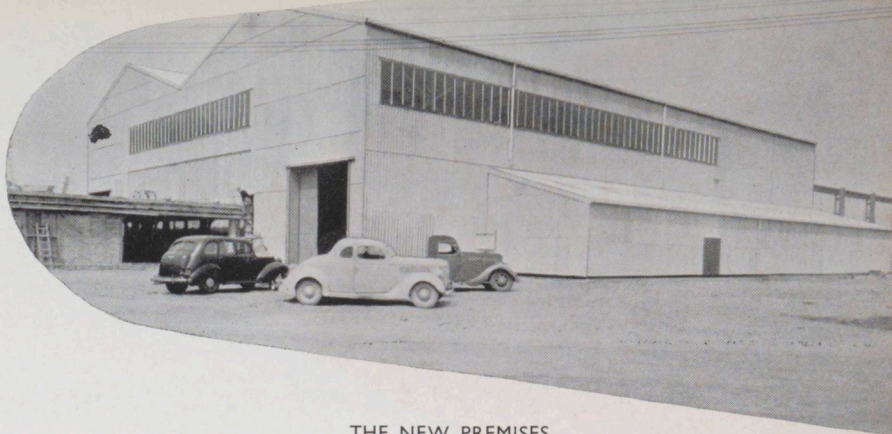
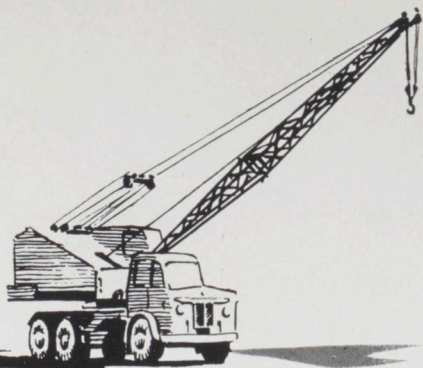
engineering workshops employing 27 fitters and turners are building all the troughing, return idlers, head and tail pulleys and "take-ups" for the conveyors to be installed at the Tasman mill. The rollers (or idlers) must run with a delicate smoothness while carrying heavy loads and the making of each unit using sealed ball races calls for high skill and exact precision.

There is an important Steel Sales Department which requisitions all materials for the workshops and collates requirements from all parts of the country. The Sales Department supplies steel to outside users and takes orders for shaping and bending to customers' requirements. Last year over 20,000 tons of steel was used and sold by Fletcher Steel throughout New Zealand.

Vulcan is already large by local standards, but this year extensive additions are to be made to the premises. Present facilities for the growing staff of engineers, draughtsmen and quantity

surveyors are overcrowded and it has become necessary to build 10,000 square feet of office accommodation, releasing the present office space for recreation rooms for employees. A new store for nuts, bolts and accessories will be housed in part of the new building, and the ground floor will be taken up with re-organised working bays. The present facilities for storing and handling steel are to be doubled by the addition of two new yards each with a 60-foot span gantry crane.

Vulcan is changing the face of Nelson Street.



THE NEW PREMISES
AT GRACEFIELD

commodate the reinforcing and engineering departments so that all operations will be gathered in one centre.

Originally a small section of the Fletcher Construction Company in Wellington, the steel workshops and yard were placed under the management of the late Andrew Fletcher and reorganised as a subsidiary registered as the Wellington Structural and Reinforcing Steel Company Limited. At that time Fletchers were building the Dominion Museum and Art Gallery, and the big gantry and overhead crane working on the site of operations were transferred to Cable Street as permanent installations on completion of the contract. The new company began outside contracting and broke away from its original function which was to do the reinforcing steel work for Fletcher Construction. A fabrication shop was opened, and steel stocks were augmented to supply other building firms.

Development of the business was rapid in the earlier years, particularly in the reinforcing steel department, which was equipped with modern power benders and cutters. It was not long before an extensive list of new clients, mainly building construction companies, were making use of the new service. In addition, Government Departments, Local Bodies and merchants began to rely on the large range of stocks carried by the steel company, and deliveries became regular to places as far separated as Invercargill and Whangarei. In the late nineteen thirties' the Railways Department began the systematic elimination of level crossings and the company was called upon to supply the reinforcing steel for almost every overbridge from Wellington to New Plymouth and Dannevirke. Deliveries were also made for many bridges built under the highways-improvement scheme on the West Coast of the South Island and in the Wairarapa and Southern Hawke Bay districts.

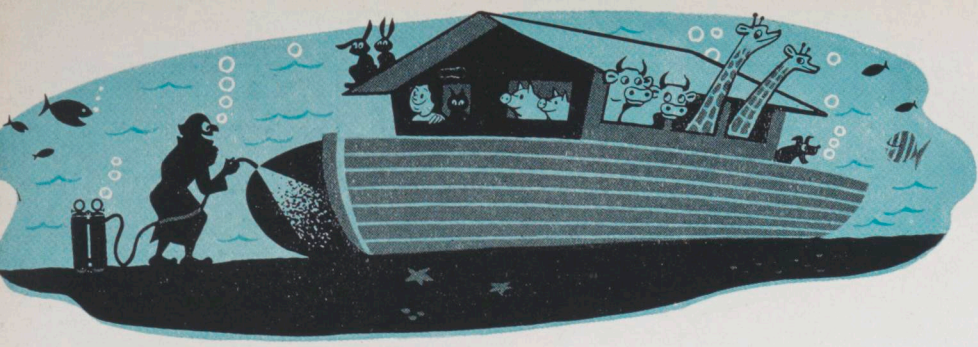
Numerous factory and commercial buildings, hospitals and schools have been erected with reinforcing steel from the Cable Street yards. The steel frames and reinforcing of some of the finest public buildings in the capital were executed by the company, notable among them the Wellington Public Library and the State Fire Insurance Building. More recent major jobs include the six-storey Smith and Smith block and the extensive additions to the Wellington Town Hall.

