

A technical drawing of a mechanical assembly, possibly a pump or valve, is shown in the background. The drawing is a line drawing on a grid, with various components labeled with letters and numbers. The main title 'Knowledge, Service, Products' is overlaid on the top left of the drawing.

Knowledge, Service, Products

The history of Spirax-Sarco
Engineering plc

SPIRAX - SARCO LTD.
CHELTENHAM GLOS.

Nigel Watson

**Knowledge,
Service,
Products**

Knowledge, Service, Products

**The history of Spirax-Sarco
Engineering plc**

Nigel Watson



**PROFILE
EDITIONS**

Acknowledgements

I was delighted to be asked to revisit the history of Spirax Sarco which I wrote nearly 20 years ago. I must thank Sarah Peers for being my guide and helping me to locate all the necessary material and contact the key people who have contributed so much to this latest version. I would therefore also like to thank the following: Nicholas Anderson, David Ashton, Chris Ball, Richard Barton, Heather Beale, Alan Black, Celine Bodhuin, Leandro Cobas, Neil Daws, Dawn Dukes, Darren Etherington, Phoebe Field, Tim Fortune, Chris Gadsden, Simon Gegg, Mick Gill, Steve Gow, Alistair Green, Martin Johnston, Tim Kent, Hyunjung Kim, Graham Marchand, David Meredith, Linda Morley, Gisele Nishino, David Northcroft, Justin O'Dowd, Lutz Oelsner, Bernard Parkin, Maria Paula Pasika, Tony Scrivin, Phillida Shaw, Marcus Steel, Chris Tappin, Helen Trebell, Tony Urbani, Mark Vernon, Jay Whalen, Bill Whiteley and Joan Yang.

Nigel Watson
May 2019

Nigel Watson has been writing corporate histories for more than 35 years. His clients have included leading family businesses and international corporations in a wide range of sectors. More information can be found at www.corporatehistories.org.uk

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Foreword

It is 20 years since Nigel Watson first visited the history of Spirax Sarco. Since that time Spirax-Sarco Engineering plc has grown and changed significantly. New companies have been established or acquired, new territories entered, new technologies developed, new Directors employed, new strategies implemented and new investments made. Watson-Marlow, which joined the Group in 1990, was too small to warrant a mention in the last history, but by 2016, when the idea for this book was first conceived, Watson-Marlow accounted for a quarter of the Group's revenues and over a third of its profits. In 1999, the Group employed 3,500 people. Today, that figure has risen to 7,500 people. While firmly retaining its British base, 75 per cent of Group employees are now based outside of the UK, in over 60 countries, with 57 per cent of them working in countries where English is not the native language. It was time for a new history to be written.

This new history is not an update of the old one, the story remaining the same and the intervening years added. This is a fresh, new exploration of the growth and evolution of the Group as a whole. A quote widely attributed to Leonardo da Vinci states, 'It had long come to my attention that people of accomplishment rarely sat back and let things happen to them. They went out and happened to things.' The history of Spirax-Sarco Engineering plc is just that; it is a history of action, a history of change, a history of people unwilling to let external circumstances dictate the fortunes of the business. It is a story of success, with some failures scattered along the way. It is a story masterfully told by Nigel Watson, who has distilled the essence of our complex history into an interesting, engaging and informative read.

Nigel was given free and full access to the Group's archive. Spirax Sarco has not sought to influence

what he has written, the views that he has formed or the history that he has portrayed. Where feedback was given on the manuscript it was to shed light on, and provide additional information about, key events in the Group's history. This history is, therefore, Nigel's. Many current and former employees have generously volunteered their time during the preparation of this book, not least our Group Corporate Communications Manager, Sarah Peers, whose love of history helped to bring this book about.

For the last 130 years, the history of Spirax-Sarco Engineering plc has been shaped by successive generations of managers who steered the Group through periods of prosperity and calm, as well as the turbulence of two world wars, local and global financial crises, and social, political, economic and technological change. This history recognises by name many of those who dedicated so much of their working lives to furthering the prospects of the Company. Largely unnamed and thus unrecognised, however, are the numerous employees of the Group, both past and present, whose hard work, innovation, ideas and skill laid the foundation for much of the Group's success, and will continue to shape the Group's future.

This book is written as an acknowledgement and a thank you to all of the Group's employees, past and present. From the youngest apprentice to the oldest retiree, from those in the most junior positions to the most senior, from the machinist on the factory floor to the sales engineer, from the marketing executive to the finance manager, you are all part of this story of success; thank you.

Nicholas Anderson
Group Chief Executive,
Spirax-Sarco Engineering plc
May 2019

1
STEAM
INLET

SPIRAX 1½" FIG. 1 STRAINER

Spirax-Sarco Engineering plc

STEAM TO SIZE
TANK COIL

SPIRAX ¾" FT 64"
"SLR.A" TRAP

SIGHT GLASS

CONDENSATE
FROM SIZE
TANK COIL

SPIRAX ½" NO. 8 TRAP

SPIRAX ½" FIG. 1 STRAINER

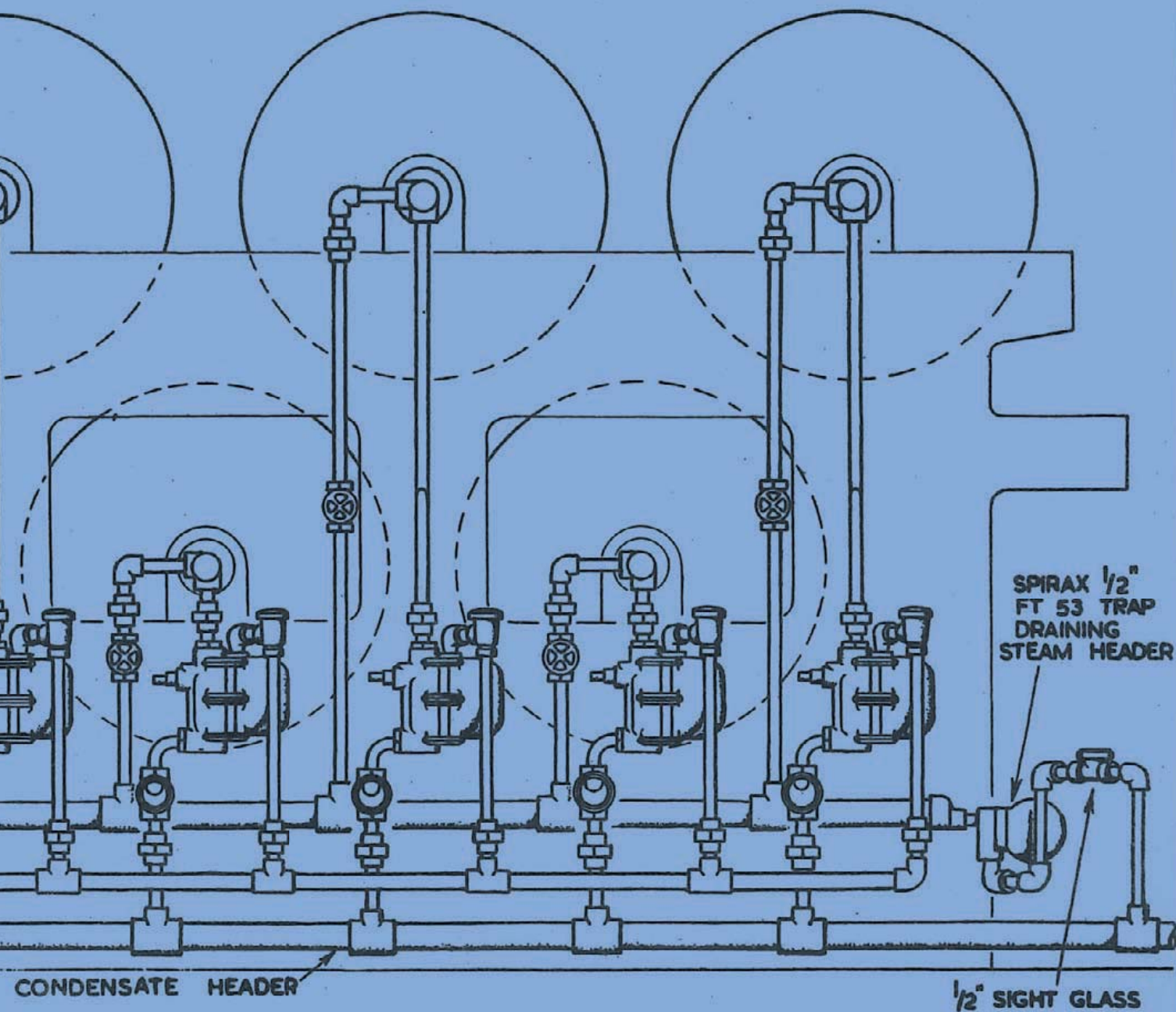
SPIRAX ½" SIGHT GLASS

SPIRAX ½" AIR VENT
FIG. 1

SPIRAX SYSTEM UNITS
ON RAYON WARP SIZING MACHINE

(MAKERS - THOMAS HOLT LTD. ROCHDALE)

AS WATER MAY BE MOMENTARILY DISCHARGED FROM THE AIR VENTS WHEN STARTING UP, THE OUTLETS ARE SHOWN CONNECTED TO A MANIFOLD LEADING TO A DRAIN OR SIMILAR.



SPIRAX - SARCO LTD.
CHELTENHAM GLOS.

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8FIRAX
SARCO

8FIRAX
SARCO
DN200/50 PN16
EI-US1025

‘The Group employs over 7,500 people worldwide, serves more than 100,000 direct-buying customers, and has over 1,500 core product lines’

On 15 May 1959, Spirax-Sarco Engineering Ltd became a public limited company, with its shares quoted on the London Stock Exchange. However, the Group is much older than that, and can trace its origins back to 1888, to a small firm of general merchants founded in the City of London.

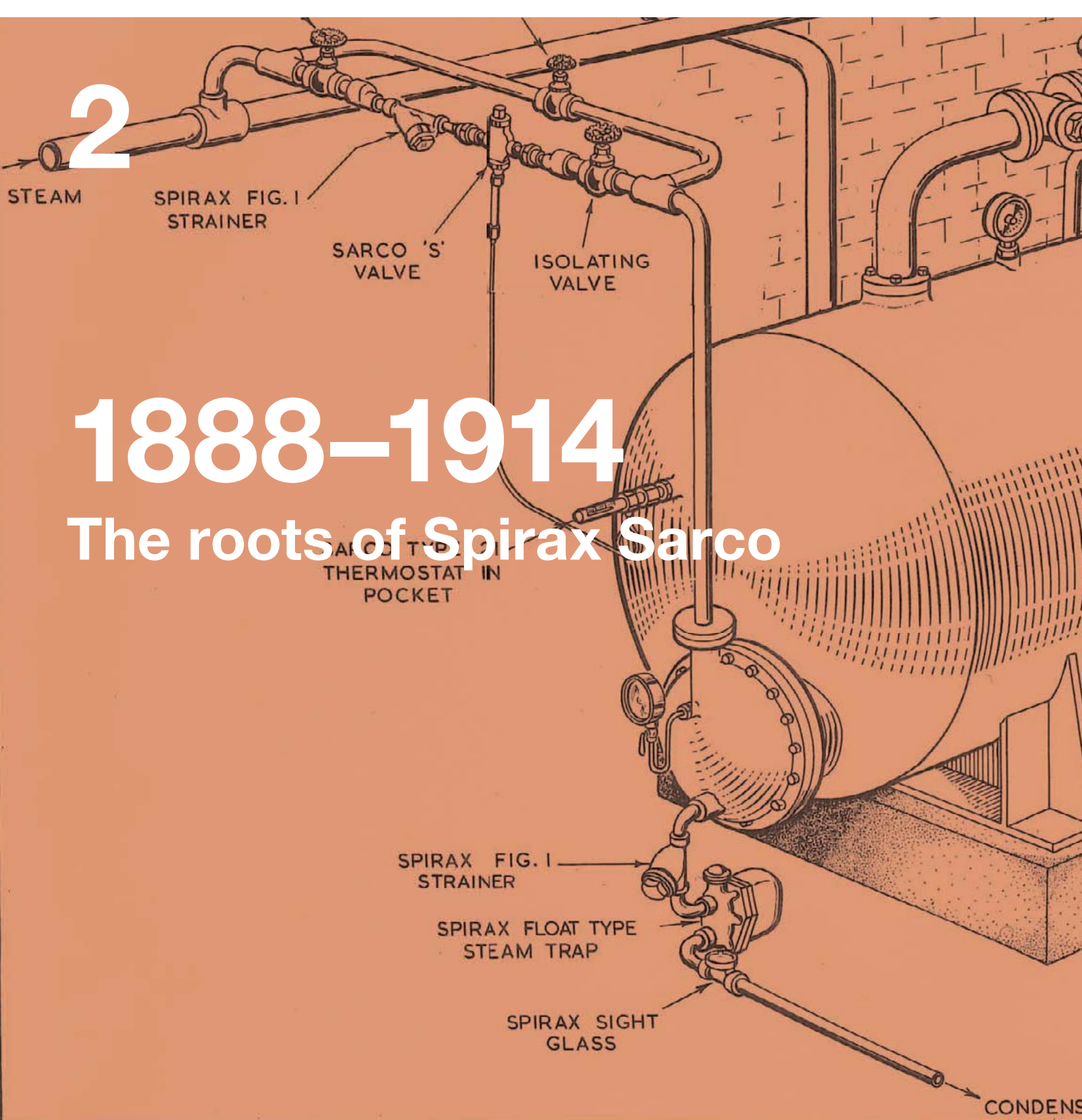
By the end of 2018, 130 years later, Spirax-Sarco Engineering plc comprised three world-leading businesses: the Steam Specialties business, made up of Spirax Sarco and Gestra; Chromalox, for electric thermal energy solutions; and peristaltic pumping and associated fluid path specialist Watson-Marlow. The Group employs over 7,500 people worldwide, serves more than 100,000 direct-buying customers, and has over 1,500 core product lines. There are more than 120 operating units in 47 countries, and the Group has a direct presence in 62 countries, covering a diverse array of markets, from food and beverage, oil and gas, chemicals, and pulp and paper, to pharmaceuticals, biotechnology and healthcare. The Group has annual sales of more than £1.15 billion, returning profits of £265 million, and is acknowledged internationally as the leader

in its fields. Yet it still has immense opportunities for growth, having just a 14 per cent share of its aggregate worldwide markets.

The story that follows traces the global development of the business from the first imports of German-made steam traps into the UK, to more recent expansion into new markets in countries such as Myanmar, Peru and Indonesia, and the addition of new businesses and technologies. It also highlights some of the enduring and evolving characteristics of the business, from the hugely successful way it has utilised its philosophy of direct selling, the long-term vision of successive generations of managers and the central importance that the Company places on recruitment, education and training. Equally important are strong relationships, not just with customers but also among people within the Company all over the world. Taken together, these factors have given the business its characteristic resilience to the roller coaster of world economic events of the last 130 years and position the Company well to continue to grow and develop into the future.

Opposite: Manufacturing of condensate return pump packages, Spirax Sarco China, 2017

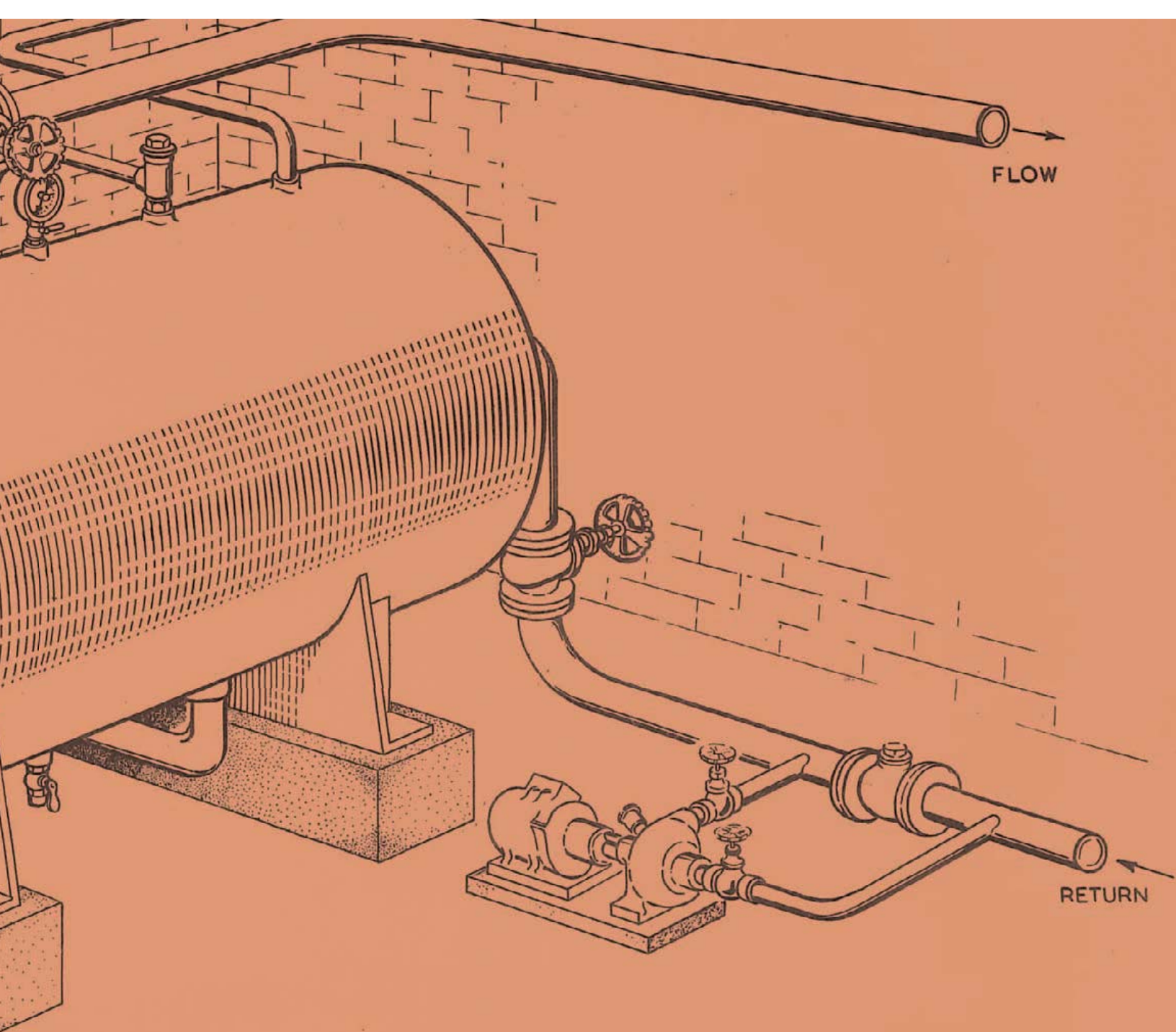
2



1888–1914

The roots of Spirax Sarco

SARCO TEMPERATURE CONTROL AND SPIRAX STEAM TRAPPING EQUIPMENT ON H.W.S. STORAGE CALORIFIER
(PUMPED SECONDARY CIRCULATION)



DATE

SPIRAX SARCO LTD.
CHELTENHAM GLOS.

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‘The “Sarco” name was derived from an abbreviation of the firm’s name (taking “Sa” from Sanders, “r” from Rehders and “co” from Company)’

In the late 1880s Fenchurch Street was a thriving commercial thoroughfare in the heart of the City of London. Every morning office workers spilled out of the trains coming from east London and south Essex into Fenchurch Street station. Many of them were heading for some of the handsome, recently constructed, purpose-built blocks of offices just minutes from the station. One of the buildings was No. 108, all red brick and stucco, seven storeys high, rooms well-lit by windows of ample size, built in 1886, and situated on the corner of Fenchurch Street and Fenchurch Buildings. Fenchurch Street was going up in the world. New blocks like No. 108 were making it a desirable commercial address.

The origins of Spirax Sarco lie with one of the businesses taking office space in the smart new building. Here Herman Sanders set up his small firm of general merchants and commercial agents in 1888. Four of his neighbours (18 businesses were housed in the block) were engineers and consulting engineers: Cowper-Coles & Co., Archibald Thompson, Walter Phillips and William Page.

Two years later Herman had a partner, and the firm became Sanders & Rehders. Although very little is known about either partner, circumstantial evidence suggests that Herman Sanders’s partner was probably German. Certainly a third partner, Max Erlenwein, was born in Cologne,

and became a naturalised British subject in 1894, the same year he joined the firm. These German connections no doubt helped the firm to build up its business in German engineering products over the next few years, and they show that the company had an international outlook from the very beginning.

Engineering goods were not at first the firm’s main interest. The partners were particularly interested in importing goods from more exotic and distant locations, especially China and Japan, and later Africa, South America, India and Australia. The firm was catching the coat-tails of the craze for all things oriental, particularly Japanese, which seized the country in the late nineteenth century.

Perhaps it was on the back of this trade that Sanders & Rehders decided to open a northern branch in Guardian Buildings in Manchester in 1896. Guardian Buildings, which housed the *Manchester Guardian* newspaper, was located in Cross Street, one of the city’s busiest thoroughfares, where office rents were at a premium. This gives some idea of the ambition of the business at the time.