The structural shop, although somewhat restricted in the old premises, has played a prominent part in the development of the company and has undertaken some important steel-frame contracts including the De Havilland Aircraft factory

at Rongotai and the new Ford Motor factory at Lower Hutt. The new premises at Gracefield were of course constructed by the firm. Smaller contracts fabricated in the workshops have flowed out steadily and roof trusses, bridge girders and general ironwork have been supplied to a wide range of clients. In recent years substantial additions have been made to the plant including modern power saws, cold straighteners and benders, shearing and punching machines and rolls. Now that this equipment has been transferred to Gracefield the stage is set for increased output of structural materials.

Progress of this kind is not merely the outcome of better plant or larger workshops or even the swelling demand for steel and steel erection that has gone with the industrial expansion of Wellington. There have been able captains to guide and plan development and skilled and loyal workers to execute the high standard of work that is turned out. The late Andrew Fletcher is remembered as a far-sighted pioneer, and J. C. Watt who was manager up to 1951 saw the company through a vigorous stage of its progress. He was succeeded by E. G. Fleming who joined the company as a cadet in 1938 and who will have the satisfaction of seeing his organisation at last established in planned modern workshops equipped with the latest of machinery. The works manager, N. W. Sutton, joined the staff in 1946 as a cadet and at the age of 25 has risen to his present responsible position. W. J. Reidy who is Sales Manager came from the Vulcan Works in Auckland where he received his training as a quantity surveyor while studying for accountancy. The foreman of the structural shop is L. Terry, and the reinforcing shop foreman, who is due to retire after long service at the end of 1955, is W. Hodge. Structural steel erection is under the foremanship of G. Abbott, and the steel store is controlled by K. Bartlett, both of whom have been with the company for many years.

The Wellington Structural Steel and Reinforcing Company has changed its name as well as its premises. In the reorganisation of the Fletcher Group in 1954 all steel interests throughout the country were merged into one company, The Fletcher Steel and Engineering Companies Limited. The Gracefield works, although not as big as those in Auckland and Dunedin, promise to grow to the stature of its elder brothers. New workshops have given them an advantage and the zeal and aspirations of management and men hold out great hopes for the future.



D. R. K. Smith, the author of this article, is design and development engineer of the Dunedin works of Fletcher Steel. Born in 1929 he was educated in Dunedin and graduated at Otago University with B.E. (Metallurgy). In 1950 he went to Australia with Broken Hill Proprietary and studied at the Nuffield School there. Returning to New Zealand in 1951 he lectured for two years in metallurgy at the Otago School of Mines. He joined Fletcher Steel in Dunedin in March, 1953.

AUTOMATIC submerged arc welding

Technical jargon can be as baffling to the layman as a foreign language. Even an experienced engineer can go off on the wrong scent when a suggestive term like the one above crosses his trail for the first time.

When Fletchers first called for submerged-arc welders it was necessary to go outside New Zealand, and after cabling instructions to our London representatives, it was dismaying but perhaps not surprising to have a reply to the effect that welders were being tested in a diving tank 20 feet underwater.

Submerged welding has nothing to do with under-water conditions nor, as our artist has suggested, with Noah's Ark. A word of explanation is needed.

There are two common types of manual welding. One is done with an oxy-acetylene blow torch, which melts both metal and welding rod held in the flame by the operator, and thus fuses the metal surfaces to be joined. Arc welding is different in that the welding rod (or electrode) is melted by an electric arc passing from the rod to the work piece. In both cases the molten surfaces are kept in control by a thin coating of chemical flux, and the arc is exposed and harmfully dazzling to the naked eyes.

In submerged welding the tip of the

electrode is kept under a heap of powdered flux which is automatically poured on to the surface of the metal. The arc is thus "submerged" and the operator does not have to use protective goggles.

The term "butt welding" simply means welding two pieces of metal edge-to-edge, whereas "fillet welding" is the fusing of two right-angle pieces or welding into a "V" groove previously cut along the edges placed together.

—Ed.

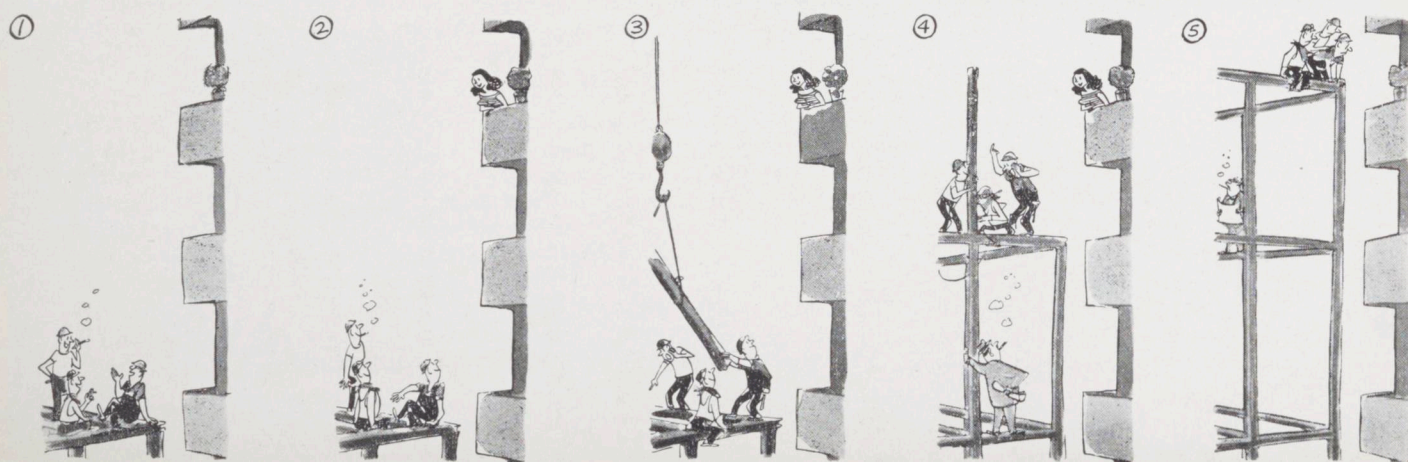
Fully automatic submerged-arc welding, as introduced last year into the Dunedin workshops of Fletcher Steel has now passed the trial stages, and is a fully developed technique.

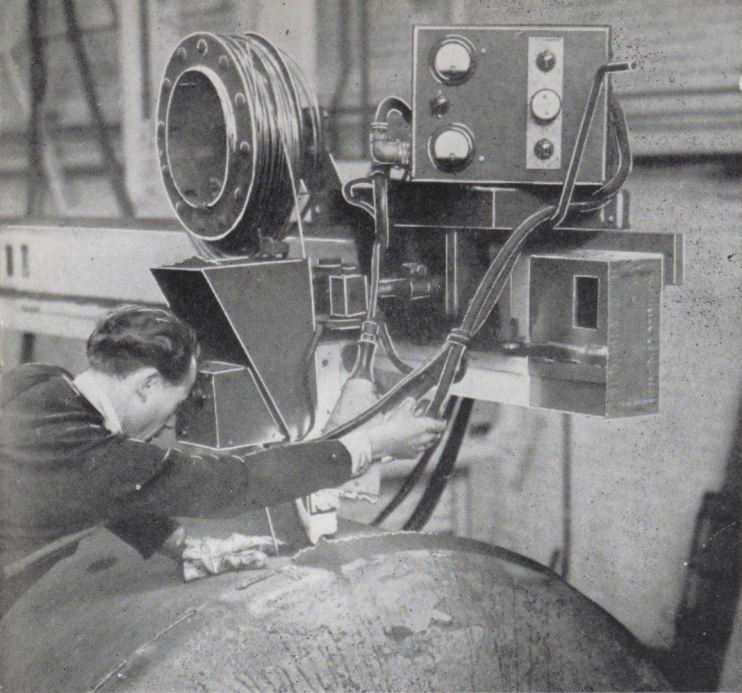
Other types of visual arc automatic welders have previously been used in New Zealand, and some semi-automatic submerged arc welds were being made, but on the penstocks at Roxburgh Hydro automatic submerged-arc welding was accomplished for the first time on a large scale in this country.

Essentially, the weld produced by these machines is the same as that made by manual welding—a wire electrode is fused in the electric arc with the metal of the job to be welded, and the molten pool is protected by a flux. With automatic welding, however, the elec-

trode is fed continuously, and the flux, instead of being a coating around the wire, is fed from a hopper as granular material. Welding takes place beneath the pile of flux, so that no arcing is visible, giving the process its name. The speed of the wire feed is governed automatically by the machine, when the operating voltage, amperage and travelling speed of the welder have been set by the operator. Once alignment of the machine on the seam to be welded has been made, only a press of the starting button and adjustments of the alignment are required of the operator.

The advantages of this form of welding are many. The granular flux will retain a large pool of molten metal which allows the use of high currents and welding speeds, and gives deep penetration. Wire electrode sizes vary from 5/64 in. to 7/32 in. diameter, using currents up to 1,200 amps., or about 4 times the usual maximum current for manual welding. Speeds are extremely fast—a 3/8 in. fillet, normally deposited in three runs by a manual welder, can be laid down in one run at 26 inches per minute. In making butt welds, it is unnecessary to prepare edges of thicknesses less than 1 in. Even up to 1 1/2 in. plate can be welded with one run each side at 6 to 9 inches per minute, while 1/4 inch plate is welded at 48 in. per minute. Only semi-skilled





operators are required for the machine, which requires occasional checking of voltage, amperage and line up, although some experience is required for the introduction of new procedures which must be fully tested on test plates before application to the job.