Gradually, the trade in engineering products grew. By 1902, the firm had established a steady enough business in boiler recording instruments to publish a catalogue devoted to them. Other

products included batteries and accumulators made by the German firm Pflüger. The business began taking a stand at the Engineering & Machinery Exhibition held every year at London's Olympia. Among the firm's exhibits in 1906 were the Sarco steam meter and the Sarco feed-water meter. This is one of the earliest references to the Sarco brand that still lives on in the name of today's business.

The 'Sarco' name was derived from an abbreviation of the firm's name (taking 'Sa' from Sanders, 'r' from Rehders and 'co' from Company) and was apparently dreamt up by one of the firm's employees, Gustav Bintz, about whom very little is known. As a trade name, it was registered on 15 March 1906, with the registration covering its use for 'Furnace Control Specialities'

as well as 'Philosophical Instruments, Scientific Instruments and Apparatus for Useful Purposes'.

In 1907 the trade journal *The Engineer* reported on one such piece of apparatus demonstrated on the firm's stand at the Olympia exhibition. 'Engineers interested in CO₂ recorders, water and steam meters, draught gauges and other similar instruments will find a good collection on Messrs Sanders, Rehders, and Co.'s stand. One of the foremost exhibits on this stand is the "Sarco" indicating and recording steam meter.'

Although reports state Sanders, Rehders & Co. was making the goods bearing its brand name, there is no evidence of any direct manufacturing, and it seems more likely that the firm used subcontractors to produce the instruments.

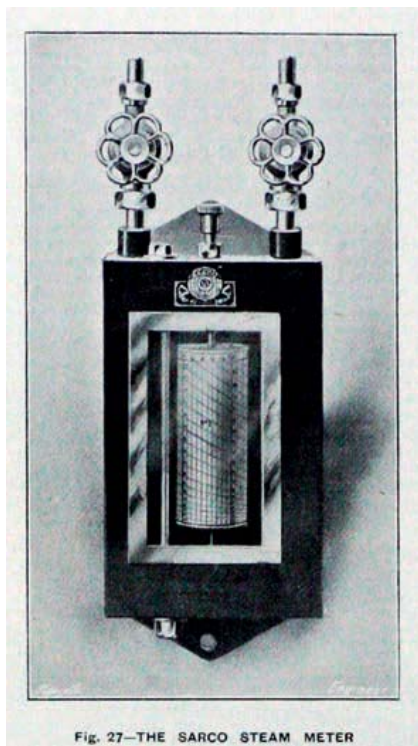


Fig. 27—THE SARCO STEAM METER

Sarco steam meter, 1907



Sanders, Rehders & Co advertising poster, October 1912

Two further events in the same year were signs of the growth and ambition of the business. Firstly, the partnership was dissolved in favour of becoming a limited company. The partners probably believed that the size of the business presented increased risk, best protected through limited liability. Secondly, the firm opened its first international branch, in the rapidly expanding city of New York. In London the firm was gradually taking over more and more space at 108 Fenchurch Street, occupying four of the seven floors in 1914. In Manchester the firm had moved to new premises in York Street, where it rented two floors. Across both branches Sanders, Rehders & Co. Ltd employed 70 people.

In London one of the employees was an able young engineer, Clement Wells, who was managing the newly formed recording instruments department. Among the instruments featured by the department was a condensed water injector that returned condensate directly into the boiler. It was perhaps a logical next step for the firm to begin importing liquid expansion steam traps from Germany around 1910. They were supplied by a firm founded by Herman Sandvoss in Düsseldorf in 1907. Sandvoss had originally called his firm Vulcan, changing the name to Samson, the brand name of his steam traps, in 1909. Before turning to steam traps, Vulcan had made a wide range of control instruments for heating systems, and it is not improbable that Sanders, Rehders & Co. Ltd was already importing instruments made by Vulcan.

Steam traps were not a new phenomenon. They were, and are, an essential part of any steam plant. In a boiler system steam is used to transport heat for a specific purpose from one place to another. Steam condenses after releasing heat and the condensate, which acts as a coolant and

causes erosion in the steam system, needs to be removed. Steam traps keep in the steam but let out the water.

The most widely used steam traps at the time that Sanders, Rehders & Co. was founded were bulky mechanical bucket traps. The pages of *The Engineer* for the period are filled with images and descriptions of these traditional traps made by many different British manufacturers. The Samson trap, on the other hand, was a temperature-sensitive liquid expansion or thermostatic trap which also had the advantage of being much more compact than the bucket trap.

Walter Crosweller, who joined the company's engineering staff in 1911, later reflected on the significance of the Samson traps:

These traps were interesting in their day and fully justified the use of thermostatic traps and they gave birth to the manufacture of flexible metallic tubing with helical corrugations ... At a time when the makers of bucket traps might have had it all their own way, these Samson traps kept the door open for other and better expansion traps to follow them.

In retrospect this proved to be a turning point. Steam traps would become as fundamental to the development of the business as they were to the increasingly complex processes employed by large-scale users of steam.

Beginning with the import of a handful of steam traps from Germany, Sanders, Rehders & Co. Ltd metamorphosed from an import-export business into an international group whose name, Spirax Sarco, has become synonymous with the application of steam technology and niche fluid path management solutions around the world.



Sales conference, Scarborough, c. 1946. Front row, left to right: Albert Ludi, Lionel Northcroft, Clement Wells and Herbert Smith

3

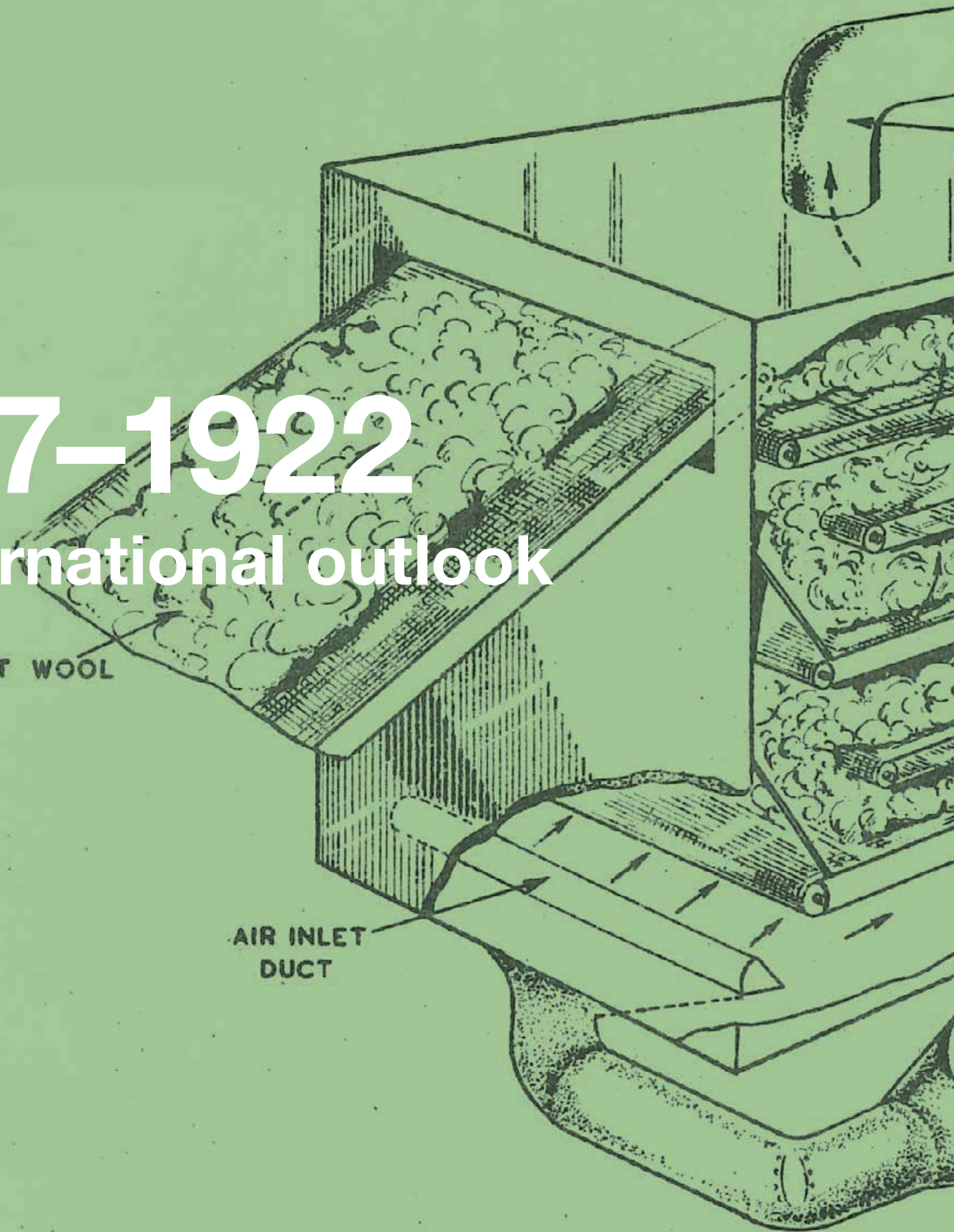
1907–1922

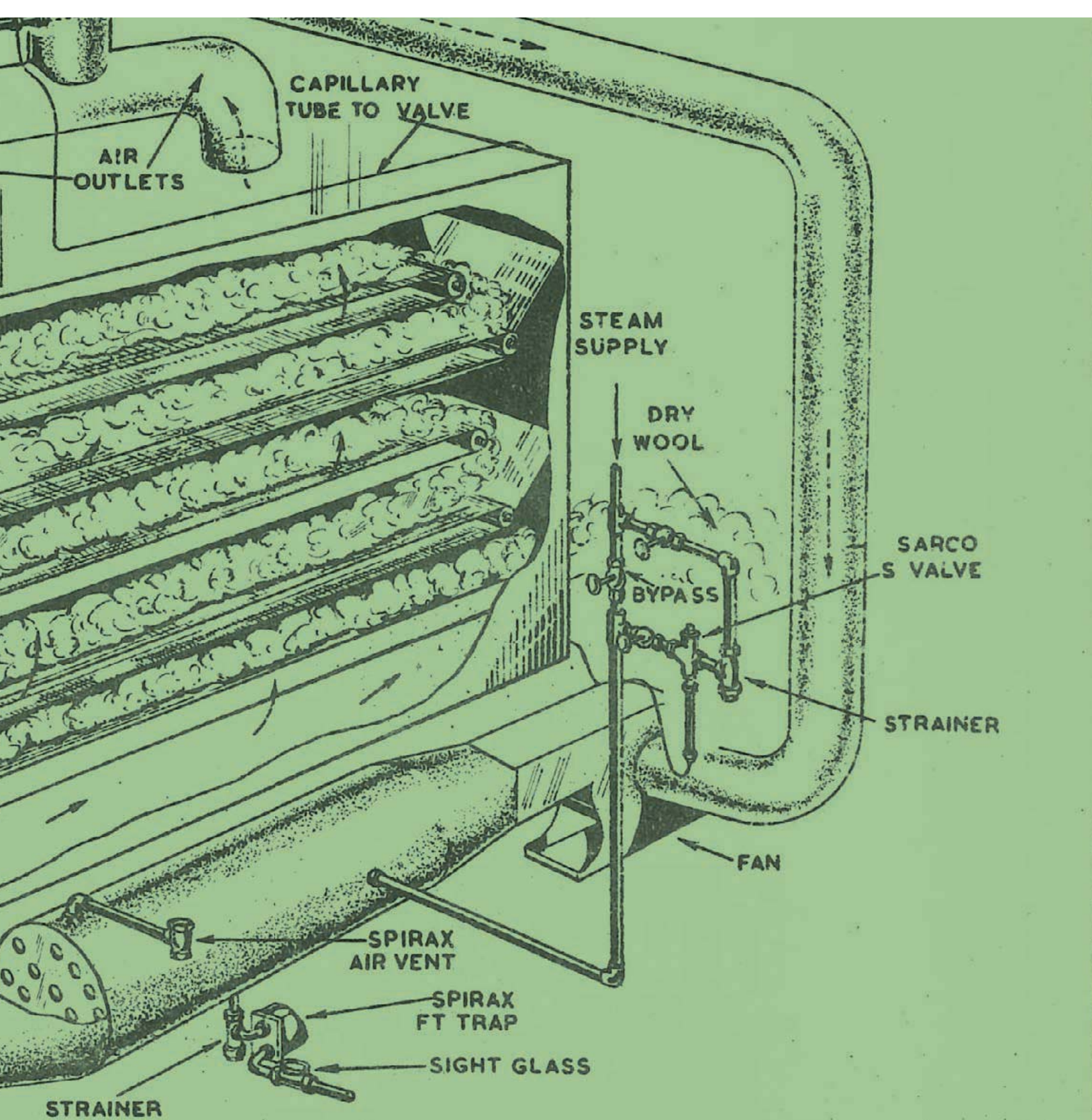
An international outlook

WET WOOL

AIR INLET
DUCT

SARCO TEMPERATURE CONTROL
AND SPIRAX TRAPPING EQUIPMENT
ON WOOL DRYING MACHINE





SPIRAX - SARCO LTD.
CHELTENHAM GLOS.

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A.M.

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J.B.N.

DATE. 2.12.46.

DWG. NO. T 32

‘The Sarco trademark was a globe with a Sarco banner draped across it: it was a company eager to go places’

In 1907 the recently launched liner *Mauretania* set a new record for crossing the Atlantic, reaching New York from Southampton in just four and a half days. Lewis Sanders probably took a slower ship, taking five or six days to complete his voyage when he set out to open the company's branch in New York, in the same year.

New York was booming. At the time, observed one historian of the city, it had the reputation of being ‘the most exciting and vital city in America’. It was the gateway to the American dream for millions of emigrants from Europe. In 1907 1.28 million people entered the country through New York. It was a magnet for commerce and industry, with more breweries, for instance, than Chicago, St Louis and Milwaukee combined. Macy's had been open since 1901, the Flatiron Building was finished in 1902 and the New York Stock Exchange was occupied in 1903. One after another successive skyscrapers went up claiming the title of the world's tallest building, culminating in Cass Gilbert's 792-foot-high temple of commerce, the Woolworth Building, in 1913.

Lewis Sanders set up his office in another of Gilbert's masterpieces. The 23-storey Gothic Revival West Street Building in Lower Manhattan, with expansive views over the Hudson River,

had only just been completed as a purpose-built office block when Lewis Sanders moved in. Once again, taking space in what was the finest new office building in the city was a statement of ambitious intent.

On 9 February 1907 the Sarco Fuel Saving and Engineering Company was incorporated. Two years later Herman Sanders, accompanied by Clement Wells, sailed across the Atlantic to see how the US business was performing. In April 1911 Wells was sent to take over the running of the Sarco company as General Manager, bringing with him Gustav Bintz as Sales Manager. Soon afterwards the Sarco company moved out of the West Street Building in exchange for offices at 116 Broad Street in Manhattan, the financial heart of the city. Sarco Fuel Saving became simply Sarco Engineering Co., its letter heading listing CO₂ recorders, steam meters, fuel and gas calorimeters, draft gauges, steam traps and thermostatic regulators.

In the UK the advertising taken out by Sanders, Rehders & Co. emphasised how Sarco products could save customers money through saving fuel. It also began to promote the idea that knowing how your steam plant worked was a crucial part of improving efficiency. ‘Do you know how much steam is used in each department of your works?’

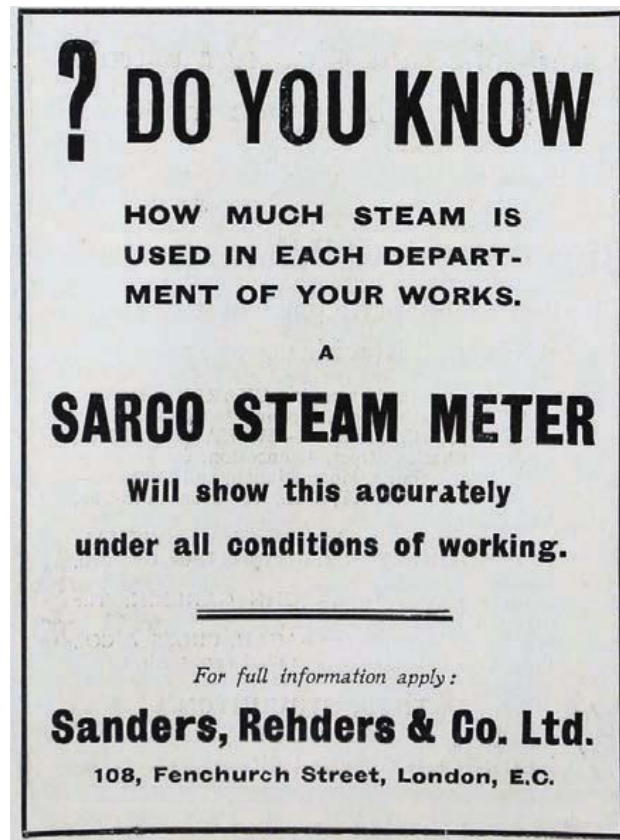


West Street Building, New York

asked one advertisement. Another exhorted, 'Knowledge is Power in Steam Raising', going on to list all the instruments under the Sarco brand that would help engineers get more out of their plants. This was a message that the US company, under Clement Wells, took to heart. 'Knowledge, in Fuel Engineering, is More Power' read the strapline at the foot of the company's notepaper.

There is no way of knowing how many of Sarco's earliest sales representatives were qualified

engineers, but two of them certainly were: George Burke had trained as a mechanical engineer at the Stevens Institute of Technology and Louis Barfus at the Cooper Union for the Advancement of Science and Art, also in New York, before joining Sarco. If Clement Wells believed that the company's success lay in selling knowledge alongside products, then it is likely that George Burke and Louis Barfus were amongst the first in a long line of technically qualified sales personnel appointed by Sarco.



Sanders, Rehders & Co. advertisement, March 1912

Building on links already established by the UK business, Sarco imported Samson thermostatic traps from the beginning. They are believed to have been the first thermostatic traps to be sold in the USA. When a handful of traps were installed experimentally in the office of a professor at the Stevens Institute of Technology in Hoboken, the rubber tubing inside them failed. The professor, who was friendly with Lewis Sanders, suggested the tubing could be replaced with a helical metal tubing invented by Solomon Frank in Frankfurt in 1896. Sanders apparently passed on this suggestion to the Samson company in Germany, which then incorporated the helical metal tubing

in its traps. This story has always been disputed by the Samson company, which attributes the use of helical metal tubing to Hermann Sandvoss's brother Ernst.

Steam traps became the most important part of the business, but selling them was hard work in those early days. The company had very little money, and could afford to employ its first sales personnel only on a commission basis. One of the first was a German immigrant, George Landbeck. With his little black folder, he began selling traps door to door in New York. He offered businesses the traps on a free trial with no obligation to buy

KNOWLEDGE IS POWER
IN
STEAM RAISING.

A SARCO CO₂ RECORDER

WILL PROVE ANY
WASTEFUL FIRING METHODS
AND HELP TO OBTAIN
ECONOMY IN THE COAL BILL.

A SARCO STEAM METER

Will show HOW and WHEN the Steam is used.
**One Meter will serve any number of
Points and will Register Correctly**

**ANY QUANTITY,
At ANY PRESSURE,
And At ANY TEMPERATURE.**

SANDERS, REHDERS & CO., LTD.,
108, Fenchurch Street, London, E.C.

Sanders, Rehders & Co. advertisement, February 1913

them unless they told him that they were happy with them on his return visit.

The traps proved popular, as did other products sold by the firm, and Sarco began building up a steady business, enabling the company to appoint more sales representatives, eventually paying them a salary as well as commission. The first Sarco representative outside New York was George Burke, sent to open an office in Chicago in 1912. Other representatives soon followed in Cincinnati, Detroit, Los Angeles, Philadelphia, Pittsburgh, Portland, Providence, Rochester, Seattle, St Louis and San Francisco, with two

over the border in Montreal and Vancouver. The Sarco trademark was a globe with a Sarco banner draped across it. It was a company eager to go places.

Like Sanders, Rehders & Co., Sarco was a selling company, which perhaps explains why Sarco Engineering, something of a misleading name, disappeared in 1915, when a new trading company, Sarco Co. Inc., was formed. By then, the war in Europe, where the Allies imposed a blockade on German shipping, was disrupting Sarco's supply lines.

SPIRAX SARCO IN THE USA

The Sarco Fuel Saving and Engineering Company was established in New York in 1907. Clement Wells became General Manager in 1911 and under his leadership the US business became the dominant partner within the worldwide Sarco/Spirax operations until the early 1950s. The original company was replaced by Sarco Co. Inc. in 1915.

In 1911 Roller Smith in Bethlehem, Pennsylvania, began making recording instruments for Sarco. When it became impossible during the First World War to import Samson thermostatic steam traps, Roller Smith also began making traps (originally the No. 7 trap, followed by the improved No. 9 trap) for Sarco. This relationship lasted until Sarco set up its own factory in Bethlehem in 1935.

The Spirax tradition for technical selling and close customer relationships began in the USA. The first branch office was opened in Chicago in 1912 and Sarco quickly developed a network of other offices in many major US cities. By the late 1930s Sarco had 60 representatives spread across the country. They were not directly employed by Sarco, which encouraged many of them to build up their businesses by handling goods for other manufacturers. Sales personnel worked closely with customers and Sarco issued regular technical bulletins.