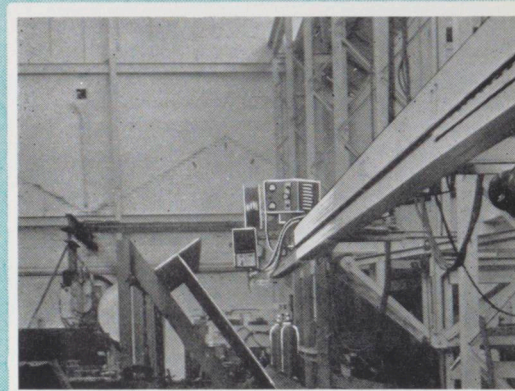
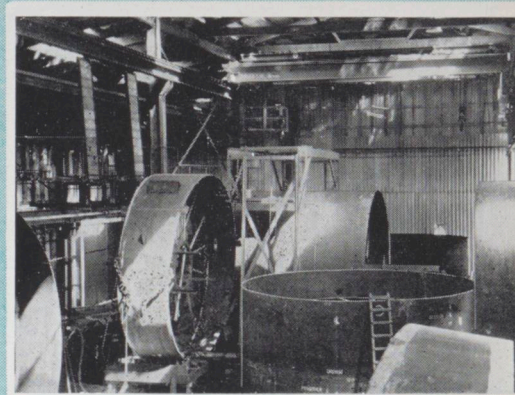
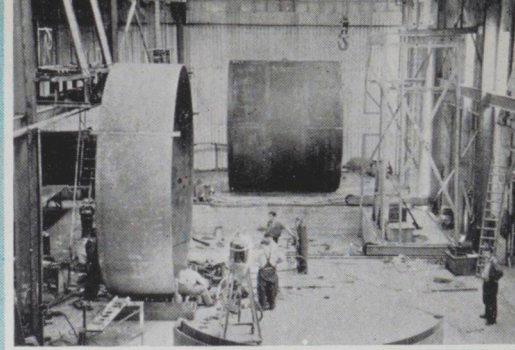
On the Roxburgh penstock contract there is 21,000 lineal feet of butt welding in plate ranging from 5/16 in. to 1 3/8 in. in thickness. All butt welds are made automatically, as well as a large proportion of the 33,000 feet of 1/2 in. and 3/8 in. fillet welds. The economies of this form of welding are shown in the welding of a 57-foot circumferential weld in 7/8 in. plate around the 18-foot diameter penstock. Manual welding would require approximately 90 man-hours. Automatic welding requires 16 man-hours, of which the actual machine

★ Above Left:
Automatic welding of a 7-foot diameter digester. The machine is aligned on seam to be welded and operator sets speed. Flux powder can be seen pouring from hopper to cover electric arc.

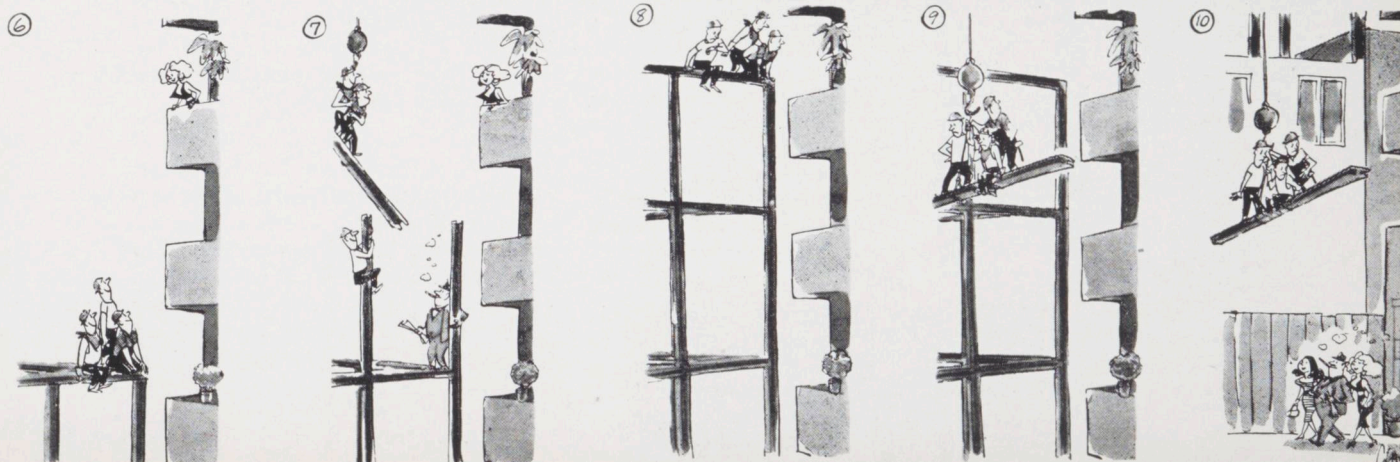
★ Top Right:
PENSTOCK FACTORY AT ROXBURGH: Automatic welding on longitudinal seam of a ring. A completed section in the background awaits sandblasting.

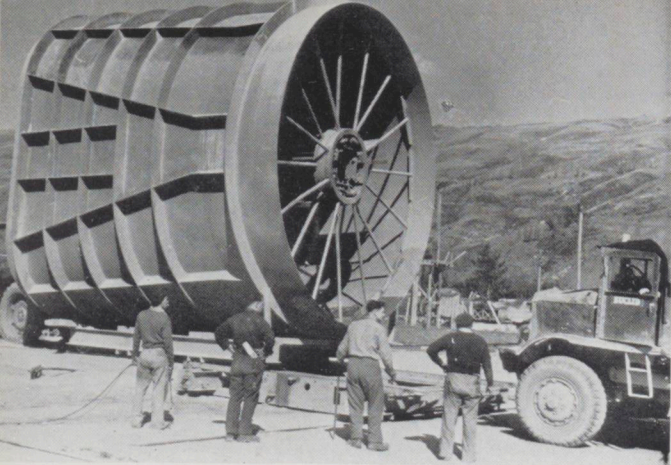
★ Centre:
Some of the 18-foot diameter rings being welded. Rings are assembled into sections by automatic welding in rotator shown above.

★ Bottom:
DUNEDIN WORKSHOPS: Automatic welding of fabricated beams for Mataura bridge, Gore.



Cartoon from "The New Yorker"





Transition section of Roxburgh penstocks built up and ready for installation.

welding time is $1\frac{1}{2}$ hours—45 minutes for the inside run, 45 minutes for the outside.

All butt welds are subject to radiographic examination, and rejections so far amount to only $1-1\frac{1}{2}\%$ of the total footage, a performance which has not been equalled in New Zealand before. The Roxburgh penstock contract is also noteworthy for the fact that reported accounts of overseas penstock fabrication do not describe any automatic welding of bend sections, as has been accomplished on this job.

In Dunedin workshops, an automatic installation has completed 20,000 feet of $5/16$ in. fillet welding on beams for the new Mataura Bridge at Gore, where welding times were reduced to one third. A start will shortly be made on fabricated girders for the Waipaoa Bridge in the Gisborne district. Several

digesters and pressure vessels have also been welded to the specification of the Marine Department.

Although the reduction of edge preparation and the speed of automatic welding are obvious advantages, the process suffers from several disadvantages. All work must be done in a downhand position, thus limiting the application of the welder for certain positional work. The machine itself is an expensive unit as is the ancillary equipment — rotators for welding cylinders, or the welding beam on which the machine runs when welding bridge beams. Setting up times for some jobs are long, and, consequently, only on long lengths of welding where stops and starts are reduced is the machine worthwhile. The biggest disadvantage is the increased standard of boilermaking which is required. Any

occluded dirt will produce defects in the weld, and therefore all edges must be dressed by hand grinding to remove scale. Fitting edges must be reasonably well matched in butt welds, as the high amperages used will cause a “blow through” if a gap is encountered. The high standard of workmanship involved offsets to some extent the savings produced by faster welding. Some metallurgical difficulties are also encountered because of the composition of certain steels making the welds susceptible to cracking.

But despite the disadvantages there is an extremely large field of work for which the machine is admirably suited. On long lengths of fabricated beams automatic welding is definitely an advantage, while its use on penstock work is a well established field. Where work to radiographic standards is required, as in welded pressure vessels, the uniformity of an automatic welder is a definite advantage over manual welding. In New Zealand there is considerable scope for boiler work to Lloyds Class 1 standards, as no shop is at present equipped for this work. Automatic submerged-arc welding has definitely gained for itself a place in our welding techniques for structural steelwork.

FAREWELL AND GOOD LUCK



P. M. MUSKETT

P. M. (Phil) Muskett, Sales Director of Fletcher Industries, left us on 1st February to set up in business on his own account as a Manufacturers' Representative in Auckland.

Phil, who has been with Fletchers for ten years, joined the Company in Wellington as a salesman. He became Branch Manager in Wellington and was subsequently appointed General Manager of Dominion Sales Corporation in Auckland, going over to Fletcher Industries at the time of the re-organisation. Phil's cheerful determination was a very important factor in building up our sales organisation and his knowledge and understanding of the building industry and its problems and selling, generally, was first class.

He has decided that there is a lot of scope in handling certain products and lines which Fletchers themselves cannot satisfactorily service, and we all wish him well in his new venture.

Older hands will recall that Phil played senior football in Napier and was a very active sportsman on the North Shore in the rugby, rowing and tennis circles. Over recent years he has given up more active sports in favour of the more frustrating varieties and if he is not pushing his lawnmower in the weekend at 100 Upland Road, he is sure to be seen birdwatching on the Titirangi golf course.

A farewell function organised by the Sales Division was held in the Board Room at Penrose on January 28th and on the following Tuesday evening, Phil and a group of friends and associates were invited to “Scotswood” by J. C. Fletcher for a farewell party. The staff presented him with a portable typewriter and he received a canteen of cutlery from the management.

Good luck, Phil! We hope to see plenty of you.

STEEL FROM AUSTRALIA

BHP

(This article has been prepared by Broken Hill Proprietary Company Limited.)

Although "B.H.P." is now synonymous with the Australian steel industry, the Company was, in 1911, still engaged in the mining and smelting of silver, lead and zinc. Outwardly there was little indication that within four years it would begin business as iron and steel masters with one of the largest plants in the British Empire.

Since 1885 the Company had extracted from its mines 1,456,194 tons of lead, 623,919 tons of zinc together with 190,081,979 ounces of silver and 102,857 ounces of gold. But mines are wasting assets and, long before the mineral reserves were reaching exhaustion, the directors, considering how best to employ their resources to the Company's advantage, sent their general manager abroad in 1911 to investigate iron and steel manufacture.

Construction was begun as soon as possible, and the commencement of operations at Newcastle Steel Works with the blowing-in of No. 1 Blast Furnace on 9th March, 1915 was indeed providential. The 1914/15 steel ingot production of 86,000 tons proved a valuable contribution to Australian war production. The plant embodied the best features of modern overseas steel works on a site determined by the proximity of coal measures and port facilities, although the ore had a long journey from South Australia.

The war increased the demand for steel, but reduced the tonnage coming into Australia, and the Company pressed ahead with expansion plans so that, by the end of the war, steel ingot production had almost doubled to 167,000 tons. Government assistance by tariff protection helped the Company through the difficulties of 1921-23. During the 'twenties' the Company's shipping fleet was built up and collieries were acquired to stabilise fuel costs. In 1924 production rose to 330,000 tons of ingots, but dropped in 1931-32 to 195,000 with the onset of the depression.