During the 1920s and 1930s growth came, especially through the company's heating department and the relationships it developed with major heating contractors all over the

country. During the Second World War, Sarco Co. Inc. supplied steam traps and controls to US naval shipyards and military bases. An industrial division was formed after the war. In the mid-1950s the pioneering TD trap was made in the USA before production started in the UK.

In 1956 Clement Wells sold Sarco Co. Inc. to the company's management. In 1962 the outdated Bethlehem factory was replaced by a modern plant in nearby Allentown. The new factory was extended in 1978.

In 1964 Sarco Co. Inc. was sold to White Consolidated Industries, which sold the business to Spirax-Sarco Engineering in 1983, when it became Spirax Sarco Inc.

In 1998 the Allentown factory was closed and relocated to a new factory at Blythewood in South Carolina. The move was disruptive, poorly implemented and cost the company money, but the introduction of an innovative manufacturing process, 'Demand Flow Technology', helped to turn the business around, and it quickly returned to profit.

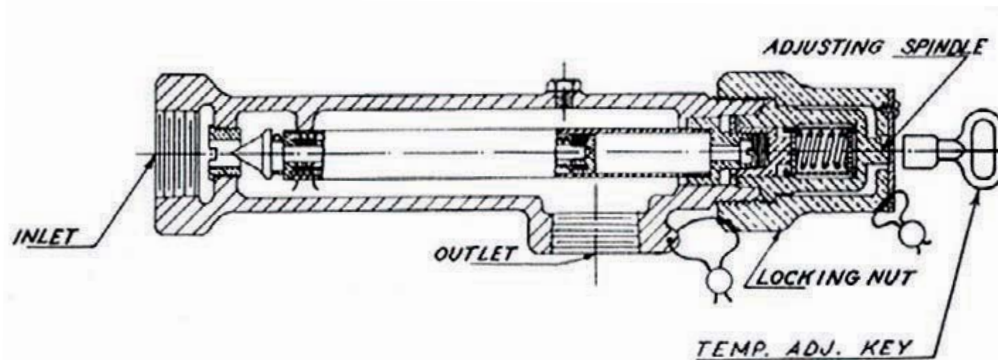
During the rest of the decade sales progressed steadily as the company began developing sales of engineered systems and concentrated on the market for repairs and maintenance in major plants and refineries. In 2011–12 the Blythewood plant was expanded, specialising in the fabrication of engineered systems, creating a new facility with over 35,800 square feet of office and production space.

Even before the First World War brought a halt to imports from Germany, Samson struggled to meet demand from Sarco, and agreed that Sarco could have the traps and regulators it supplied made in the USA. The challenge for Sarco was finding a manufacturer capable of reproducing the helical metal tubing. Since 1911 the Roller Smith Company, with offices in Park Place in New York and a factory at Bethlehem in Pennsylvania, had been making CO₂ recorders for Sarco. Roller Smith's founder, Colonel Frank Roller Smith, was a capable engineer, having served as chief engineer on the American warship *Nashville* during the Spanish-American War. He had formed the company in 1908 by acquiring the Switchboard Equipment Company of Bethlehem, Pennsylvania, where he opened his factory, and the Whitney Electrical Instrument Company of Penacook, New Hampshire. The new company made miscellaneous electrical measurement and control instruments, some of them automotive meters. Roller Smith employed a very talented Factory Manager, Herbert Smith, one of the many Irish immigrants to settle in New York. The two firms developed an association sufficiently strong to last for more than 20 years and to lead to Frank Roller Smith acting for a time as Sarco's President.

It was only natural for Sarco to turn to Roller Smith to reproduce Samson steam traps as imports dried up. It was crucial for the business that the new traps should be turned out as soon as

possible to avoid customers moving elsewhere. For Herbert Smith the challenge was devising a machine to produce the helical tubing. Over the course of one weekend the solution came to him and although the result was rather makeshift it worked. Within three months Smith had designed a rather cumbersome cast-iron replacement imitating the Samson trap, which became the Sarco No. 7 trap. But in doing so he became convinced he could produce an improved version, and very soon the Sarco No. 9 trap appeared. Much neater in appearance, made from bronze, it was a balanced pressure trap, unlike the No. 7, and required no adjustment. The latest version of the No. 9 trap was still being made half a century later.

While Sarco flourished in the USA, the fortunes of the UK business, which had been doing so well on the eve of war, were in decline. Sanders, Rehders & Co. relied, it seems, on manufacturers, like Samson, outside the UK. While Sarco could rely on Roller Smith to supply products it could no longer import, it was much more difficult for Sanders, Rehders & Co. in the UK. Firstly, the business appears to have lost any links it may have had with any UK manufacturers, and secondly, the priority for most engineering factories in the UK was output for the war effort. The business struggled on, but Sarco's survival in the UK after the war depended almost entirely on support from Sarco Co. Inc.

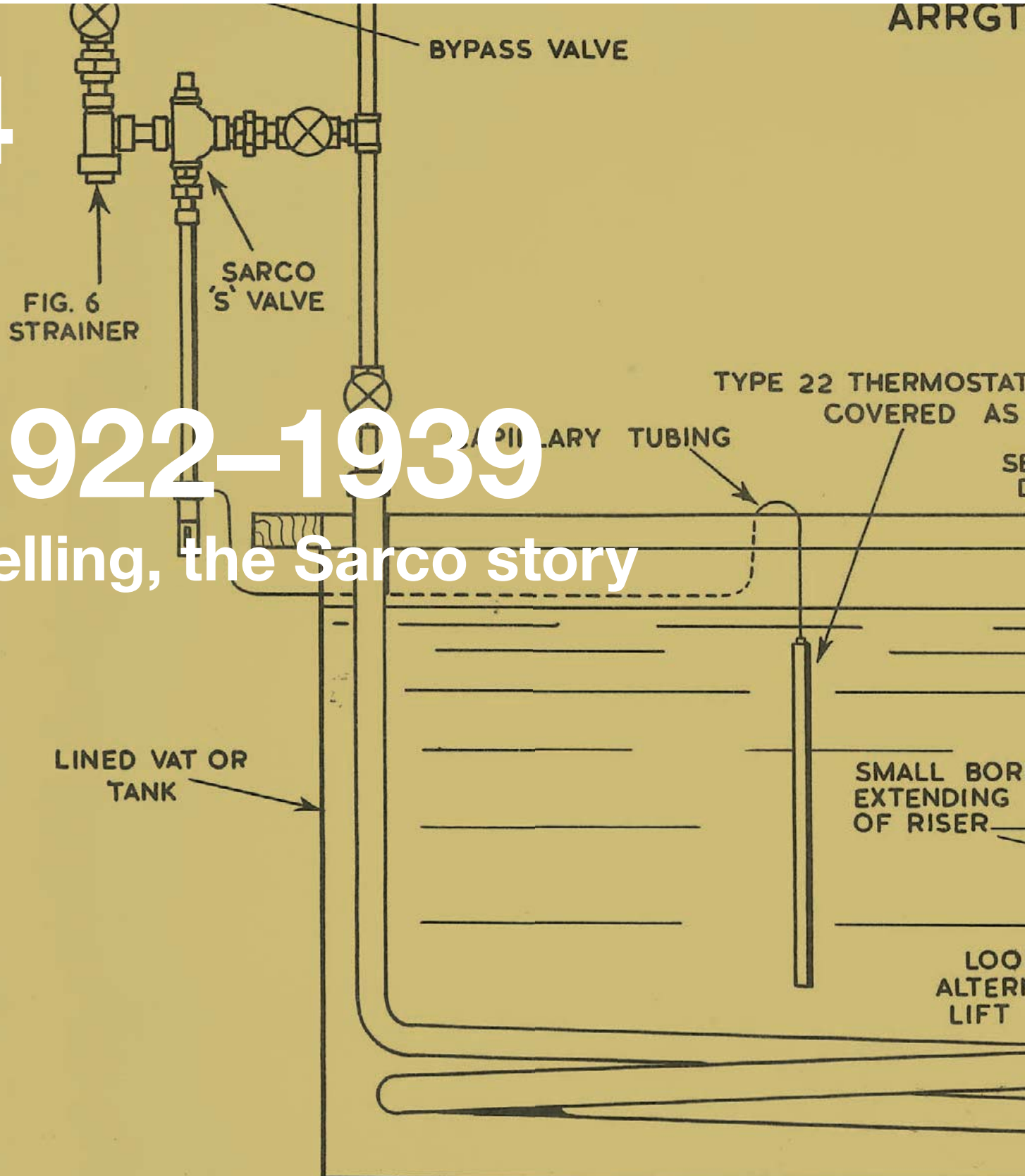


No. 7 Steam Trap

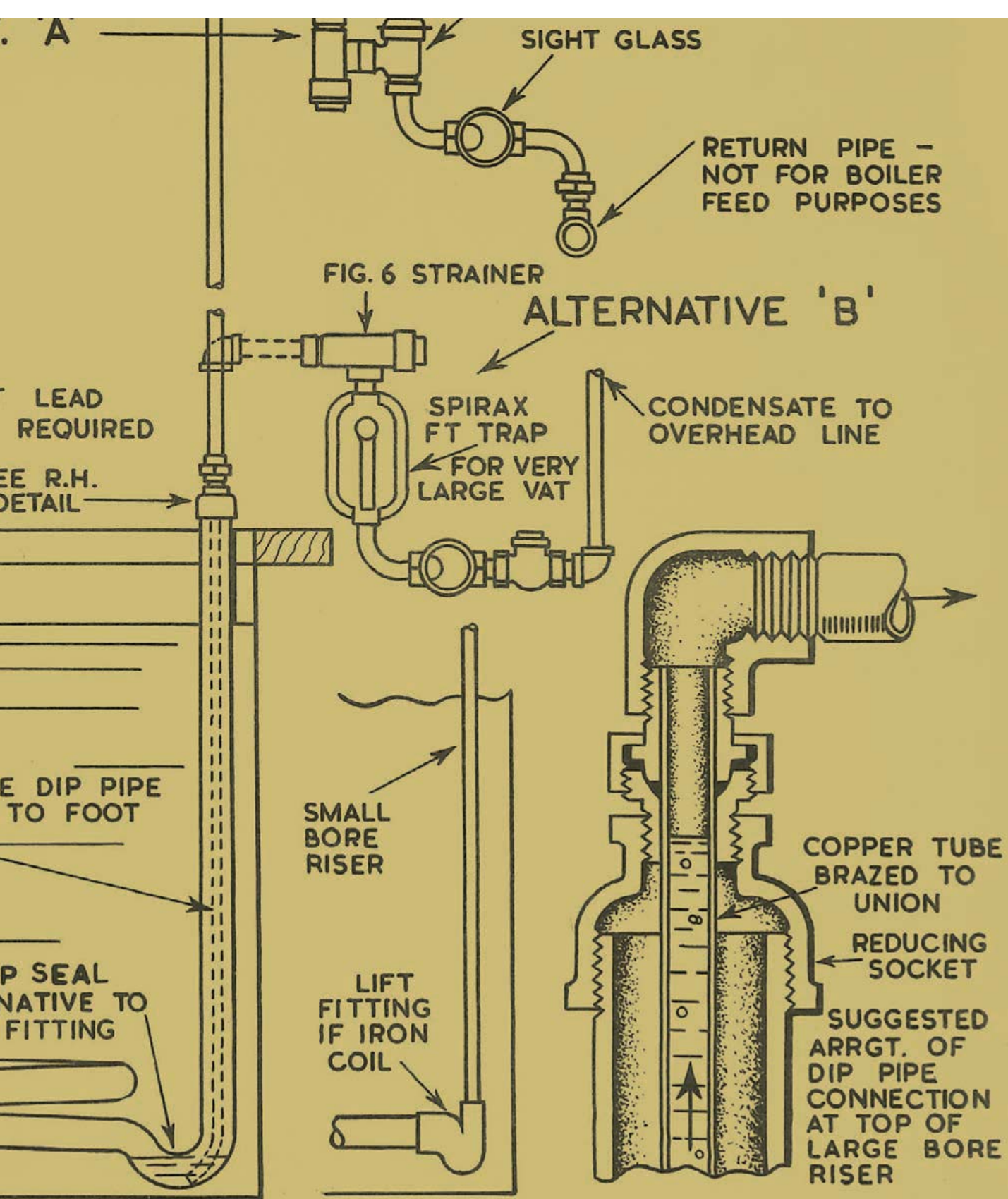
4

1922-1939

Selling, the Sarco story



SARCO TEMPERATURE CONTROL
AND SPIRAX TRAPPING EQUIPMENT
ON PLATING VAT



SPIRAX-SARCO LTD.
CHELTENHAM GLOS

DRN. B.P. CHKD. *Am*
DATE. 25-4-47

APPD. *NBM*

DWG. NO. T 44

‘I would safely say there isn’t an apartment house in New York erected between 1921 and 1932 that isn’t equipped with Sarco radiator traps’

In the years between the two world wars it was Clement Wells in the USA who drove the development of the business on both sides of the Atlantic. As Ruth Greenfield, who joined Sarco in 1919, recalled, ‘he was in complete charge and knew everything that was going on outside even though he sat in a little closed office behind a big desk’. At some point he purchased the US business outright. The decline of the UK business probably left the Sanders family unable to resist an offer for Sarco from Wells.

Under Wells, before the First World War Sarco had already established a significant network of representatives in many of the USA’s major cities. These continued to grow after the war, driven by Clement Wells’s assistant, Mr Ritchie, who spent at least six weeks twice a year criss-crossing the continent, appointing new representatives, mostly paid by commission, and making sure they had the resources they needed as far as the company could afford them. Ritchie made sure he appointed people who were as happy selling to a heating engineer as they were to a major industrial plant.

By 1938 Sarco had 60 representatives spread across the country, in places such as Atlanta, Dayton, Milwaukee, Indianapolis, Baltimore, Grand Rapids, Houston, San Antonio,

Miami, Memphis, Boston, Nashville, Buffalo, Charleston, Cleveland, Tulsa, Dallas, Denver, Salt Lake City, Savannah and Syracuse. ‘See Phone Book For Local Sarco Representatives’, urged advertisements.

In New York, Sarco moved from Broad Street into the magnificent Woolworth Building, sharing offices with the Roller Smith Company until more space was needed in 1926, when a further move was made to another new block, 19 storeys high and uptown, at 183 Madison Avenue.

Although most of Sarco’s representatives were not directly employed, they were incredibly loyal to the business. Sarco helped many of them develop from one-man bands into significant distribution businesses and, especially during the Depression, when business was hard to come by, encouraged them to take on lines from other companies. This ensured their survival, with Sarco continuing to receive the benefit of their loyalty, their relationship with local customers and their accumulated knowledge and expertise. The 1930s were not easy for Sarco itself. While it was typical of Clement Wells that he refused to make anyone redundant, almost everyone took cuts in their salaries and wages, helping to keep the business going until better times returned under Franklin Roosevelt and his New Deal.



7000 Sarco Traps in these six New York apartment houses

Central Park West ranks high among New York's most desirable apartment locations. Our snap-shot, taken through Central Park, shows in the foreground the splendid El Dorado, flanked by five other fashionable apartment buildings.

All these buildings are equipped with Sarco Heating Systems, totaling more than 7,000 radiator traps.

Sarco Specialties for steam heating systems comprise Radiator Traps, Bellows-Packless Inlet Valves, Float-Thermostatic Traps for drips, Air Eliminators and Boiler Return Traps.

Leading architects and heating engineers specify them consistently for their QUALITY.

Remember Sarco also when modernizing heating systems. We can furnish replacement elements for rehabilitating radiator traps or valves of any make.

Ask for Catalog O-45

Sarco Company, Inc.
183 Madison Ave. New York, N. Y.



Branches in Principal Cities

SARCO CANADA LTD., FEDERAL BLDG.,
TORONTO, ONT., CANADA



SARCO RADIATOR TRAPS

December, 1934

Heating-Piping
-Installation-

Don't Try To Pick
Steam Traps
Blind-Folded!

A steam trap right for
any purpose will often
prove unsuitable for an-
other condition. Large
sums are wasted by trying
to use the same kind of steam trap for every industrial application.

Sarco has long recognized that there is no "universal" steam trap,
therefore provides several different types from which to select the one
best suited.

Sarco No. 9-2 Thermostatic Steam Trap leads the line. This is the
type which changed engineering practice from old-fashioned group
trapping, by means of a few large, centrally located traps, to individual
trapping in trap on every coil.

This is the system we recommend for most steam-heated process
equipment, operating at pressures from 5 to 125 lbs.

For applications where condensate must be removed as fast as it
forms, regardless of the heat-value thus wasted, Sarco Float-Thermostatic
Steam Traps are best adapted. These are preferred, for example, on
large oil heaters, hot water generators, boilers in laundries, and col-
lectors (or dry cans) in textile mills.

On extensive systems, where condensate cannot be returned to the
boiler, there is no better or more economical steam trap than Sarco
No. 8. Even on high pressure (up to 350 lbs.) it discharges only cool
condensate with a minimum of "flash" steam.

Put your steam trap problems up to us. Write today for Catalog
O-48 and full information. There is no obligation, and our experience
in this special field may save you money and help you.

No. 9-2

SARCO COMPANY, Inc.
183 Madison Ave.
NEW YORK, N. Y.
Branches in Principal Cities
Sarco Canada Limited, Federal Bldg., Toronto, Can.

SARCO STEAM TRAPS

March, 1932

Heating-Piping
-Installation-

Is Your Trap a
Dam or a Spillway?

Drip bucket and float traps are like a dam.
They do not operate until sufficient con-
densation forms to fill the bucket or raise
the float, consequently cooling off the con-
densate.

Sarco Steam Trap is a spillway. It dis-
charges condensation as fast as it
forms and returns it to the hot well while it
is hot.

Condensate's place is back in the boiler
while it is still hot. If it isn't discharged from
the trap until it has cooled off, that lost heat
has to be replaced in the reheating, at the
expense of costly fuel.

Only a third the size, and a third the price
of big traps, but how they do keep the
steam line DRAINED.

Sarco Steam Traps take up no more space
than street elm. They can be put in places
larger traps wouldn't go. They have only
one moving part, the thermostatic element,
which operates on a slight difference in
temperature between water and steam.

If the fact that there are over a million of
them in use means nothing to you, just the
coupon and we will send one free that you
can screw into the pipe line of the hard-
est place to trap in your plant. Keep it there
a month, and then decide from its actual
performance whether you want to pay for
it or send it back.

Is Heating, too...
let your architect
or consulting en-
gineer advise you.

SARCO COMPANY, INC.
183 Madison Ave.
New York, N. Y.
BRANCHES IN PRINCIPAL CITIES
Sarco Canada Limited, Federal Bldg., Toronto, Can. 25 Queen, Elizabeth St., London E. C. 1.

SARCO STEAM TRAP

MAIL THE COUPON

SEND US ONE
183 Madison Ave., New York, N. Y.
I would like to know more about the Sarco Steam Trap and its advantages.
Name _____
Address _____
City _____ State _____
Occupation _____

SARCO NEWS

Published Monthly for the interchange of helpful information by
SARCO COMPANY, INC., 183 Madison Avenue, New York, N.Y.

Vol. 10 No. 9
September 1939

**SARCO STANDARDIZED
FOR FURNITURE ASSEMBLY LINE**

Kuehne Plant Has Most Modern Conveyor System

By F. S. Acton, Vice President, Balma, Inc.

During the latter part of 1938 our company, Balma, Inc., designed and installed a Balma System of continuous production flow layout, plant systematizing and conveyancing, was called in by Kuehne Manufacturing Company.



F. S. ACTON

pany who were planning an extensive program, with the view of doubling their production. We were informed that our company was selected after much research and investigation. The instructions were to prepare a proposal of a scientific plan for the mass production of directly and breakfast furniture.

After a thorough preliminary survey by our engineers it was easily seen that in this case it was possible to use the existing buildings without drastic alterations, and that new buildings necessary could be added in the future. We then advised the proper place in relation to the right system and then built the buildings around it, rather than having to fit the system to suit many years ago.

When we started the picture at

This clipping is from the house organ of Kuehne Mfg. Co., Mattoon, Ill., leading manufacturers of furniture specialties.

It reports the completion of another Balma furniture finishing system, paralleling the modern assembly line methods of the automobile industry.

Continuous conveyors carry the material thru various stages of jointing and finishing with drying ovens preparing it for each successive step.



In each drying oven, a Sarco type KR-14 wet bulb control with automatic water supply maintains constant humidity, a most important element in correct drying.



Sarco News, September 1939

Cultivating relationships with existing and potential customers was a crucial part of the representative's role. As one sales person observed about one customer, 'we have worked very closely with them in developing special strainers'. When a potential client changed personnel, reported another representative, 'we accordingly got in touch with the new superintendent and of course went thoroughly into the question of our various traps'. A sales circular from the 1930s outlined the approach a representative should follow. Firstly, the local

sales person would contact the customer and prepare a 'Sarco Economy Estimate', letting the customer know what they would save as well as what they would pay. Secondly, the customer was given a money-back guarantee. And thirdly, the customer was reminded how Sarco offered 'a complete service to industry', with its range of traps, regulators, valves, strainers and controls. Persistence paid off. In one recorded instance, it took two years from the date first contact was made until Sarco won an order from a steel and wire plant in Peoria, Illinois.