Meanwhile Australian Iron and Steel Ltd., which in 1928 had established an iron and steel works at Port Kembla just south of Sydney, merged with, and became a subsidiary of B.H.P. in 1935. With elimination of unnecessary duplication of plant and effort at these two

works, more balanced production soon increased Port Kembla's ingot output from 140,000 to 400,000 tons per year. With the object of creating a demand for its own products, B.H.P. had by then increased the number of its subsidiaries to eight.

At the outbreak of the 1939-45 war Australian yearly ingot production had reached 1,250,000 tons, while five blast furnaces were annually providing slightly more than one million tons of pig iron. The mine at Broken Hill finally closed in 1939 after yielding minerals worth £160,000,000 during its life, but at the same time work began on a blast furnace at Whyalla near the South Australian ore deposits, a feasible proposition in a coal-less area only because technical development had cut coal consumption from 3½ tons to 1½ tons per ton of pig produced.

War hastened the transition of Whyalla into South Australia's first centre of heavy industry, so that by 1941 both the blast furnace and a shipyard were ready to play a part in Australian defence, an example of regional development and decentralisation. Today the Company's own fleet numbers 13 vessels, seven of which were built at the Whyalla yard, Australia's largest. Other vessels are maintained under charter.

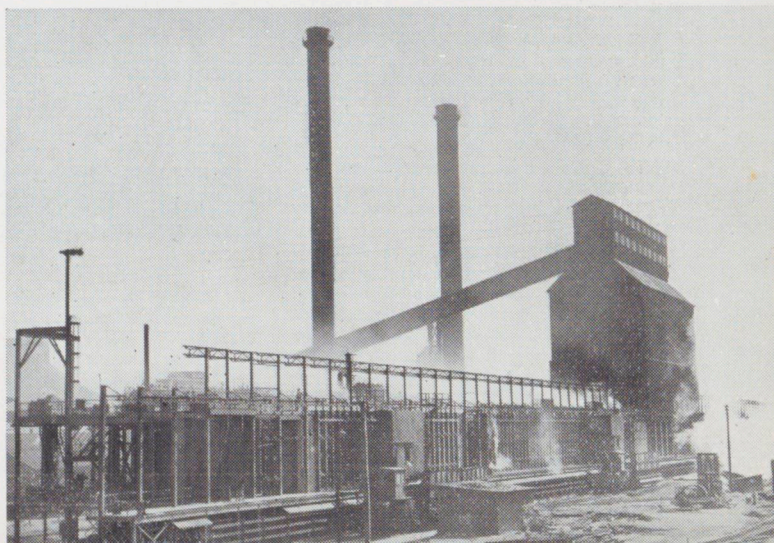
Whereas Australia's most important contribution to the 1914/18 war had been man-power, it soon found itself in the next war with almost all the essentials of a full-scale defence programme. Perhaps more noteworthy

than production increase was the way in which the steel industry became almost self-sufficient by successfully undertaking manufacture of materials which could no longer be imported such as ferro-alloys, tungsten carbide and magnesium.

In the nine post-war years the steel industry has featured in the unprecedented expansion of Australian manufacturing showing a rise of 79% in pig production and 86% in ingot steel figures. For several years after the war the Company found great difficulty in obtaining workers to man existing plants, let alone build new ones, but nearly £50,000,000 has been spent on new capital works since 1945 to lift last year's ingot production to more than two million tons.

In these years the annual wage bill soared by 325% to £26,000,000 covering 29,000 employees. Small wonder that several increases in steel prices have been necessary. But Australian steel still retains a price advantage—a tribute to the sound foundations on which the industry rests.

The main centre of post-war activity has been Port Kembla, where an overall production increase will culminate in the rolling of wide strip in 1955 to help Australian industry meet a growing demand for such goods as cars, refrigerators, rolling stock and eventually tinplate. Production from the first unit (the plate mill) began early in 1954 and when finished the project will have an annual capacity exceeding one million tons.



The new battery of coke ovens at the Port Kembla Works of B.H.P.

Personalia



AUCKLAND

HATCHED: Boys to Mr. and Mrs. J. H. McCoskrie of Head Office, to Mr. and Mrs. W. Metcalf of "Vulcan", and to Mr. and Mrs. H. W. J. Watson (Nelson St. Joinery).

MATCHED: Marilyn Sutton to Edwin Garchow (Oamaru) on 12th February. Mr. and Mrs. V. Manoloffe ("Vulcan"), who were married in February. Daphne and Arthur Wright at Auckland on 29th February. Lenie Koopmans, who became Mrs. Bylsma on 6th January.

Ngairé Broad and Brian Bell were married on 26th February.

Congratulations to them all and to apprentice, Gilbert Hall, who received a presentation Parker 51 from Fletcher Timber for his excellent exam results last year.

WELCOME: Trevor Ganderton has joined Sales & Services as Branch Sales Manager. Also Walter Loveday and Peter Grant, both Quantity Surveying Cadets; Edward Emmer-ton, draughting cadet; Graham Leech and David Wilson, who have joined the staff of the Penrose Office; George Kelly (Sales & Services); Malcolm Urquhart (Fletcher Timber) and the following new apprentices to Fletcher Construction:—Donald McLeod, Robert Smith, Selwyn Harris, John Ellis, James Clark, Richard McKinnon, Douglas Mercer, Alan Reid, Noel Smith, Barry McKinnon, William Rerekura, Alex Woodhead, Graeme Ward, Eugene Holder, James Tattersall, Robert Bourke and Ivan Unkovich.

PLYWOOD LAMINATIONS: Eighty revellers made the Christmas break-up a bright occasion. The Samoan boys arrived with their guitars and set the balloons be-bopping. The children's party drew 65 kids from near and far to pull the whiskers of "Mac" McGrath. Ted Cave and Bill Bell looked very proud of their grandchildren.

SPARKS FROM "VULCAN": The children's Christmas party was held at the Trades Hall on 18th December. Father Christmas in the person of Glen Davis distributed gifts to 104 children from a gaily decorated tree supplied by Rex Running. There was ice-cream and "pop" for the kids, and tea for the parents.

SALES TALK: Brian Stewart has gone to Christchurch to take over the position of South Island Sales Manager. Reg Bradley has left.

TIMBER TATTLE: Dick Perham, who was manager of the Rangitaiki Mill and more recently timber co-ordinator at Rotorua, has taken up the position of Assistant Mill Manager with "Tasman" at Kawerau. Ken Bendall is to take his place in Rotorua.

OFFICE DILEMMA: What would you do if a lady, who drives a lot and smokes a lot, lost her lighted cigarette down her *decollete* while you were seated behind her doing 40 along the Gt. South Road? The answer, says Galahad, is that—the lady's not for burning.



Norm Wells chatting with W. A. Bourke (left) Managing Director of Fletcher Timber, and Tom Solomon, Manager of Nelson Street Joinery (right).

FAREWELL TO NORM. WELLS

Norman Wells, foreman of Nelson Street Joinery, has retired after 25 years service. Mr. J. C. Fletcher and executives of Fletcher Timber came to say goodbye at the send-off party which had been arranged. After the presentation and the speeches the Christmas spirit took over.

Born at Devonport, Norman, who is 67, recalls that he used to come over to the city every morning on the paddle boat which took up to an hour and a half in rough weather. If passengers crowded to the port side, the starboard paddle would lift out of the water, causing the ferry to go round in circles. With the skipper frantically yelling orders to passengers and crew from the wheelhouse, they used to arrive somehow at the Queen's Wharf in time for work.

Norm will remain in Auckland where he has his home, but plans to tour the South Island Lakes before settling down to enjoy a well-earned rest.

KAWERAU Correspondence

(From Rex Moyle of F.C.C.)

We closed the year with a Hangi. Some of our Maori staff prepared the pigs and x gallons of XXX Ale were tapped. Contrary to expectations, no one fell in the river.

On Christmas Eve a motorised Leprechaun toured the town with a loudspeaker at a late hour. Sleepy residents were summoned to the Christmas tree, where songs and dances went on until dawn. One of our U.S. associates was heard to say, "Hell, I thought the Russians had landed."

And now, like Shakespeare's schoolboys, everyone has crept unwillingly back. Manager ('Splice the Main Brace') Bourke sojourned in Auckland as did accountant Carl Ryan. John Potts tried out his expensive fishing tackle at Taupo, but gave up after three weeks without a bite. Peter Risbridge called back at regular intervals from Ohope, The Mount and Waihi for further "supplies", usually accompanied by a different "cousin". Pay officer, Graham Fenton is now the proud father of a daughter. Ernie Johnston took the road in his 8 h.p. "Bucket of Bolts" with two nervous passengers who, upon arrival at Auckland, were resuscitated and treated for shock. Ernie has now taken off to supervise the 50-house job at Kaingaroa. Peace reigns again.

PARAGRAPHS FROM PURCHASING

Auckland's Purchasing Department sports a nightingale. Pat Price has been voted Lady of Song in Ossie Cheeseman's popular radio programme. Congratulations, Pat—when we cast our vote we really meant it, and maybe Seagar Patten's suggestion that we have a piano in Purchasing has merit.

Ted Kane's transfer to Purchasing to look after the overseas section is welcome. Congratulations on your new appointment, Ted. Congratulations also to Dave Lewis on his marriage and welcome to Donald Grigg our new Wellington cadet.

Taking on chances on Wellington's weather at Xmas, a contingent of our Kaiwarra friends invaded the Queen City. It was good to see you, Alan Wilson, Bill Curgenven, Derek Atkins: actually, just prior to your arrival, the weather at Penrose was clear and sunny.

Buyer Fred Lewis—engineer draughtsman at Rolls Royce U.K. before coming to New Zealand—lectures at University College in his spare time. That's telling 'em, Fred!

WELLINGTON Wisdom

(From Alan Wilson)

WELLINGTON ENTERTAINS: The kiddies and mothers—also Dad, at a picnic at Maidstone Park. Christmas presents were given to all the children and, in spite of the dull day, a good time was had by all.

Managers, foremen and leading hands of all companies had a "smoko" arranged by the "evergreen" Bill Curgenven—a grand night. Highlights of the evening were: Joe Craig's speech in reply; Bob Arkley's solo inspired by Dr. Mazengarb; Bill Curgenven's new invention, a machine for getting rid of dirty glasses—it breaks them!

WELLINGTON WELCOMES: Mat Martin and Don Grigg, who have joined the Purchasing Division; Gordon Bloomfield back from England; Ken Hogg, Arthur Bradley and Mr. McKay-Campbell who have joined us at Kaiwarra; Noel Crowley, traveller for Fletcher Timber; Miss Vercoe and last but not least Ray Berry, who comes from Christchurch to be Branch Manager of Fletcher Construction. Jack (Colin) Watt is setting up our new designing office.