Customers ranged far and wide, and the following list is not comprehensive: breweries, laundries, match makers, sewage plants, steel producers, car manufacturers, paint and varnish factories, chemical plants, air and naval stations, railway stations, apartment blocks and department stores, from Sears Roebuck in Washington to Younker Brothers in Des Moines.

One of the most important ways of keeping in touch with this far-flung sales force, and a forum to share best practice with colleagues, was the monthly publication *Sarco News*, which the company first issued in 1928. It carried news of major sales successes, advice from representatives on selling and technical articles. The company also advertised extensively and issued technical bulletins and sales leaflets. One issue of *Sarco News* underlined ‘the forward tendency of the Sarco Co. in adding ... one or more new products each year’. The company’s Philadelphia representative, F.C. Perkins, wrote in 1938 that the high point of the year was ‘the constant improvement in existing apparatus, and the developing of new apparatus by the factory, together with the technical and constructional information which has been in the [*Sarco*] *News* and the [*Sarco*] *Outlook* each month, and the continuous cooperation we have received from the New York office’.

One of the major successes of the US company between the wars was the heating department, set up in 1921, which forged strong relationships with major heating engineers, contractors and consulting engineers. As Ruth Greenfield later remembered, ‘I would safely say that there isn’t an apartment house in New York City that was erected between 1921 and 1932 (that’s when we come to the Depression) that isn’t equipped with Sarco radiator traps.’ Once again part of the success was down to employing knowledgeable engineers. One of the heating department’s most successful sales people was a qualified

mechanical engineer named Cummings, who joined Sarco in 1922.

The association between Sarco and Roller Smith lasted until 1935. It may be that Sarco bought part of Roller Smith’s business. The Roller Smith factory in Bethlehem certainly carried on operating until the business was sold in 1959 and moved to New Jersey. The name can still be found today, curiously, on a range of exercise machines. Whether Sarco bought out part of the Roller Smith business, or decided to set up its own factory, the company began making its own steam traps and other products for the first time in 1935. The premises were a former silk factory previously run by the Manhattan Silk Company in Clewell and Itaska Streets in Bethlehem. Clement Wells organised a coach to carry all his office personnel to Bethlehem to celebrate the opening of this new venture, which he organised under a separate company, Sarco Manufacturing. The building was never well suited for an engineering factory and only became less efficient as extensions were added from time to time as the business expanded.

Clement Wells set out three objectives for Sarco Manufacturing:

To make better products: on this depends the welfare of everyone in the Sarco group, not only those in Bethlehem but salesmen and representatives all over the world, who get the orders for the materials we make.

To improve your working conditions and your opportunities: the Sarco management is deeply interested in this.

To make a profit: this is necessary to provide for security of employment and the development of the organisation.

These three objectives quickly became part of

the culture of the whole organisation and remain so to this day.

While the business in the USA was thriving, the UK company was in a mess. It was clearly less flexible, responsive, innovative or entrepreneurial than the US business. There was an attempt to salvage the engineering side of the business in 1921 by setting up a separate company, Sarco Engineering & Trading. By that time the four floors occupied by the business at 108 Fenchurch Street, London had shrunk to just five rooms on the third floor. Sarco Engineering & Trading moved out, taking offices initially in Kingsway and then in the imposing Aldwych House just around the corner. There was a workshop at Long Acre in Covent Garden, but it seems likely this was used more for storage than manufacturing, with any engineering work probably restricted to limited repairs and maintenance to a wide range of ageing Sarco products. The parent business, Sanders, Rehders & Co. Ltd, struggled on until 1923, when a liquidator was appointed.

Sarco Engineering & Trading also failed in 1927, but the trademark and other assets were bought in the same year by two long-serving managers, George Hahn and Stanley Crosier, who formed another incarnation of the business, the Sarco Company Ltd. From the same workshop in Long Acre, the Sarco Company began making small numbers of temperature control and measuring instruments. These were promoted in advertisements as 'The Key to Sarco Economy'.

When Sarco Engineering & Trading was formed in 1921, the poor prospects for the business precipitated the departure of employee Walter Crosweller. In partnership with James Walker, who had experience of selling advertising in the newspaper industry, he set up the firm of Walker, Crosweller & Co., beginning with a single room as an office in Danes Inn House in London's Strand, using an empty shop in nearby Drury Lane as a store and workshop. Based on their experience with Sanders, Rehders & Co., they aimed to import industrial instruments; one



Sarco Manufacturing, Bethlehem, Pennsylvania, USA, c. 1935



Sarco Company advertisement, c. 1927

of their main lines was the Arkon steam trap made by a company which, as Drayton Controls, was later acquired by Spirax Sarco.

Clement Wells was already developing an export market for the Sarco traps made in the USA. In 1922 he appointed Richardson Frères of Marseille as Sarco's first distributor in Europe. Richardson was an old-established firm, founded by an Englishman in 1855 and still flourishing today, supplying heating and other products. From his previous experience, Wells understood the potential of the market for steam traps in

the UK, and he was eager to follow up his foray into France by appointing a UK distributor. It was unsurprising that he should turn to Walter Crossweller, whom he had recruited to Sanders, Rehders & Co. in 1911. In 1923 he offered Walker, Crossweller the rights to distribute Sarco's balanced pressure No. 9 steam traps in the UK. The firm had to turn down the approach because of the existing agreement to supply Arkon traps. This came to an end in 1925, and on 1 October 1926 the first consignment of Sarco traps arrived from the USA.

SPIRAX SARCO IN FRANCE

Sarco steam traps were first sold in France through an agent, Richardson Frères, based in Marseille. This arrangement lasted from 1922 until 1937 when Clement Wells set up Sarco Appareils Thermostatiques. Located in Paris, the new company struggled to make money until Albert Ludi took charge in 1939, with Marcel Bardin as Technical Director. Until that time all the Sarco steam traps sold in France were imported from the USA. It was in 1939 that the French company began assembling traps in the Rue Oberkampf in Paris, where the small works possessed just one lathe and a press.

The company kept going during the Second World War, making traps in very small numbers in very difficult conditions (a bicycle was used to generate electricity). The company had to move from Paris into the so-called 'zone libre' administered by the Vichy regime. As Albert Ludi was a Swiss citizen, however, he was able to travel all over France, keeping in touch with the company's customers. In 1946 Ludi and Bardin, who had kept the business going during the war, obtained 15 per cent of the company from Clement Wells. In the difficult times just after the war the company was able to fulfil orders largely thanks to supplies of traps imported from Spirax in the UK.

The company returned to Paris in 1950, when it took over slightly larger premises, a former textile factory in the Rue Rébeval, but the company struggled for lack of investment.

When Spirax Sarco bought the company from Clement Wells in 1957, it had to concede majority control to Ludi and Bardin since it lacked the resources to take over management itself.

With rising sales, the Paris premises became too small, leading the company to relocate to Châtellerault. A new factory was opened there in 1961 under the management of Hervé Bouveret, who had been with the company since 1955. In 1965 it was agreed to double the size of the factory.

In 1971 Sarco SA became a wholly owned subsidiary of Spirax-Sarco Engineering. The loss-making heating department was closed, and the focus switched to sales of Spirax Sarco industrial products. In 1975 the company changed its name to Spirax Sarco SA, and two years later it moved to new premises at Trappes just outside Paris.

Following the decision to retain Châtellerault, the French factory became an integral part of the Group's global manufacturing strategy, supplying products to Spirax operations across the world. The factory was upgraded in the 1990s and has become the Group's main facility for steam system controls and ancillary equipment.

In 2002 a new training centre was opened as the company renewed efforts to increase domestic sales.

There was one snag. Since the rights to the Sarco name in the UK in 1926 were owned by Sarco Engineering & Trading, and subsequently acquired by the Sarco Company Ltd, the traps imported from America had to be sold under a new name. ‘Finding that name,’ *Spirax Topics* later recorded,

caused more heartaches and headaches than we care to remember. At last somebody had a rush of blood to the head when he thought of linking the name with the spiral element in the thermostatic trap. ‘Why not call it the Spiral steam trap?’ he asked. Then somebody else said, no, the name Spiral sounded too much like something that went round and round and it made him dizzy ... Finally one of our bright lads said it was the ‘L’ that was messing things up, so we went through the alphabet to find a substitute letter.

The result was ‘Spirax’: two parts of today’s steam business were now in being, but it would be another generation before they were finally joined together.

Spirax traps made a good start in the UK. They helped Walker, Crosweller record its first-ever profit in 1927. In each year until the onset of the Great Depression in 1931 the firm sold more traps than its contractual obligation, exceeding more than 2,000 in 1930, and regularly cabling Sarco in New York for more. But the relationship between the two parties was not an easy one. In 1929 Sarco agreed Walker, Crosweller could begin assembling traps in its London workshop, producing the bodies for the motor elements imported from the USA, but the quality of the assembled traps was poor. Moreover, Spirax traps were one of the cheaper lines being sold by Walker, Crosweller, whose sales force, paid on commission, preferred to concentrate on higher-value products promoted by the firm. In an effort to remedy this, Walker, Crosweller agreed to accept a new Sales Manager

recommended by Clement Wells. While the new manager imported some elements of the way traps were sold in the USA, including offering a free trial and money-back guarantee, and appointed a team who sold only traps, he did not follow a key part of the US strategy: few of the sales team were either qualified engineers or had any knowledge of the industry. As a result he alienated many existing and potential customers. Wells found it hugely frustrating, writing later of ‘the old method of W-C & Co. whose idea of selling was to employ peddlers from all the various sales fields. It succeeded for a time but it is not a system on which permanent success can be based’.

Poor-quality traps and ineffective sales tactics were compounded by the impact on the value of sterling when the UK left the gold standard in 1931. This had pegged the value of the pound to the value of gold bullion, effectively creating a fixed rate of exchange. But a run on sterling arising from the UK’s economic and political difficulties compelled the Bank of England to give up the gold standard as reserves drained away, leading to a sharp devaluation of the pound. In the following year the UK’s commitment to free trade also vanished, as the government imposed an import tariff of 10 per cent on manufactured goods, which was doubled within a few months. The cost of importing Sarco traps, or any part of the traps, became excessive. As Walter Crosweller recalled in 1937, ‘the motor element was the big piece in the trap and the cost quickly became prohibitive. Having at last found a saleable line of almost universal demand, we were faced with losing it with this turn in the political wheel’.

The UK was the world’s leading importer, and the USA its leading exporter. The UK economy was still one of the top handful in the world. It was too big a market, with too much potential, for Sarco to give up. The solution lay in making complete traps in the UK, but there was no way Clement Wells would grant Walker, Crosweller a manufacturing



**SPIRAX
VAPOUR
and
VACUUM HEATING
SYSTEMS**

Spirax Radiator Trap

Combine simplicity, efficiency
and operating economy with low
installation costs.

Full particulars, diagrams and detailed
explanations of the Spirax Heating
Systems furnished on request.

Please mention this Journal.

Walker, Croswell & Co., Ltd.

**20 QUEEN ELIZABETH ST.
LONDON, S.E.1.**

*Telephone :
HOP 1386 (three lines).*



Spirax Inlet Valve

Walker, Croswell & Co. advertisement, February 1931

licence, given their poor track record in producing quality traps. He wanted to ensure that any production carried out in the UK conformed to the methods and standards followed in the US factory. On the other hand, he needed to secure Walker, Croswell's cooperation, since they controlled sales of Spirax traps in the UK. It was also in Walker, Croswell's interest to make sure they continued to be supplied with quality products they could sell at a competitive price. The answer was a joint venture, the Spirax Manufacturing Company, formed by the two parties in early 1932. With Sarco Co. Inc. owning 51 per cent of the shares, Clement Wells ensured

he had control. Possessing control, however, was an advantage only if it could be exercised effectively. Given his commitments to the growing American business, as well as the time it took to cross the Atlantic, Wells recognised this was impossible. Trying to control the business by correspondence was no substitute, and only encouraged procrastination on the part of his joint venture partners. He resolved the situation by persuading Herbert Smith, Roller Smith's talented Factory Manager, to take up the challenge of running the new business, giving him the powers to act on his behalf in all decisions taken about the business.

PROGRESS

1930

1931

1932

1933

WALKER, CROSWELL
& CO., LTD.
20 QUEEN ELIZABETH STREET
LONDON, S.E.1

SPIRAX STEAM TRAPS



This had many advantages. Firstly, Smith was the perfect person to make sure the UK factory turned out products matching the quality of those from the USA. Secondly, it gave Wells his own man, someone he trusted implicitly, on the spot. Moreover, given the close working relationship between Sarco and Roller Smith, Herbert Smith was steeped in the culture of the business. There would be no further alienation of customers because of poor quality.

Herbert Smith made an immediate impact after he arrived in London to run the business on behalf of Sarco in March 1932. Smith's engineering talent lay in designing and making quality products that could be sold at a profit. Within three months the factory was assembling the first complete Spirax steam traps made in the UK. As the first issue of *Spirax News*, published by Walker, Crosweller, reported in May, 'our new London Factory is in working order and ... production of the "All British" Spirax Steam Trap has commenced ... every trap without exception is thoroughly tested under working conditions to its full pressure with live steam ... it is the aim of the management to maintain a high standard'. In addition, the new factory was making regulators for the Sarco Company Ltd, with the first one, serial number 601, despatched from the works on 22 November 1932.

Smith knew it was impossible in the short term for the factory to produce every part of the trap. Indeed, confronted by the factory, located in The Cut in Lambeth, on the south side of the Thames, he must have wondered whether he had done the right thing in taking up the challenge. It was a far cry from Roller Smith's Bethlehem plant. By the end of the year there were just half a dozen people, and plant and equipment was limited to a gas boiler, a capstan lathe, a centre lathe, a vacuum pump and a number of assembly benches. Smith quickly reached agreements with several UK manufacturers to make various parts

of the trap, often making significant improvements as part of the specifications he drew up for these subcontractors.

Soon, as Walter Crosweller recalled, 'with the aid of one of the finest firms in the country [we were] turning out helical tubing which America stated was quite as good as theirs'. For more robust traps with a longer life, Smith specified stainless steel for valves, more corrugations in the helical tubing and pressed gunmetal bodies. Improvements were made almost every year to the famous No. 9 traps, and Smith soon added two more thermostatic traps, the No. 10 and the No. 40, all three in their various versions lasting several decades before being discontinued. By the late 1930s the factory was also producing float traps, the first real alternative to thermostatic traps, originally imported from Sarco in the USA in 1933. Spirax also began making a range of the cheaper inverted bucket traps, but in the face of existing competition these were never very successful and were eventually superseded by the well-known Drayton traps after Spirax took over the business in the 1960s.

The sales approach of the manager imposed on Walker, Crosweller by Clement Wells had not been a success. It was time for a fresh start. With a stream of quality products supplied by the Spirax Manufacturing Company, Walker, Crosweller began transforming the way traps were sold. Firstly, the widening range of traps made it possible to create a team of trained sales people, with engineering expertise, dedicated entirely to selling traps where previously to make a living they had needed to sell other lines as well. Secondly, and more importantly, the firm moved away from using resellers and distributors.

A major change came with the appointment of Lionel Northcroft as Sales Manager for Walker, Crosweller in 1932. (Incidentally, it was here that Northcroft met his future wife Vi, already



Lionel Northcroft, Managing Director (1939–1968),
Chairman (1959–1971), Spirax Sarco

working for the firm, who would be an immense support to him in later years, accompanying him on long international sales trips and attending all sales conferences.) Northcroft had first-hand experience of effective selling techniques, having worked during the Depression as a door-to-door encyclopaedia salesman in south London. He used this knowledge to good effect in his new post, later remarking how his earlier experience had 'taught me how *not* to treat salesmen!' With his highly personable management style, Northcroft would play a crucial role in the development of the company's direct sales business model that is still in existence today.

It was Northcroft who developed for Walker, Crosweiler a new sales approach based on 'direct and scientific selling', as he described it. Referred to inside the company for many years as 'KSP – Knowledge, Service, Products', this remains a fundamental element of the Group's selling philosophy today.

Northcroft was not starting with a blank sheet of paper. From Clement Wells and Herbert Smith he learned about the principles underpinning the way Sarco operated in the USA: the appointment of representatives or agents who were knowledgeable and qualified engineers, the way they liaised closely with their customers, and how they built up personal relationships with them, gaining an understanding of their businesses and basing their sales on what was best for improving their efficiency. Northcroft's talent lay in how he developed these principles in a way that would ultimately prove flexible enough to meet the requirements not only of the UK market but of many others around the world. In particular, he recognised that there was no need in the UK, a smaller, more densely populated country than the USA, to rely on distributors, and it was possible to dispense with resellers altogether. Cutting out the middlemen created a much stronger bond between Spirax and its customers and also yielded much better profit margins.

Northcroft put together a team made up mainly of people with engineering qualifications and expertise, from university graduates to automotive, mining and naval engineers. They were effectively self-employed, remunerated by commission, as were Sarco's agents in the USA. Northcroft himself had an engineering degree and many years' experience as an engineer in industry. Many members of the team proved dedicated and loyal to the business, encouraged by what Northcroft described as the company's 'policy of cooperation and help'. (On the other hand, there was no toleration of mediocrity: 'when any outside or inside member of the firm ceases to do his or her best, it is time a change was made'.) Northcroft was particularly influenced by the approach adopted by one of his team, Albert Milnes, another experienced engineer.

Milnes believed that professional advice was an essential part of selling: he was selling not traps but trapping, acting not as a traditional sales representative but more as an engineering consultant. It was a lesson absorbed by his colleagues, one of whom later wrote how 'the Spirax rep was received not as a commercial traveller ... but as a man who would be able to help his clients to run their plant efficiently from every point of view'. One of Northcroft's often repeated sayings was 'all engineers should be trained to be good communicators'. Spirax sales engineers were repeatedly urged to assess the works of every new customer before they agreed to accept an order. In 1935 this was formalised in the 'Spirax Pre-Sales Service Plan', with each customer's plant inspected and assessed by Spirax service engineers who also ensured every trap was fitted properly.

As with *Sarco News* in the USA, best practice was passed on through a monthly publication, *Spirax News*, which Northcroft edited for 22 years after its first issue in 1932. There were also regular technical bulletins, each one aimed at a

different segment of the market, from laundries and dairying to shipping and textiles.

With a recovering economy, quality products and a sophisticated approach to selling, Spirax prospered. In October 1932 Walker, Crosweiler sold more than a thousand traps in a month for the first time, equivalent to the total number the firm had sold in 1927. Each month brought record sales. By March 1935 *Spirax News* could report that ‘we are selling more steam traps in this country than any other firm’. Although the business was not huge, records show that UK sales rose from £27,000 in 1933 to £70,000 in 1935. There are no surviving financial figures for sales for the rest of the decade, but there is an analysis of volume sales for 1932 to 1938. The total number of traps and strainers rose from 9,800 in 1932–33 to 39,000 in 1937–38. While the industrial side, comprising sectors such as automotive, chemicals, paper, shipping and textiles, accounted for two-thirds of volume sales, nearly 30 per cent of all traps and strainers were sold to heating engineers, echoing the similar success in the sector enjoyed by Sarco in the USA.

By 1939 Albert Milnes was writing to his colleagues that ‘in the last five years we have helped each other to lift steam traps from the level of ironmongery and pipe fittings. Spirax Trapping is a real science and many of the most advanced steam users in the country are glad to seek our advice on their problems.’ ‘Our whole policy,’ reported *Spirax News* a little later, ‘has been to get away from the earlier Spirax tradition of commission salesmen handling steam traps and to build up an organisation of technical representatives and engineers, capable of giving advice to steam users on all aspects of their plant and equipment.’ As a result, believed Lionel Northcroft, Spirax could claim to have invented ‘the technology of steam trapping’.

As the UK, thanks largely to Herbert Smith and Lionel Northcroft, became Sarco’s most important market outside the USA, Clement Wells took every

opportunity to increase his control. In 1937 he bought the Sarco Company, which held the rights to the Sarco brand in the UK. If the UK had not been divided between two separate companies, sales and manufacturing, possibly the Sarco Company, which was selling Sarco regulators, would have been merged into the rest of the business. Instead, Wells set up another company, Sarco Thermostats, to carry on the business.

While it may have been tempting for him to apply the Sarco name to all the products made by Spirax, Wells would have quickly discounted the idea, now that Spirax was the leading brand in the UK steam trap market. Nevertheless, Sarco Thermostats worked closely with Spirax Manufacturing, which supplied many of the instruments sold by the former. Sarco Thermostats also drew some products from the US factory, which also supplied parts for assembly in Sarco Thermostats’ small UK factory. There was close cooperation between the factories in the UK and the USA – as one letter from Stanley Crosier, who ran Sarco Thermostats, put it in 1938, ‘I certainly feel that the more closely the English and the American factory are in contact with each other, the better it will be for the development of sales in this country’ – and there was constant correspondence on many subjects between the two companies on either side of the Atlantic. It seems likely that Spirax Manufacturing was in similarly close contact with Sarco Co. Inc.

In the same year that Wells established Sarco Thermostats, Spirax got the chance to move into a purpose-built factory. The political situation in Europe was increasingly volatile and there was concern about the vulnerability of the business if it was still in London when war broke out, since the capital was likely to be a principal target of enemy action. Moreover, the lease on the existing property in London was running out. The location identified by the business was the elegant spa town of Cheltenham, situated in a predominantly rural area some hundred miles north-west of London. While government was already encouraging industry to

THERMOSTATIC CONTROL IN ITS SIMPLE DIRECT FORM

IN MOST thermostatic control systems the force of expansion is not sufficient to operate directly the main regulating valve. Auxiliary power (such as electricity or compressed air) has to be used with, as a result, some complication of the apparatus. All Sarco controllers, however, are self-contained and self-sufficient units. Expansion within the sealed oil system exerts a positive actuating force of such power that regulating valves up to 6 in. are operated *direct*.

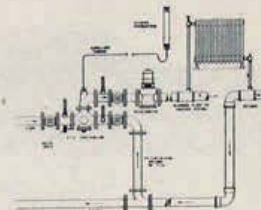


Temperature Regulators, self-operated and direct-acting, for controlling temperature in space heating, air-conditioning plant, hot-water tanks and calorifiers; for drying rooms, stoves, kilns and other dryers; for boiling vats, pans and tanks; evaporators and stills; coolers, cooking retorts, washing machines; acid vats, plating tanks, tanning pits, pickling vats; for cold storage and refrigeration rooms.

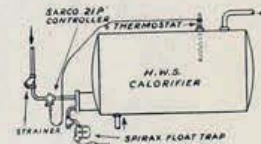
Liquid Blenders and Diversion Valves, self-operated and direct-acting, for blending hot and cold water, brine or other liquid and delivering the mixture at a predetermined temperature. Ideal for large quantities of blended liquid at a steady temperature for process purposes, for container-washing, and for such as textile, washing machines, tanning drums, sewage digesters and so on. For circulating and re-circulating liquids at a controlled temperature; for brine refrigeration plant, for engine test beds; for controlling cooling water temperature in diesel engines and compressors.



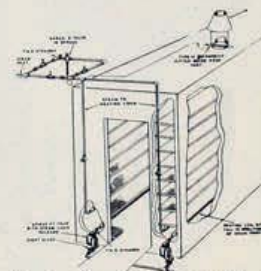
Combined Heater and Regulator, self-operated and direct-acting, for small hot-water tanks, storage cylinders and certain water-jacketed vessels. The Sarco 'Thermocirc' is a small, neat device (less than 11 in. long) that operates on steam supply with the simplicity of direct injection but without risk of waste; a combined water-heater and temperature regulator; simple, reliable, inexpensive.



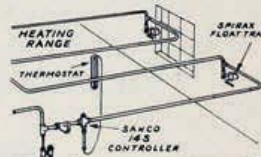
Sarco 'E.T.O.' Controller for advance control on accelerated hot-water heating system.



Sarco Temperature Controller giving on/off control on a hot-water storage calorifier.



Sarco Regulator controlling temperature of steam-heated pottery drying stove.



Sarco Temperature Controller giving gradual control of steam pipe heating system.

Please use this request slip for diagrams and information. Tick the items required and add your name and address in the space below.

YOUR NAME AND ADDRESS

SARCO THERMOSTATS LTD., CHELTENHAM, Glos.

Phone: Cheltenham 5155-6 London Office: 28 Victoria St., S.W.1 Abbey 6101-3892



SARCO THERMOSTATIC CONTROL SYSTEMS

D 1652

move out of the capital, Cheltenham's local authority was campaigning to attract new employment to the town, which was suffering from a declining population and a stagnant economy. The town was also closer to Birmingham, where most of Spirax's suppliers were situated.

Walker, Crosweller managed the project, bought land from the local authority on a new industrial estate at Whaddon in the west of the town, commissioned architects to draw up plans and paid for contractors to construct premises comprising 6,000 square feet of office space and 12,000 square feet of factory space. Spirax took a lease on part of the factory and moved in during the autumn of 1937. The only hitch in the move was the disappearance for a week of the railway trucks carrying all the plant, equipment, fixtures and fittings, which had been shunted into a siding near Swindon. At the time Spirax employed 70 people: the number soon rose beyond 100.

'Our country home,' reported *Spirax News*, 'is the right atmosphere to deal with upheavals, new work, new problems and private and public crises as they arise.' As it turned out, the move into the Whaddon factory would be short-lived. Clement Wells was eager to bring UK sales and manufacturing together under one umbrella. He had seen the benefits this had brought in the USA. He was also irritated by demands from Walker, Crosweller for higher royalty payments as Spirax sales increased, and was unimpressed by what he considered to be the dilatory approach towards business taken by his joint venture partners.

In early 1939 Wells rejected an offer from Walker, Crosweller for his share of the business; they too recognised the future potential of Spirax sales. Wells, as the controlling partner, held the whip hand. He made a counter-offer for Walker, Crosweller's Spirax sales agency and their stake in the Spirax Manufacturing Company. Terms were agreed in March 1939, with a commitment from Walker,

Crosweller not to design, sell or take an interest in any form of steam trap for three years. In June, Walker, Crosweller staff involved in selling Spirax traps moved over to the Spirax Manufacturing Company. As the sole shareholder, Wells appointed Herbert Smith and Lionel Northcroft as joint Managing Directors. Northcroft shared Smith's commitment to the vision and ideals of Wells, which would later prove a crucial factor when Wells was deciding to whom he should sell his own interest in the business.

Spirax also had to find new premises as Walker, Crosweller gave the company notice to quit the Whaddon factory and offices. The company bought a property in St George's Road which came with a factory recently built in the grounds for making sweets. It was too small and not in good condition, but an extension was quickly added for packing and storage. For the time being, sales personnel moved into offices in the Pittville district of Cheltenham. In December 1939 Lionel Northcroft could write that, 'We have, for the first time, a factory which belongs entirely to us, with no mortgages or disabilities. We have a business which from top to bottom is entirely one and is, we hope and think, being carried out with the unity of purpose which has never before been possible.'

The UK business was only one part, if the most important, of Sarco Co. Inc.'s overseas interests, which steadily expanded during the inter-war years. Sarco's first associate company, as the firm liked to describe its international subsidiaries, was in Canada, where Sarco had been represented since before the First World War. Sarco Canada Ltd was formed in Toronto in 1926 as a sales organisation. It was run by Clement Wells's brother, Eric, who had joined Sarco in 1924 in New York, where he worked initially as a draughtsman and then as a local sales representative. Under Eric Wells, the Canadian company flourished. He built up the sales force, imported goods from the American company and appointed agents across Canada.

In the following year, 1927, Econosto became Sarco's agent in the Netherlands, beginning a relationship that still continues today. Based in Rotterdam, Econosto had begun life in 1892 as the Economic Steam Production Agency, winning agencies for a wide number of manufacturers, supplying Dutch industry, particularly shipbuilding. The steam engineering side became a separate business in 1906, taking the Econosto name in 1918. When the firm began looking for a new range of steam traps, it was introduced to Sarco, becoming the latter's first international agent, and selling the first Sarco steam trap in the Netherlands on 29 June 1927.

In 1930, Sigurd Sorum became Sarco's agent in Norway. Sarco's representation in Spain began around 1932 when a small firm, Industrial Mas Nieto, based in Barcelona, responded to an advertisement asking for representatives. The founder of the business, Luis Mas, later recalled how hard it was establishing Sarco in a country that was still under-industrialised. What succeeded, he remembered, was adopting Sarco's technical approach, convincing engineers that steam traps properly installed could make their plants more efficient. Progress was disrupted by the savage civil war, which scarred the country, and only resumed after the Second World War.

Through Sarco Thermostats, an agent based in Warsaw was appointed to cover Poland in 1937, and it seems the same agent was handling sales for Spirax within a couple of years. Wells preferred the American company to handle all export orders, which restricted the UK company's export activities to a handful of sales to Denmark and Poland. 'We would prefer,' Wells wrote from New York to Sarco Thermostats in June 1938, 'to handle all foreign sales from this side but I realise that it may be an advantage to handle some foreign sales thru London.'

By the late 1930s, reported *Sarco News*, the American company was managing 'a very large

number of export shipments', supplying agents not only in France, Norway and the Netherlands, but also in Cuba, Ecuador, India, Sweden and South Africa. Sarco's Indian agent, appointed in 1933, was Bell's Asbestos and Engineering, a well-established British firm with branches across the British Empire. In 1934 Bell's became Sarco's agent in South Africa, where Bell's General Manager had been apprenticed to the same UK heating firm as one of Sarco's senior managers. They also acted for Sarco in Queensland, Australia, from 1937. In New South Wales Sarco was represented by a firm of consulting engineers, Richard Wildridge & Co. In New Zealand John Chambers & Son, based in Auckland, held the Sarco agency.

In July 1937, Sarco appointed its first agent in Latin America, the firm of Fett & Oebauer in Santiago, Chile. In the following year Sarco took its first order from Argentina and also appointed Sainte de Founes, based in Brussels, as agent in Belgium. The New York office often hosted visits from its overseas interests. In 1937, these included Sarco's agents from Austria, Cuba, the Netherlands and Sweden, where the agency was held by Fritz Meyer of Fliesberg, who also covered Finland, as well as James Walker from Walker Croswell.

When Clement Wells dissolved the partnership with the Walker, Croswell agency in 1939, he had already set a precedent for doing so. Two years previously, he had brought to an end the agency held by Richardson Frères in France, disappointed with its performance, and instead had sent over a senior manager, Robert Bolaffio, to set up another Sarco trading company. On 14 May 1937 Sarco Appareils Thermostatiques (Sarco France) was set up in Paris. As well as offices, the original premises featured a small workshop with the intention that the company would start assembling its own traps, but the new business got off to a rocky start and Wells clearly felt let down by the new company's initial management. It took two years to sort out, culminating in the appointment of Albert Ludi to run the business, alongside Marcel



Beechmount, Spirax's original sales office in Cheltenham, c. 1939

Bardin, a qualified mechanical engineer, who took charge of production. These two managed the French company until their retirements in 1971. Sarco France was the fourth associate company, following Sarco Canada, Spirax Manufacturing and Sarco Thermostats.

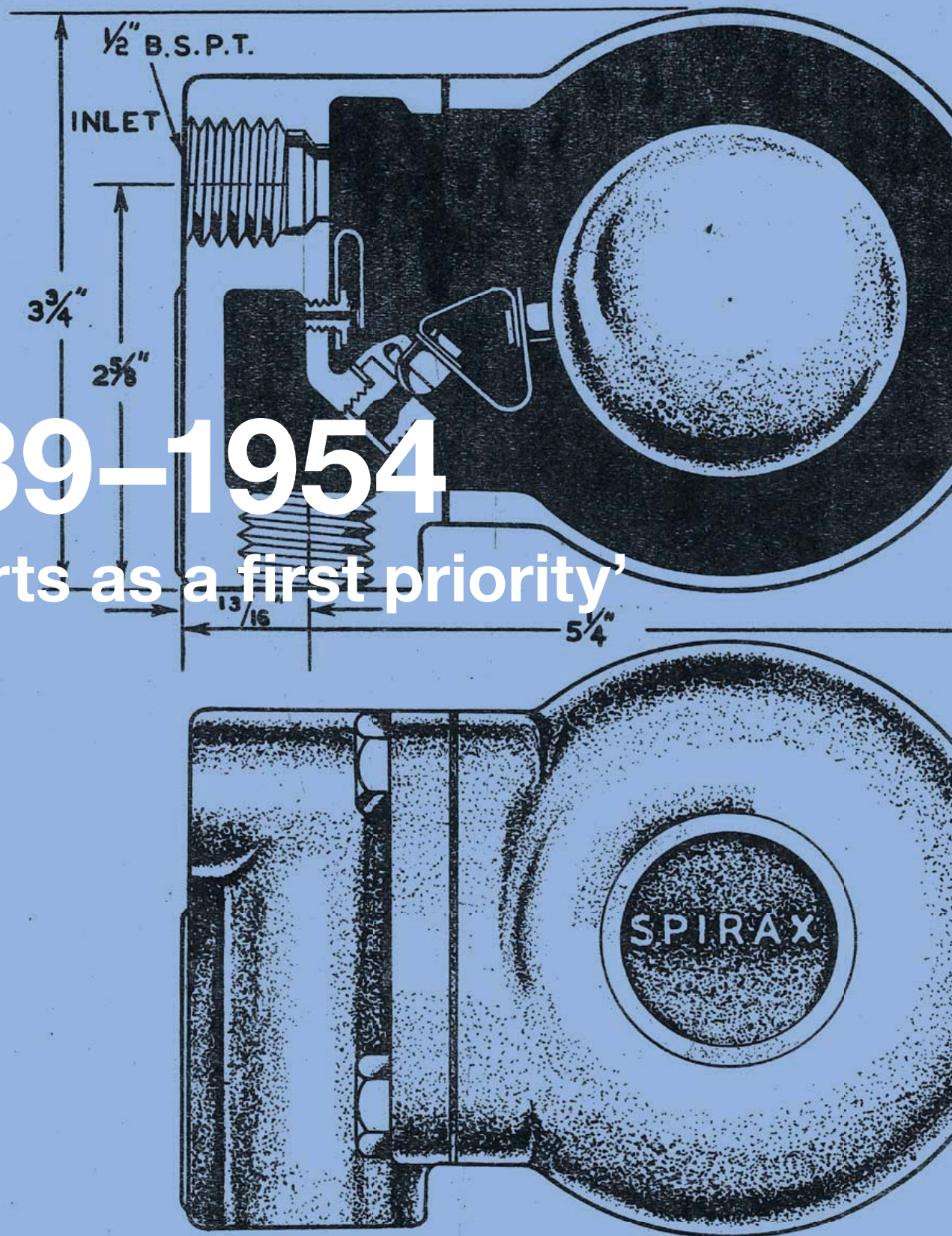
Clement Wells was proving adept at circumnavigating external difficulties thrown up by political and economic crises. This would become a feature of the organisation as a whole as it developed internationally. Just as he had found a solution to

the problems created in the UK by the economic crisis of the early 1930s, so he discovered ways around the economic barriers being thrown up by protectionist regimes in Europe. In Mussolini's Italy, Sarco entered the market for the first time in 1937, when it granted Jucker the right to make and sell Sarco products. In fact, like Walker, Crosweller in 1929, Jucker, based in Milan, began by assembling traps, importing internal parts from the USA and making the bodies in Italy. This arrangement would last many years, ending only in the 1980s.

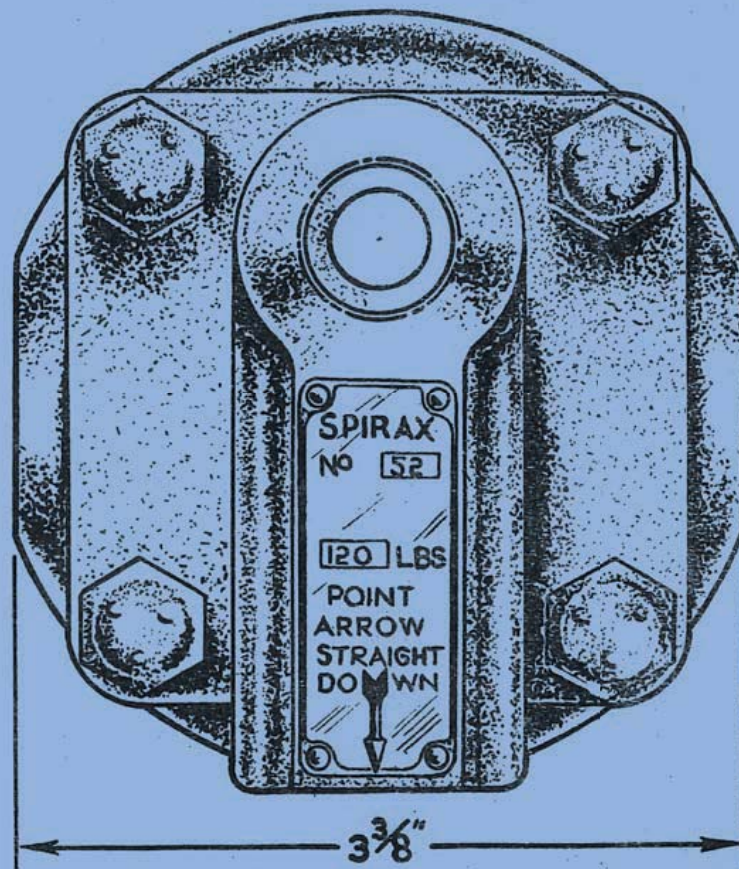
5

1939-1954

'Exports as a first priority'



$\frac{1}{2}$ " FT 51, $\frac{1}{2}$ " FT 52 AND FT 53
SPIRAX
STEAM TRAPS



TYPE	CAPACITIES LBS/CONDENSATE/HR. AT PRESSURES OF					
	20 P.S.I.	40 P.S.I.	60 P.S.I.	80 P.S.I.	100 P.S.I.	120 P.S.I.
FT 53	830 LBS.	1150 LBS.	1370 LBS.			
FT 52	395 LBS.	540 LBS.	650 LBS.	740 LBS.	820 LBS.	881 LBS.

TYPE	CAPACITIES LBS/COND./HR. AT PRESSURES OF					
	100 P.S.I.	120	140	160	180	200 P.S.I.
FT 51	420 lbs.	450	480	508	528	555

SPIRAX MANUFACTURING CO. LTD.
CHELTENHAM GLOS.

DRN. JDR.

CKD. *Am*

APPD. *[Signature]*

DATE 14.11.46.

DWG. NO. T27

‘The work which you and we are doing today is of prime national importance’

By 1939 Sarco Co. Inc. was stretching out across the globe from its headquarters in New York. With companies in the USA, Canada, the UK and France, and some 20 agents scattered worldwide, including manufacturing licensees in Italy and Spain, the Sarco/Spirax brands were making their mark in many places where industrial plants were powered by steam. The only exception was the important UK market where, through the application of the same vision, Spirax had become the leading brand name.

Success in the USA and the UK had been achieved through a very specific approach to selling, based on qualified and experienced sales engineers building up close working relationships with their customers, offering them technical advice and assistance to help them extract from Sarco/Spirax products the greatest benefit for their plants. Spirax in the UK led the way in developing direct selling, while Sarco in the USA had to rely by necessity on a network of distributors to supplement its direct sales force. While the concept of direct selling based on knowledge, service and products was primarily a feature of the businesses in the USA and UK at that time, as Sarco's agents and associates were regular visitors to New York it is possible that some of them may have learned something about how Sarco products were sold, which they might have applied on their return home.

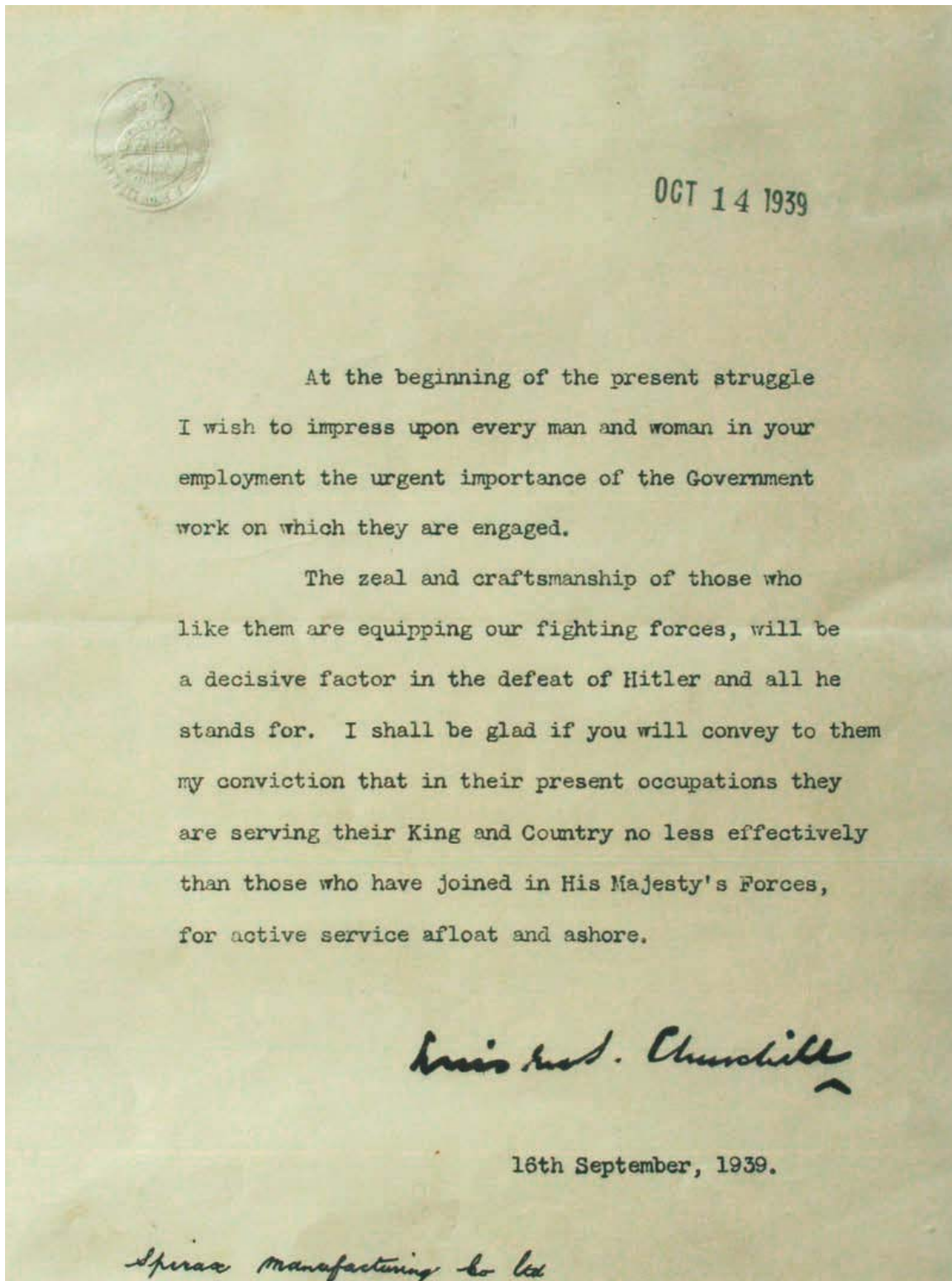
Sarco carried on expanding its network of agents in parts of the world untroubled by a second world war. In 1940 a sales agreement was reached with Sociedad Argentina Técnica Y Comercial in Buenos

Aires, covering Argentina and Uruguay. In 1944 a similar agreement was signed with Oscar Taves & Co. of Rio de Janeiro for Brazil.