WELLINGTON FAREWELLS: Evan Langley and wishes him well in Christchurch; Myra and Graham Cawthorn who are leaving us to go to Putaruru.

This 40-foot high Christmas Tree was "planted" in the Handyman's Yard, Penrose. From this vantage point it could be seen by holiday traffic approaching and leaving Auckland—a colourful greeting by day and night.



WELLINGTON CONGRATULATES: John and Chris Stewart (nee Craig) on the birth of a daughter; Margaret Galbraith on her marriage to Roy Wiffen; Miss Gabites of Purchasing on her marriage to Roland Waring-Flood; Len Burgess of Sales Division on his engagement to Miss R. C. Whalen of Dunedin. Also the three grandfathers—Auckland's Alec Craig, genial Don Bryce and Basil 'everybody's friend' Hanify.

GENERAL: The office extensions are proceeding apace and Jack Lobb promises to have us in early in the year.

CHRISTCHURCH News

(From Toby Buttery)

CONGRATULATIONS: Our best wishes to Jack Greenwood (Fletcher Construction) on the birth of a son; C. E. Fagan on the addition of another boy to his family; E. Buckner on the birth of a baby girl; and V. M. Lester on the birth of a son.

WELCOME: In Christchurch we gladly extend a hand to the following new arrivals: Barry Holland, Michael Shaw and Dawn Buist who have started their careers as juniors in our accounts office; Royce Payne who has started in the office of Plywood (N.Z.) Ltd.; and Dennis Harney, who is commencing his duties with the Purchasing Division.

SOCIAL EVENTS: The annual Christmas party for children and the Christmas festival dance were both outstanding successes. At the party over 500 presents were distributed and about 400 parents were entertained by the Social Club.

DUNEDIN Diversions

(From Don Chisnall)

WEDDING BELLS: Betty Healy joined ranks with Tony Van Zanton at Milton on the 15th January. Vivian Allan was married to Ron Gilbert at Queenstown also on the 15th January.

BIRTHS: Recently announced are additions to the families of Messrs. W. McCorkingdale, W. Lapham, D. C. Brown and S. J. Wilson.

TRANSFER: We still hope to see quite a bit of Tim Kearney, as he has not been shifted from Dunedin.

RESIGNATIONS: Gordon Phillips who has the Central Hotel at Arrowtown. Good luck in your new venture, Gordon. Mrs. Van Vugt who has now settled in her own home takes wishes with her for a happy home life.

WELCOME: N. Davidson and J. McDonald, Miss R. Walker and Miss E. Christian.

A staff function was held at the Caledonian Club on the 21st December, about 80 persons being present. Bob Wright officiated as Master of Ceremonies and Eric Edwards provided the music for the dance which followed. Mrs. Lennox presented all the ladies with a small Christmas token.

A Christmas Party was also held at the new store in Irvine's building by the Social Club of the Plumbing Division—70 children, attended by their mothers, were present for a Christmas Treat, complete with a decorated and well laden Christmas Tree. Father Christmas, attended by two clowns, presented each child with a gift. Ice-cream and other goodies were available for the children and afternoon



We quote from a letter sent by the Manager of the Export Department of British Iron & Steel Corporation Limited, London:—

"the first issue of your staff magazine has been read with interest by many of us here. We trade in steel with most countries in the world and too often we have only a slender knowledge of our clients. If I may take the liberty of paraphrasing the message of your Chairman of Directors,

"As I see it, *Arrowhead* will be telling us where you are going as a Company—telling the boys in Britain's Steel Industry what your boys are doing, and informing us about what you make and build and how you do it." —COLIN SMITH

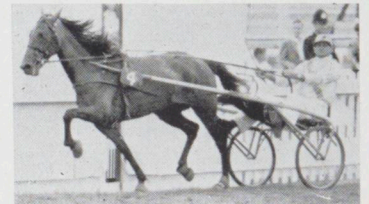
"Whilst appreciating the fact that Fletchers are expanding rapidly in New Zealand, I have yet to see in your publication a word of mention about the sterling efforts of Jim Espie and his staff in Sydney.

To put ourselves on the map so to speak I would like to see some small mention of the Australian ventures put before the New Zealand staff.

Wishing your Magazine all the best and regards to all my old friends in New Zealand."

"BLUEY" WHITTLESTON

Australia will go on the map in our next issue.—ED.



ROYAL RING

EMPLOYEE'S HORSE WINS FOR THE THIRD TIME

Royal Ring, a 5-year-old gelding, owned, trained and driven by Fred Spyve of Plywood, paid £42/18/- for a win at Epsom at the Christmas meeting. The race was the two mile Oak Handicap for straight-out trotters.

tea was provided for the ladies. Thanks are due to Mr. J. S. Fletcher for his generosity in making a contribution to the Social Club. This party, held six months after the Club was formed, follows two successful social functions for the men only.

The local Fletchers' Cricket Club have so far had a pleasant, if not successful season, having lost a recent game to A. & T. Burt Ltd.—the score being 101 to 107; our highest scorer Bill Pullar with 33 runs; bowler of the day was Hughie Day with five wickets for 14 runs.

The Bowling Club are busy cleaning up their bowls in preparation for the game with the Love Construction Company, Port Chalmers, for the Love Cup. This has been held for two seasons now by our team and hopes are high.