In Europe, however, the Second World War made it impossible for most of Sarco's agents, manufacturing licensees or associates to carry on. The exception was Spirax Manufacturing, which played a significant part in the British war effort.

The company already had a strong relationship with the British Admiralty before the war. Early in 1938 it had received its largest-ever order from the Admiralty to supply traps to the naval dockyards in Portsmouth, Devonport and Chatham and the torpedo depot in Greenock. The rearmament programme, accelerated by the British government in the immediate years before the war, proved a fruitful source of orders for Spirax. Spirax traps were even being specified for use in the sirens produced for the Air Raid Precautions service, and the company was winning work from the War Office for Royal Air Force stations, military barracks and militia camps. It was a hectic period for the UK company. With more than 3,000 traps sold every month in early 1939, *Spirax News* reported that 'sales of Spirax traps have been going on at a ridiculous level'.

In the first month of the war Spirax sold more than 6,000 traps. 'The work which you and we are doing today is of prime national importance,' noted *Spirax News*. A circular letter from the Prime Minister, Winston Churchill, praising the work done for the war effort by countless companies,



Letter from Winston Churchill to the Spirax Manufacturing Co., September 1939

including Spirax, was proudly framed and hung on the wall. The company's reputation in the steam process industry for maximising energy efficiency and minimising expenditure made it an invaluable adviser to the British government in wartime. Crucial to good energy management was selecting the correct steam trap; a correctly sized steam trap helped to reduce fuel consumption and increase output. Behind this was the need to sustain exports of coal, one of the country's most important exports, in order to achieve foreign credit, especially from the USA, to pay for essential imports of food and raw materials. Once the war began, domestic coal consumption was cut by three-quarters to allow an increase in exports. Moreover, as more miners joined the forces, productivity in the mines plummeted. Making the most of the scarce available supplies was crucial for factories dedicated to production for the war effort.

The UK factory pulled out all the stops to meet rising demand, with production reaching 85,000 traps for the year in 1941, and exceeding 10,000 traps in a month in January 1942. The most important customers were the Admiralty and the Ministry of Supply, but traps were in demand from heavy industry, including chemicals, paper, shipping and steel, and the dockyards and railways were also major users. Productivity rose steadily, increasing by 50 per cent, despite shortages of raw materials and the call-up of men into the forces. Spirax was fortunate in that its work was given high priority, along with the fact that it could continue to make in wartime the standard products it made in peacetime – and that most of its sales team were too old for military service. In addition, the factory began working 24 hours a day, relying increasingly on female labour, and continued to make 87 different types of trap, some needing 23 different parts. The strain began to show as the war went on, with lengthening delivery times. The factory had to make do and mend as the quality of castings from nearby foundries deteriorated, some using metal recycled from bedposts. The bonds between the Spirax sales team and customers did not weaken.

Representatives were encouraged to visit areas that had been bombed as soon as possible in order to offer customers whatever support they could.

In addition to supplying critical steam system components to help maintain wartime industry, Spirax made a significant contribution to the British war effort by promoting fuel economy. In 1942, with the need for energy conservation ever more urgent, Lionel Northcroft approached the Ministry of Fuel and Power to place the benefit of the company's expertise at the Ministry's disposal. As a result, the company supplied sales engineers for the Ministry's team of lecturers giving talks to plant and factory managers all over the country. A number of them joined regional fuel efficiency committees or became fuel efficiency engineers. Lionel Northcroft joined the Fuel Education Committee in London, and both he and Albert Milnes were members of the Steam Panel, chaired by Oliver Lyle, Managing Director of Tate & Lyle, the sugar refiners. Lyle made himself an expert in fuel efficiency and the economic use of steam; after the war he published both *The Efficient Use of Fuel* and *The Efficient Use of Steam*. Lionel Northcroft himself was the author of *Steam Trapping and Air Venting*, published in 1944, which became a standard industry reference book, and after the war he received an OBE in recognition of his services to fuel efficiency.

Spirax also helped to promote the need for an Institution of Plant Engineers, eventually founded in 1946, for the broader dissemination of knowledge and expertise. The company published a regular series of 'Fuel Economy Bulletins' and in 1940 launched the *Spirax Topics* range of technical leaflets, covering everything from chemicals and heating to food and textiles. *Spirax Topics*, claimed the company a few years later, 'did more than anything else to forward our policy of technical advice'. 'Remember,' wrote Lionel Northcroft many years later, 'ships were being sunk and lives lost bringing oil to this country to be wasted in boilers and process plants and heating systems. At the end of the war our engineers were the most



Ruth Greenfield (seated), Vice-President of Sarco International Corporation, USA, in the early 1960s

knowledgeable group of specialists in the use of steam to be found in the world.'

Once the USA joined the war after the attack on Pearl Harbor at the end of 1941, Sarco too played its part in the war effort. Clement Wells was under no illusion about the danger to freedom posed by Hitler and his allies. In 1938 Wells had made plans to bring Sarco's Austrian representative, Leo Walter, who was Jewish, to the USA with his wife. Walter sent a touching letter of thanks to Sarco Co. Inc. in June 1938, in which he was also appreciative of the help given by the US Consul in Vienna to 'the helpless Jewish people here'. He politely enquired about the possibility of working for Sarco Co. Inc., pointing out that 'it is absolutely impossible for us to take along any money and we must leave all here, with the exception of traveller's baggage'.

As a result, Sarco employed him as a technical author once he arrived in the USA after passing through the UK. Wells, as a Briton by birth, had planned to take personal charge of Spirax when the war came, but found it impossible to cross the Atlantic.

In 1941 Sarco moved from 183 Madison Avenue to larger offices, the gargoyled Farmers Loan & Trust Building at 475 Fifth Avenue, built in 1926, opposite the New York Public Library. As the country moved onto a war footing, Sarco opened a department specifically to handle government orders. Ruth Greenfield worked in the department:

All the government quotations that came in had to come through me; all the navy shipyard work came through me ... I had

a lot to do with several of them at that time because every blueprint that came in and every request for quotations that came was special material or for a special purpose, and the factory really worked overtime, making up equipment for the various new armaments that were being prepared, and ships that were being built, and it was a very, very busy period for us.

Within a year of America entering the war, Sarco's sales had doubled. Many US shipyards, including Newport Shipyard and Bethlehem Shipbuilding, were working under pressure and at speed, demanding parts in a hurry, often requiring one-off specialist products. The company was also supplying traps and controls to US military bases around the world. Sarco's Bethlehem factory was repeatedly extended to try and keep up with growing demand, which only exposed how unsuitable and inefficient the premises really were. To cope with mounting orders, the company was compelled to use subcontractors. Nevertheless, the company, as Ruth Greenfield, Vice-President of Sarco International, put it, 'was booming and money was being made hand over fist'.

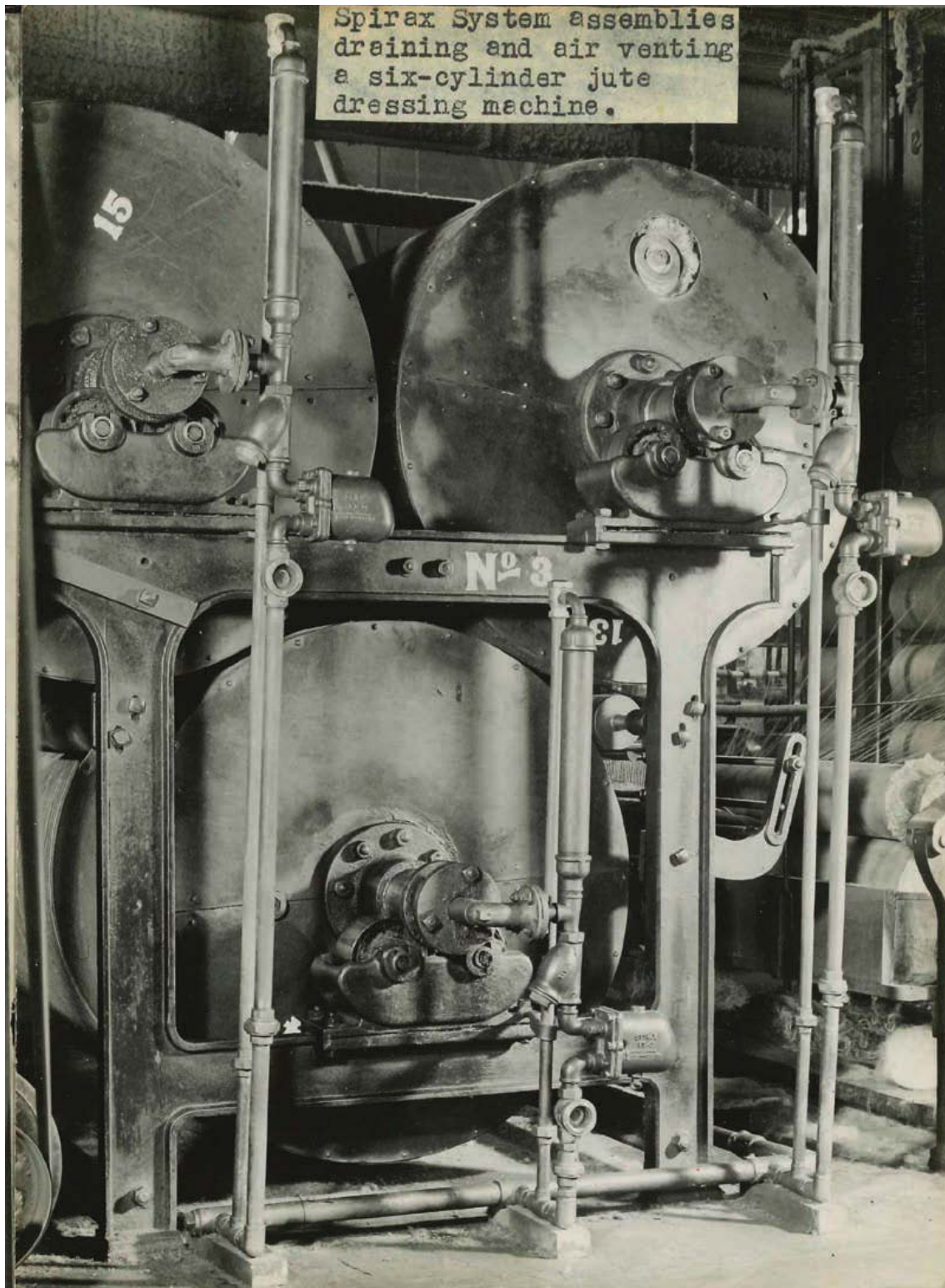
With the US company working flat out for the US war effort, it was unable to supply all the orders flowing in from Sarco Canada. While the Bethlehem factory still managed to supply traps for Canada, the Canadian company set up a small factory at Claremont, just outside Toronto, in 1941 to make other parts. To cover its costs, it also took on lines from other manufacturers.

It was the consequences of the war that fundamentally shaped the development of the international business once peace returned in 1945. Clement Wells had no doubt thought that it would be possible to manage the business internationally just as it had been before the war, but circumstances had changed. While the war had strengthened America, it had weakened the UK. Paradoxically, this would shift the pivotal point for the international

growth of Sarco/Spirax from the USA to the UK. There were two main reasons for this. Firstly, the dollar was in short supply, making it very difficult for any of Sarco's international agents to buy goods from the USA. Sarco was being inundated with requests from agents worldwide to buy from the UK, the biggest manufacturing centre outside the USA. Secondly, the British government was leading an export drive to earn dollars to pay for the country's wartime debts and post-war reconstruction; Spirax, like many other manufacturers, was being encouraged to develop international markets. As Lionel Northcroft wrote in *Spirax News* in 1946, 'it is the duty of British manufacturers to increase exports ... we therefore are treating exports as a first priority'. Without Sarco's consent, however, Spirax had no rights to sell outside the UK. As Ruth Greenfield remembered,

slowly and one by one, Mr Wells, not graciously, not willingly, had to part with some of these territories and give them permission to buy from Great Britain ... I remember he did it with many misgivings and hesitated because he was giving away the best part of himself ... it wasn't for monetary reasons, I think it was just personal reasons, and the fact that he had so much feeling for the overseas part of the business that he just hesitated relinquishing any little bit of it.

Denmark was the first market to which Spirax sent exports after the war. It was a small market that Wells had permitted the company to deal with before the war. By the end of 1945 Spirax had appointed a new agent, Brodrene Dahl, the previous one having been jailed as a collaborator. The war had made life difficult for Sarco France, but the company managed to carry on making very small numbers of traps. After the war, however, the French company also turned to Spirax for supplies to fulfil its domestic orders. Sarco's Dutch agent, Econosto, followed the same path. Within a year of the war ending, Spirax was sending a third of its output to other countries. With Sarco's consent,



Spirax System assemblies draining and air venting a six-cylinder jute dressing machine, c. 1950

the UK company was also supplying Sweden, Norway, Australia, New Zealand, Canada and Argentina. Spirax was also at liberty to appoint new agents either in existing countries or new territories. Bell's took over the whole of Australia, for example, and was also appointed to cover Rhodesia (now Zimbabwe), Malaya (now Malaysia) and parts of India. Portugal was another new market, with an agent first appointed in 1948, as was Finland, served by the Swedish agent Fritz Meyer from Fliesberg in Stockholm.

By far the biggest export market for Spirax in the immediate post-war years was India, which had been less than a sideshow for Sarco before the war. In fact, an expert on the Indian economy from the Federation of British Industries consulted by Spirax advised the company that the market was negligible. This conversation took place towards the end of the war, when flying bombs were still terrorising London's population. 'One indeed came over,' recalled Bill Coleman, the senior sales engineer who would be sent out to India, 'when we were in the middle of our conversation. We were on the fifth floor of the Federation building and were trying to make up our minds whether to continue the conversation as if it was a matter of no moment or whether to crawl under the desk.'

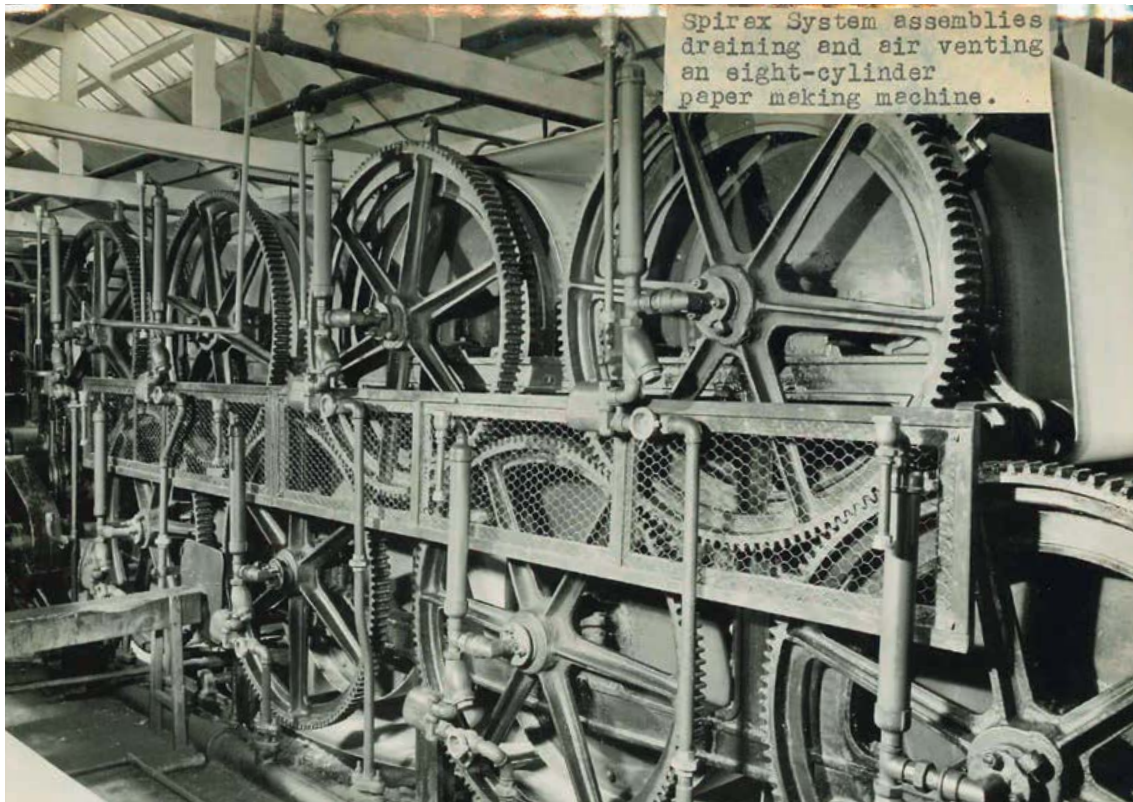
When Coleman arrived in India in 1946, he appointed three new agents, based in Calcutta (Kolkata), Bombay (Mumbai) and Madras (Chennai). The most significant appointment was the agent in Bombay, J. N. Marshall, who already handled numerous other products, including diesel engines, pumps and tractors. Marshall was persuaded to accept the agency after witnessing the performance of Sarco traps already installed in a textile mill in Kurla, a district of Bombay, now Mumbai. As his biographer wrote, 'there he saw that the energy and money saved were phenomenal'. Through Marshall's extensive existing network of mill agents and mill owners, Spirax was able to win significant orders very quickly. In 1950 Marshall recorded that the agency had achieved sales worth

£250,000 since it had begun representing Spirax. He complained, tongue in cheek, that Spirax products were so robust and reliable that his firm was winning hardly any orders for replacements, adding that 'your equipment, due to its robust construction and technical correctness, has enhanced the prestige of our firm.'

The deluge of export orders, especially from India, which at one point accounted for 80 per cent of Spirax exports, as well as the priority placed on them, made it difficult for the UK factory to fulfil demand from the domestic market, leading to cancelled orders and the drift away of some customers. Despite doubling capacity in 1946, with the purchase of another factory at St Mark's Road in Cheltenham, productivity wasn't helped by shortages of raw materials and skilled labour in a country which itself was recovering from the war and entering a period of sustained austerity, with rationing and other government controls over the economy lasting well into the 1950s. Even so, within the UK market, where there were still 26 trap makers in 1950, Spirax led the way, holding half the market.

Government controls in other countries proved an intermittent impediment to international development. In a newly independent India, the government soon imposed import restrictions as a way of encouraging the expansion of domestic manufacturing post-independence. Similar restrictions were imposed from time to time by other nations around the world, from Denmark, the Netherlands and Norway to Australia and New Zealand, all aimed at helping to rebuild domestic industry after the war. To mitigate the impact of these controls, the Norwegian agent, Sigurd Sorum, was permitted to assemble traps locally, as had Sarco's agents in Italy before the war.

The way in which Spirax opened up the Indian market helped to set the pattern for future international development for many years. With the support of a small group of fellow sales engineers sent out from the UK, Bill Coleman provided the



Spirax System assemblies draining and air venting an eight-cylinder paper making machine, c. 1950

help and advice that J. N. Marshall in Bombay needed to develop as process steam engineering specialists. It was not long before ministers from the state government in Madras were commenting that 'Spirax are the only people in India who give correct advice'. As *Spirax News* told its readers, 'the policy of sending out our own specialists to give technical service and advice direct to the steam users in India has been more than justified'. This was all part of spreading across global export markets the direct approach to selling based on knowledge, service and products which had proved so successful in the UK.

Very soon Spirax was also inviting other agencies to send their engineers for training in the UK. Among

the first were Erik Arnberg from Brodrene Dahl in Denmark around 1946 and Brian Henry from New Zealand agent John Chambers in 1949. 'This idea of giving specialised steam training,' noted *Spirax News*, 'to the representatives of overseas engineers is quite certainly the best way of increasing the value of our overseas connections.' It also led to the opening in the UK of the first of many training centres which would appear worldwide. By 1950 Northcroft was writing that

we seem to have proved conclusively that the best way of getting results is by having a Cheltenham-trained engineer [that is, including engineers sent by agents to the UK for training] operating in the country concerned ... All this is carrying to a



logical conclusion what we have said for so many years in this country. The selling of steam traps cannot be conducted on an ironmongery basis but should be done by trained engineers with specialised knowledge.

It was Spirax in the UK rather than Sarco in the USA which welcomed a growing number of international visitors. The first international conference organised in the UK appears to have been held in 1949, benefiting UK staff through 'so many new ideas and new thoughts from outside our organisation'.

Albert Ludi and Marcel Bardin from Sarco France were regular visitors to the UK. They appreciated the support given by Spirax while the French company rebuilt its local market. In 1949 Georges Crosnier joined the company. He would later open up markets in French-speaking North Africa, including Algeria, Tunisia and Morocco, and central Africa, such as Gabon and the Congo. In 1950 Sarco France acquired small premises in Paris.

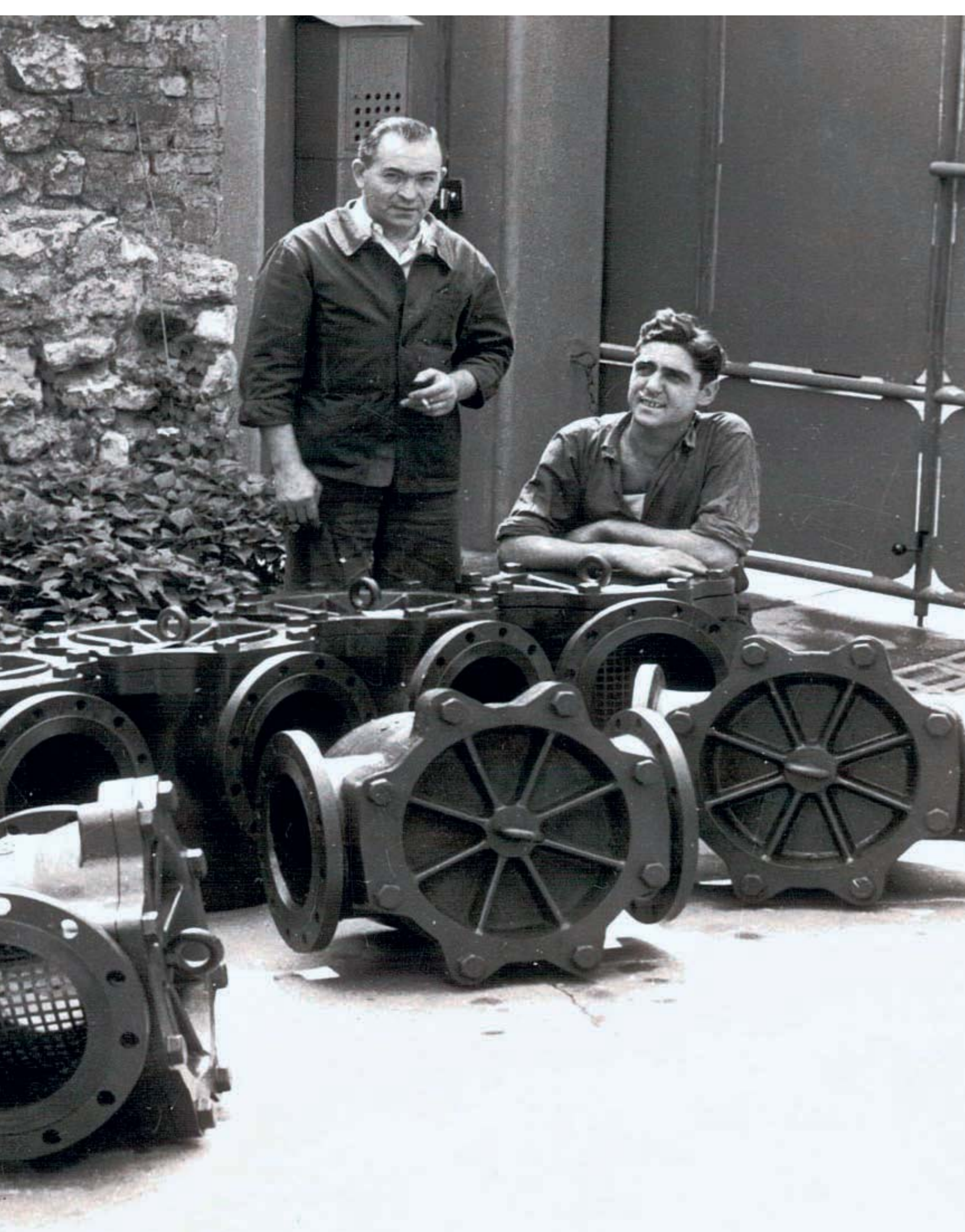
Although through force of circumstances Spirax was taking the leading role in the international development of the business after the war, back in America, Sarco Co. Inc. was also flourishing. Lionel Northcroft was rather dismissive about Sarco's reliance in a much bigger market on a combined network of representatives and distributors. He was particularly critical about the non-industrial heating side of the business because, he believed, heating contractors and stockists 'buy steam traps on price as ironmongery'.

The domestic growth the US company enjoyed during the Second World War persisted in the immediate post-war era. In September 1947 Sarco

had to move offices once more, transferring to twice as much space in the splendid Empire State Building. During the 1930s the US company had expanded largely thanks to its links with heating contractors across the country. The war had shown the potential of the industrial side of the business, which Clement Wells took steps to strengthen after 1945. Wells obviously admired the way Sarco's sales approach had evolved through the influence of Spirax and in 1947 he recruited one of its architects, Albert Milnes, to Sarco. Under Milnes, Sarco created two divisions, one comprising the heating business, the other the industrial business, which he took over, but it appears he soon recognised the challenges of applying the UK approach to direct selling in the much larger USA.

By the late 1940s the biggest factories in the Sarco/Spirax worldwide selling empire were those in Bethlehem in the USA and Cheltenham in the UK. With Spirax now fulfilling most export orders, the Cheltenham factories had grown to meet demand from domestic as well as international customers. As well as the premises in St Mark's Road, used for the machine shop, an extension was completed at St George's Road in 1947. The UK business was also extending the range of its products, adding a new baby float trap in 1945 and the Ogden steam-operated pump in 1948. By the autumn of 1951, the Spirax factories were making more than 30,000 traps, strainers and sight glasses every month.

Spirax was also responsible for the instruments made by Sarco Thermostats, which had relocated to Cheltenham during the war. To accommodate a growing number of people employed in sales and administration, Spirax acquired Charlton House in Cheltenham in 1945. Charlton House was an elegant Georgian mansion, completed around 1810, set in attractive grounds, although it had seen



1939–1954: 'Exports as a first priority'



Sarco France, Paris, January 1952



Charlton House, Cheltenham, 1947

better days, having been used as the headquarters of the US military justice system in Europe prior to D-Day. Charlton House remains the Group's headquarters today.

Sarco's Bethlehem factory was concentrating mainly on supplying domestic orders. The US market for steam traps was three or four times the size of the UK market, while the non-industrial heating sector was 15 times as large. The Bethlehem factory was not very efficient, but the move to purpose-built premises would only take place in the 1960s, long after the UK and US businesses had parted company.

Alongside these two principal centres of production, other smaller facilities were dotted across the international businesses. In Europe, traps were being assembled in France, Spain, Italy and, for a short time, Norway, although their total output remained small. In Spain, Luis Mas had kept in

touch with Clement Wells during the war, even travelling across the Atlantic in a neutral ship to New York, taking a month to get there. Assembling traps was the only way to circumvent the Spanish government's import restrictions. A shortage of foreign currency was another obstacle, and Luis Mas recalled how 'it became necessary to export almonds to get enough foreign currency to buy steam traps!' Industrial Mas Nieto began putting traps together in a small workshop in Barcelona, later moving to better premises at Sant Feliu de Llobregat. In Latin America production began in 1953 when Sarco's Argentine agent was granted a manufacturing licence.

Without a holding company, the entire Sarco/ Spirax organisation was a loose alliance, with Clement Wells in New York at the centre of this network. At the end of the war he had been the sole shareholder in every one of the business's constituent companies, Sarco Co. Inc., Spirax

Manufacturing, Sarco Thermostats, Sarco Canada and Sarco France. He owned the Sarco brand in the UK through Sarco Thermostats, which was allowed to export its own range of products, many of them made in Cheltenham, into Europe, although this was on a small scale.

Through Sarco Co. Inc., he owned the rights to the Sarco brand everywhere else in the world in addition to the Spirax brand in the UK. It was only at Wells's discretion that Spirax was able to develop any international sales. In other words, the business he had built up across the world since the early part of the 20th century was a very personal enterprise.

By the late 1940s Clement Wells was in his mid-seventies. He was beginning to consider how best to secure the future of the business. Over a period of eight years from 1946 he steadily disposed of his personal interest either wholly or in part in the constituent parts of the organisation. His decisions appear to have been guided by an inclination to settle ownership on those involved in each business, but this came at the cost of fragmenting the business. It would take 35 years before it was put back together again.

In 1946, during a visit to France, he had disposed of part of his interest in Sarco France to Albert Ludi and Marcel Bardin. He followed this in 1948 by setting up a cooperative trust to acquire his shares in Sarco Canada, an arrangement that gave a share in the profits to every employee. In 1952 he sold his interest in Sarco Thermostats and Spirax Manufacturing to Herbert Smith and Lionel Northcroft on condition the new business paid royalties to Sarco Co. Inc. for the next 20 years. Smith and Northcroft merged the two companies into one, which they called Spirax Sarco Ltd, incorporated on 19 June 1952. Four years later Wells sold Sarco Co. Inc. to its senior management team, one of whom was Albert Milnes, although the business they took over covered only the USA.

This was because in 1952 Wells had transferred all Sarco Co. Inc.'s international interests into a new company, the Sarco International Company, which he owned outright. Sarco International held the rights to sell Sarco products worldwide, with the exception of the USA, Canada, France and Belgium (where a small subsidiary of the French company had been formed) and the countries where Spirax was trading. Removing the international side of the American business did not go down well with Sarco Co. Inc.'s senior executives, resulting in protracted negotiations over the future of the US company. It was only in 1956 that an agreement was finally concluded.

In just ten years Clement Wells had effectively dismembered the organisation he had built up over the previous half-century. The way in which he disposed of his personal stake in the bulk of the business resulted in its fragmentation and, for many years, seriously compromised the ability of any part of it to develop the international platform he and others had so painstakingly constructed over nearly half a century.

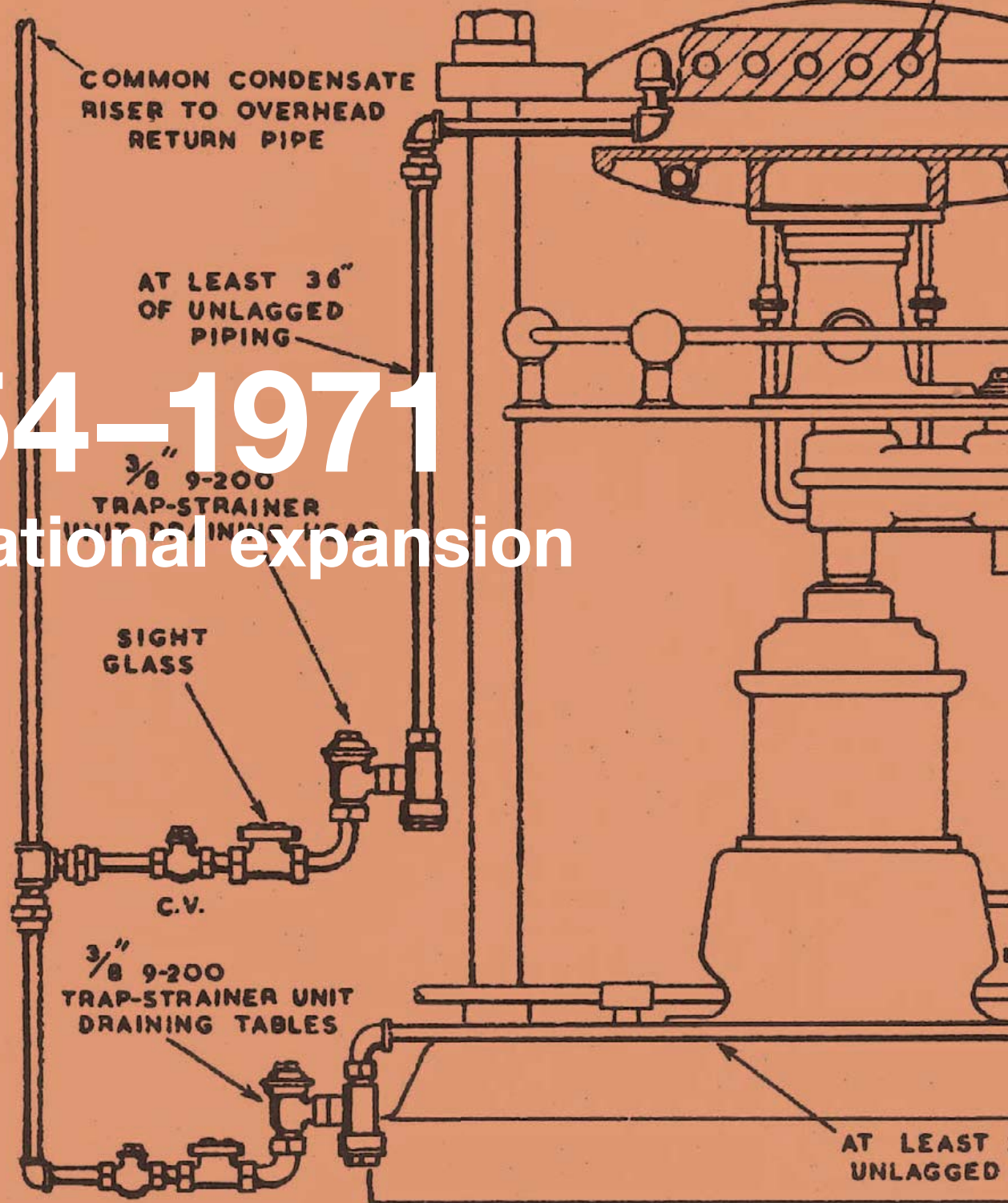


Sales conference, c. 1950.
Front row, left to right: Lionel Northcroft,
Herbert Smith and Albert Ludi

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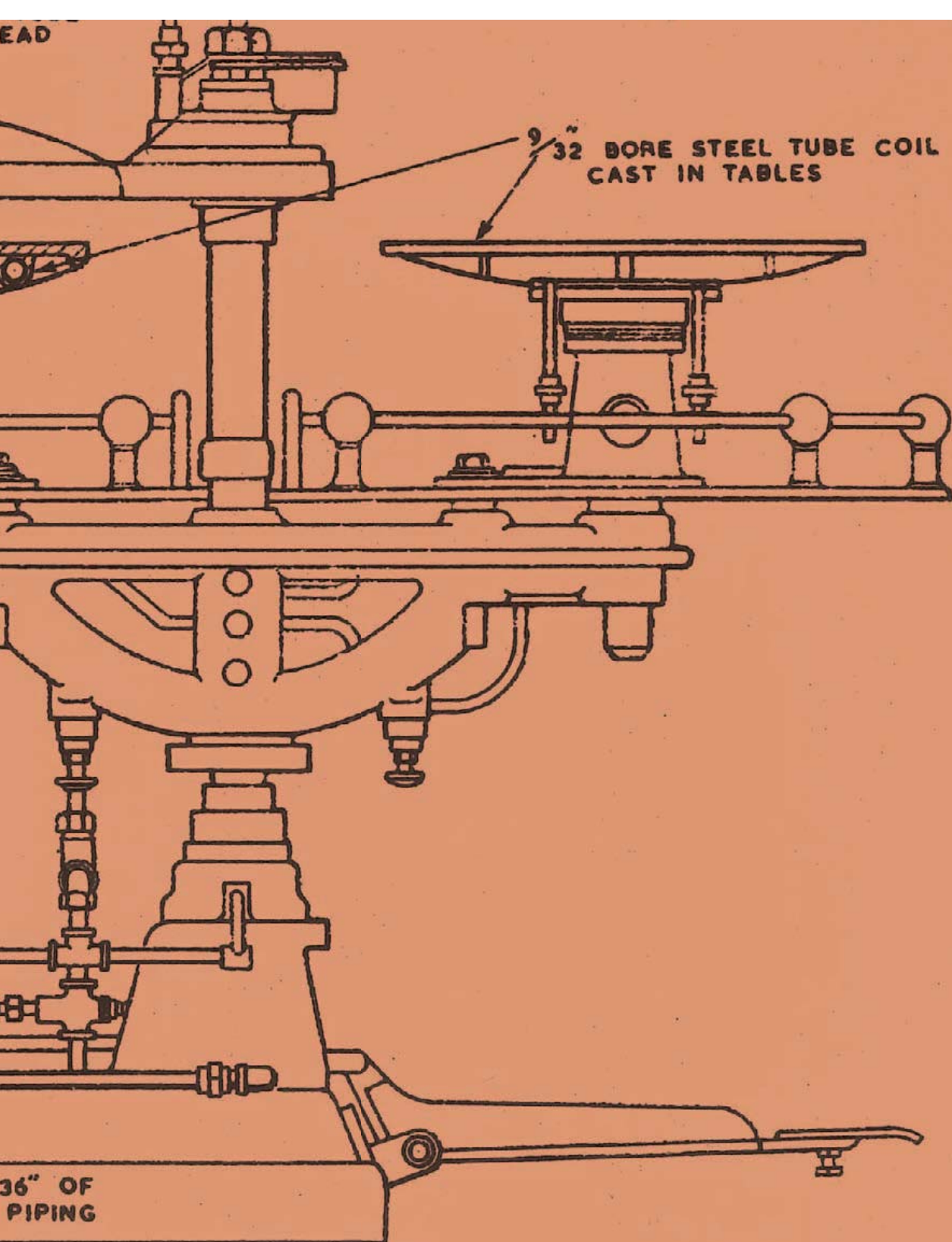
1954-1971

International expansion



SPIRAX 9-200 TRAP-STRAINER UNITS
ON B & G TWIN-RAPID LAUNDRY PRESS

HEAD



SPIRAX - SARCO LTD.
CHELTENHAM GLOS.

DRN. JDR.

CHKD.

am

APPD.

JDR

DATE 21.5.47.

DWG. NO. T54

‘The policy was to make sure the business continued to grow: a strong Spirax Sarco was the best defence against unwanted interest from outsiders’

Of all the previous parts of Sarco/Spirax, the one in the best position to carry on expanding the business internationally was Spirax Sarco in the UK. For Sarco Co. Inc., the American market was a big enough challenge, the biggest steam process market in the world, with a number of strong competitors. Sarco Canada and Sarco France were much smaller businesses. There was plenty of potential in Sarco International, with its exclusive trading rights covering most of the globe, but in reality it was a mixed bag, ranging from a handful of significant interests in Latin America and Europe to a long list of countries where sales were tiny and distribution was handled by agents juggling the products of several other companies. It also lacked direction under an ageing Clement Wells, who had moved to Switzerland, from where he had backed the formation of yet another Sarco company, Sarco Konstanz (Sarco Germany), in 1954.

Spirax Sarco, on the other hand, already saw international development as an integral part of its future. The company prospered in the early 1950s, but there was always a feeling that better things could be achieved. With sales up 50 per cent in 1951, partly because of the rearmament programme accompanying the Korean War, ‘it would be too easy,’ said *Spirax News*, ‘and too smug to be satisfied’. After record years in 1954 and 1955, signalling a period of prosperity probably unprecedented since 1914, *Spirax News* could only comment, ‘Why then should we be comparatively half-hearted about the fact that it was a record?’

Because during the year we had more things to sell.’ The limited international market in which Spirax Sarco was permitted to operate for most of the 1950s was not an easy one. Import restrictions and quotas were still being haphazardly imposed in countries like Australia and New Zealand, making sales unpredictable. The economic turbulence of the Suez Canal crisis in 1956 was another reminder of how the business could be thrown off course by external events over which it had little control. For Lionel Northcroft, the crisis demonstrated how

intimately tied up is the economy of Great Britain with the economy of Europe. We have assumed in the past that we were in some way different. If the tragic events of the past few months have gone some way in persuading Britain that they are now a part of Europe and that they cannot stand as a separate unit, even with the Commonwealth, then in the long run it may well be that everything that has happened has been for the best.

As an insurance policy against the ups and downs of the UK market, Spirax Sarco began looking for other businesses that might have potential. A small machine tool maker, John Such & Sons, was the first, followed shortly afterwards in the same year, 1957, by Heat Transfer, which specialised in heat exchangers. In fact these businesses turned out to be a sideshow, never amounting to much, despite the perseverance of their parent company over many years. (On the other hand, time vindicated



Steam cooking ham, 1950s

the instincts that judged heat exchangers would be a positive addition to the product range, although this would take nearly half a century.)

By far the most important event of 1957 was the unexpected opportunity to acquire Sarco International from Clement Wells. It seems to have been his original intention to sell Sarco International back to Sarco Co. Inc. in New York, but he had been dismayed by the way the management buyout team had run the business, including their departure from the Empire State Building for more modest offices in Madison Avenue, and he had never quite forgiven them for the arguments that had prolonged the negotiations for the disposal of the company. He had clearly been keeping an eye on the performance of Spirax Sarco and as someone with a strong belief that a business is nothing without the people within it, he must have been impressed by the £100 bonus for each employee with which Spirax Sarco marked its successful first year of trading. 'The most extraordinary thing,' remembered Lionel Northcroft,

was that relations between Mr Wells and ourselves had been cordial for some time but very quiet. Every now and again we made contact, and then one day out of the blue I had a letter which said approximately, 'If you come to Zurich you might find something to your advantage,' or words to that effect. Herbert Smith ... and I went over there and found to our amazement that Mr Wells was willing to sell to us, to Spirax Sarco Ltd, not only Sarco International but all his holdings in all his other Sarco companies, Germany and France and what have you.

The price asked was £100,000, all in dollars. Northcroft and Smith agreed, returning to the UK to obtain from the Bank of England, in an age of capital controls, consent for the money to leave the country.

This was undoubtedly a major step forward in building a stronger platform for international development. But Spirax Sarco was initially hindered



Spirax-Sarco Engineering Ltd's Initial Public Offering, 1959

from maximising Sarco International's potential because of the adverse reaction the deal caused among the shareholders of the French company, the biggest of the Sarco companies outside the USA, who had expected to have the chance to buy their own business. Since Spirax Sarco lacked the capacity in management to take over responsibility for the French business, the compromise reached in order to ensure that existing managers stayed on was to relinquish majority control. It would be 15 years before Spirax Sarco finally obtained full control. Throughout that time Sarco International was still based in New York, where it continued to employ a handful of people.

Having achieved independence in 1952, Spirax Sarco was not going to give it up lightly. As a private company, Spirax Sarco ran the risk of dismemberment in the event of the death of either Herbert Smith or Lionel Northcroft because of the need to raise funds to satisfy heavy death duties. To mitigate this risk, the business became a public company on 15 May 1959 as Spirax-Sarco Engineering, selling 30 per cent of its issued shares to the public. It was a popular offer, oversubscribed 20 times, and with each employee receiving a gift

of a hundred shares. The flotation of Spirax-Sarco Engineering not only realised the cash to meet any future tax bill, it also guaranteed the Company's independence, since only a minority of the shares were sold.

As more shares entered the public domain with the passage of time, maintaining independence remained just as important for those leading the business, only the policy adopted by successive generations was to make sure the business continued to grow: a strong Spirax Sarco was the best defence against any unwanted interest from outsiders. As a result, Spirax-Sarco Engineering plc remains the independent parent company of an expanding international business.

Another aspiration of the business as it secured its immediate future was the eventual unification of the disparate parts of Sarco/Spirax worldwide. For Lionel Northcroft, who had become sole Managing Director in 1959 when Herbert Smith retired, it was essential that 'we must strive to perfect the liaison not only with the manufacturing centres of the world but also between the individual manufacturing and selling organisations'.

His chosen method of doing so in those days before instant global communication was meeting people face to face all over the world. He himself made a number of international trips – such as across Europe in 1946, to India in 1948, South Africa in 1954, Australia and New Zealand in 1955 and South America in 1959 – as did many of his fellow Directors and senior executives, who were also frequent travellers. In meeting with Spirax Sarco personnel and business associates around the world, Northcroft was exemplifying the importance of personal contact, which he recognised and promoted as crucial for successful sales growth. ‘We believe,’ observed the Annual Report in 1959, ‘that personal contact and instruction alone can ensure success in the marketing of our technical products.’ Regular personal contact with customers still remains an essential part of the business.

One important destination for Northcroft during his international business travels was India, where Spirax had made such strides after the war. Progress had been more chequered in the face of import barriers raised by the Indian government. This culminated in the denial of import licences to the agents of foreign principals in 1958 as part of the government’s New Industrial Policy. The solution was the first joint venture between Spirax Sarco and any of its international agents and distributors. It was the company’s leading agent, J. N. Marshall, who proposed the two parties should join together to build a factory for making traps. A joint venture was formed, under the name of Spirax-Marshall; Spirax Sarco held a 51 per cent stake, although effective management control lay with Spirax Sarco’s partners. The factory was built during 1958 and opened in Poona (now Pune) in the following year. The first works manager, seconded to the factory for a year from Cheltenham in 1959, was Len Hack, setting a pattern for the future, where new international ventures were helped to find their feet with the help and advice of experienced UK managers before they were handed over to able successors recruited and trained locally.

The first Spirax Sarco steam traps made on the Indian subcontinent were soon being despatched, and the factory was making a profit within a year. Not only was the factory making goods for all the Spirax Sarco agents in India, it was also offering technical support to customers in Pakistan (where Zelin was appointed as agent in 1967) and Ceylon (now Sri Lanka). Another innovation was the creation of Spirax Sarco’s first international training centre in India by 1960. While Marshall kept the Spirax name at the forefront of the steam process industry in India, and became the company’s sole agent by the end of the 1960s, for many years any financial benefits for Spirax Sarco were limited by punitive levels of taxation.

Latin America was also on Lionel Northcroft’s itinerary. Towards the end of 1959 he visited Argentina, Brazil and Uruguay. In many Latin American countries the situation was much the same as it was in India, with protectionist governments raising barriers to free trade as a means of encouraging local manufacturing.

Since 1953 Sarco products had been made under licence in Argentina by Sociedad Argentina Técnica Y Comercial in Buenos Aires. Northcroft was forging new links in 1959 which came to fruition four years later, when another joint venture was agreed with a local machine tools manufacturer, Alfonso Aguilar. Spirax Sarco, through Sarco International, once again took a 51 per cent stake. The new business, Sarco Argentina, was located in a new factory completed in Buenos Aires in 1964. While the factory principally supplied Argentinian customers, it also fulfilled orders from Bako, Spirax Sarco’s agent in Uruguay. For Spirax Sarco, it was a way of making sure it retained its presence in the market in the face of growing local competition. It was soon making money – ‘a small but aggressive unit’ and ‘a story of success’, according to Spirax Sarco’s Annual Reports in the late 1960s. By 1970 it was one of the Group’s fastest-growing companies.

A COMPANY HISTORY SUMMARY

SPIRAX SARCO IN BRAZIL

In 1944 Oscar Taves & Co. of Rio de Janeiro became Sarco's Brazilian agent. Agency arrangements ended in 1959 and Sarco Sul Americana was formed as a joint venture between Spirax Sarco and R. S. Hall Ltda of São Paulo in 1960. Spirax Sarco gradually increased its stake in the business, which was renamed Spirax Sarco SA in 1983, at which time the Group owned an 85 per cent stake in the business. The business eventually became a wholly owned subsidiary of the Group in 1991 on the retirement of Cicero Macedo as Managing Director.

Manufacturing began in 1960, producing TD traps, filters and viewers, based on existing designs. In the same year the company also set up one of the first Spirax Sarco training centres. By 1962 the Brazilian factory was supplying steam products to Chile, Paraguay, Uruguay,

Peru and Ecuador. A larger factory was built in Cotia, outside São Paulo, in 1978, when new products were added, including safety valves. A new training centre followed in 1983.

From the 1990s, following the appointment of Jairo Soares as product engineer, the Brazilian company began designing its own versions of several Group products, including TD traps and safety valves. Other key contributors were Jose Pereira de Jesus and Roberto Dorignon.

A specialist safety valve plant was developed in 2007 and the company became Spirax Sarco's global safety valve centre of excellence in 2014. This specialisation, in which Paulo Guilherme has played a leading part, was further strengthened in 2016 with the acquisition of Hiter, a leading Brazilian control valve manufacturer.



Sarco Brazil's manufacturing facility, Cotia, São Paulo, c. 1978

For similar reasons a comparable enterprise was formed in São Paulo in Brazil in 1959 and began operating in 1960. Sarco Sul Americana was formed in partnership between Sarco International and a local business, R. S. Hall, where Robert Hall was Managing Director and Cicero Macedo the Production Director. Macedo played a key role in the development of the business, training in the UK before taking up his position, and eventually taking over as Managing Director. The Brazilian factory, located in the Barra Funda district of the city, produced its first traps in September 1960 on machines sent out from the UK. Within a couple of years the Brazilian business was supplying traps to Bolivia, Chile, Ecuador, Paraguay, Peru and Uruguay. As in India, a training centre was also opened in Brazil. The original factory soon proved too small, and in 1964 a new one was opened. Within a few years another extension was planned to meet rising demand so that Sarco Sul Americana, in the words of the 1970 Annual Report, could hold its place 'in this highly inflationary but explosively expanding country'.

The two manufacturing plants set up in Brazil and Argentina would become an integral part of Spirax Sarco as the Group expanded internationally, and they remain so today. It was not easy operating in two countries at a period in their development when political and economic crises were the norm rather than the exception. These two outposts of the growing Spirax Sarco band of international businesses learned to cope with these ups and downs as a matter of course, demonstrating a resilience in the face of adversity that stood as an example of what could be achieved in difficult circumstances.

Other than overcoming import barriers, there was another reason why it was in Spirax Sarco's interest to set up local manufacturing facilities. Under the agreements reached with Sarco Co. Inc. in 1952 and 1956, governing trading rights across the world, Sarco International was largely tied to the American factory for the products it supplied to the many

agents it had in Latin America. This was never an easy relationship, since quality from the US factory varied, and the range of products it made was inferior to that offered from the factories in the UK.

In the rest of the world, manufacturing was still being carried out by licensees in Italy and Spain, while a licence had also been granted to the existing agent in Sweden, Fliesberg. Also included among the manufacturing licensees listed in 1959 was the Mexican firm of Especialidades para Vapor (EPV), based in Monterrey. It seems that EPV had originally been set up to sell Sarco products imported from the USA and, as elsewhere, local manufacturing became an effective way to overcome restrictions on imports and improve customer service. EPV also secured the agency for Mexico in 1962.

Outside the UK, the principal factory was based in France. The original workshop in Paris was completely unsuitable, and plans were put in hand for a new factory, completed in 1961 on a site acquired at Châtellerault, not far from Poitiers. There was also the small factory run by Sarco Germany, and although this was expanded and modernised in 1962, the market was very difficult, with well-established competitors, notably Gestra. The German factory became much less important, eventually closing in 1984. This was partly because of the increased output coming from France, where it was agreed to double the size of the Châtellerault factory in 1965.

Import quotas continued to hinder progress in Australia and New Zealand during the 1950s, although both countries were easing restrictions by the end of the decade. In Australia, Bestobell took over the agency for the country as a whole, while in New Zealand Spirax Sarco set up a small manufacturing and assembly venture in 1964 in partnership with Andrews & Beaven, who had taken over John Chambers, the previous distributor. Bestobell also continued to represent Spirax Sarco in South Africa, and it was concern over the possibility that Bestobell might give up

these agencies that deterred the company from establishing production facilities in either country.

By 1962 Spirax Sarco was represented either directly or by agents in 71 countries, from Ghana, Kenya and Nigeria to Singapore, South Korea and Taiwan. Export sales were still small, and in 1961 well over half of those went to European countries, with a further 20 per cent going to former colonial territories like Australia, New Zealand, Rhodesia (Zimbabwe) and East Africa. Attempts were being made even then, at the height of the Cold War, to open up markets behind the Iron Curtain. In 1958 Spirax Sarco was part of a consortium engaged on the air venting and steam trapping of large tyre vulcanisers being sent to Russia, and the steam traps included in the consignment were

probably the first Russian export order fulfilled, albeit indirectly, by the company. Five years later, Spirax Sarco also attempted to revive its presence in Poland, where small numbers of traps had been sent before the war.

For Lionel Northcroft, Spirax Sarco's success in exporting showed the rest of the UK manufacturing industry that it was not as difficult as some said. 'We were very small in 1945 when I first went abroad and made our initial overseas contact, which cost the firm perhaps £100 and a week of my time. We are only a medium-sized organisation now but we do business in 64 countries.' There was no reason, he stated, why exports should be any less profitable than home sales. One of the most important steps to take, he advised,



The 'Old Order Room', Spirax Sarco, Charlton House, Cheltenham, 1960



Sarco France's Châtellerault factory, 1962

was making sure you entered a new territory quickly and sent the best person you had to start things up. He always believed that international success depended on early entry in new territories, coupled with a determination to sustain a market presence in the long term, a philosophy upheld by successive leaders of the business and still in evidence today.

Another important factor in international success was the application wherever possible of direct selling and certainly of the technical approach that had proved so fruitful. As Northcroft stressed in 1965, commenting on the incursion of US trap makers into the UK market, Spirax Sarco must not move away 'from continuing to sell service and advice and proper engineering'. Applying this policy

internationally became known within the business as 'spiracisation' (a later version was 'spiraxisation'). It combined the despatch of managers abroad to develop this approach with agents and distributors, as Spirax Sarco's export manager achieved in Spain and Portugal in the early 1960s, with well-established training programmes for international engineers held in Cheltenham. Upon returning to the UK after visiting agents and customers in Kenya, Uganda and Tanzania in 1971, one manager wrote that 'the problems that engineers have in East Africa ... are not always appreciated by British manufacturers ... a company such as ours which can offer comprehensive literature, stocks of equipment, spares held locally and a wide range of education and instructional material, stands head and shoulders above the rest.'



The Olympia exhibition stand, 1964; Drayton Controls was acquired in 1963

The company's positive strategy of international expansion was hindered by an ill-conceived parallel strategy of diversification in the UK. This stemmed partly from an anxiety over the future of the UK steam trap market. The fear was unfounded, but this only became evident after Spirax Sarco had attempted to bolster the UK business with a major acquisition that held back the development of the whole Group. Spirax Sarco had previously acquired one or two small businesses, and added to these over the next few years, but none of them added much value and all of them were eventually either closed down or sold. The exception was the takeover of Spirax Sarco's principal UK competitor, Drayton Controls, which was attractive not only because of its existing business in steam traps but also because of its involvement in the wider controls field. Talks began between the two sides in 1960 and were held on and off over

the next few years without reaching agreement. In 1963 an offer for the business from another suitor forced Spirax Sarco's hand. A bidding war ensued, precluding much due diligence, with Spirax Sarco emerging as the winner. It was, Northcroft said, 'a natural step forward which cannot help but make for stability and further growth'. But too much money (£860,000, a sizeable sum in those days) was paid for a business Spirax Sarco would never succeed in turning around.

Ironically, it was the stunning success of one of the most innovative products ever launched by Spirax Sarco which was responsible for causing almost terminal damage to Drayton. The thermodynamic trap, known as the TD, had been launched in the UK in 1957. It was part of a programme intended to make sure Spirax Sarco kept its place in the market and sustained its reputation for quality products

professional advice and good customer service. As one Annual Report put it a few years later, expansion 'depends upon the continuous introduction of new and improved products for the home market, coupled with even more intensive cultivation of the export field'. By the late 1950s the range had already added thermostatic valves, steriliser controls and inverted bucket traps, although none of these could match the sales of the original Spirax trap.

The TD trap was in a class apart from all these developments. An earlier historian of the company described the new trap as 'arguably the most significant development in steam trapping worldwide'. At the time of its UK launch, Lionel Northcroft had written how Spirax Sarco was 'in a position to startle the trapping community'. Unsuccessful attempts had been made in the late 1870s to develop a thermodynamic trap, but little further serious work was done on the idea until the 1940s, embodied in a 1944 Australian patent for improvements relating to steam traps. Sarco Co. Inc. carried out development work based on the patent, but the US factory was unable to make a satisfactory working model and the prototype gathered dust. Shortly before Wells sold his shares in Sarco Co. Inc., the project was revived, the trap was redesigned (by a professor of thermodynamics at the Brooklyn Polytechnic Institute) and a new patent was taken out and transferred to Sarco. The professor's small working model had astonished sceptical engineers when it was tested at the Bethlehem factory, proving to have a capacity several times in excess of similar-sized standard traps.

An agreement was reached between Sarco's US management team, who now controlled the US factory, and Spirax Sarco in the UK for the new trap to be made on both sides of the Atlantic. Due to the restrictions placed by Clement Wells on the export business of both companies, the US company, whose business was limited to North America,

a sphere out of bounds to Spirax Sarco, had little to fear in terms of competition from Spirax, whose main market continued to be the UK. In the US thermodynamic traps were made from bar stock, while in the UK they were made instead from a variant of stainless steel. The new trap was an immediate success in both markets, becoming

All the fun of the fair

AS WITH fairgrounds, so with steam traps. You pay your money and you take your choice. But need there be all that much choice in steam traps? If the modern tendency is simplification, why do we go to the trouble of making traps which operate by various principles? The answer is clear. We believe that the most profitable steam usage, with the least trouble, demands this choice. The practical experience of users of our traps proves our point. When they want a choice of operating principles, they come to us. For open top bucket traps: inverted bucket: ball float: liquid expansion thermostatic: balanced pressure thermostatic. On some applications, of course, these principles are largely interchangeable. For other applications, one principle is better than another, for higher production, longer life and less trouble. And there are those applications where real knowledgeable steam engineering recommends only one type. Our famous little pocket manual describes the Spirax range of steam traps, how to choose them, and how to fit them. A constant reference in many parts of the world, it can be more widely known, still in return for the request slip.

When it is possible to make steam traps on other principles—fully reliable and doing a better job than any other kind—Spirax will make them.

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Spirax-Sarco Ltd steam trap advertisement, 1957

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Up to 550°F.

10-350 psi without adjustment

Unaffected by superheat, waterhammer, vibration, corrosive condensate and freezing

Discharges condensate when present

Shuts tight on no load

No condensate seal or prime

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Please post full details of the versatile new Spirax 'TD'

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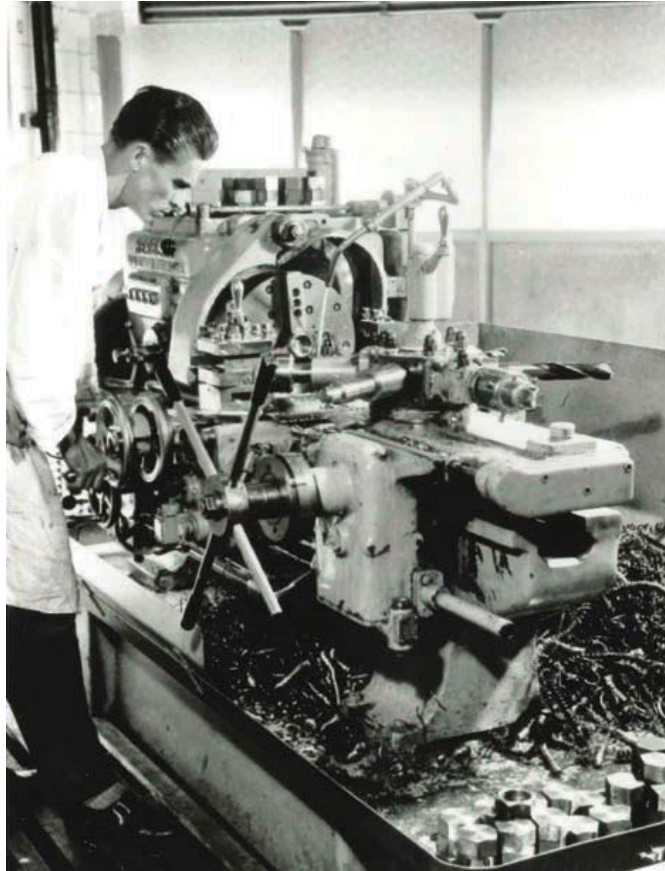
EG1158

Spirax-Sarco Ltd, Cheltenham, Glos. Phone: Cheltenham 5175-76
London: 28 Victoria Street, SW1 Abbey 6101-3632

Spirax-Sarco Ltd thermodynamic steam trap advertisement, 1958

central to the profitability of the US company, and in the UK it accounted at one time for 40 per cent of all steam trap sales, causing some anxiety about the future lifespan of other Spirax Sarco products. Simple, rugged and resistant to water hammer, the thermodynamic trap was almost maintenance-free. It was never intended to be a universal trap, but it took the UK market by storm, seriously damaging sales of rival manufacturers. One of the first customers for the new traps was the oil giant Esso, which installed 700 for the first phase of the company's new refinery at Milford Haven in Wales. Competitors tried hard to make a similar product without infringing Sarco's patent, but none of them proved superior to the original version. As one contributor to *Spirax Sarco News* wrote in 2000, 'in terms of value to our business, the TD appears in a league of its own'. By then, some seven million TD traps had been sold, and the Group was still selling 350,000 every year, worth £25 million.

Nothing that was developed during the 1960s had the same impact as the thermodynamic trap. Spirax Sarco met demand from the oil and petrochemical industries by adding a bimetal trap to the range, but it would be some years before the company tackled this growing sector properly. The well-established Sarco temperature regulator, largely unchanged since the early 1930s, was redesigned to permit volume production, and helped to expand sales. Unusually, Spirax Sarco reached agreement in 1967 with another manufacturer, the US company Monnier Brothers, to make and sell Monnier filters, regulators and lubricators for compressed air, a new market for the company. Spirax Sarco had to work hard to make the Spirax Monnier range a success, having to pioneer once more its knowledge-based approach to sales in a market where price was still the main consideration. Even so, 50 years later, Spirax Monnier filters and regulators are still being sold in their latest improved versions.



Thermodynamic steam trap manufacturing, Sarco Argentina, 1965

The success of the TD trap undermined Drayton's core business, causing Spirax Sarco to embark upon an ill-advised buying spree in an attempt to diversify into other fields. After transferring the steam trap business, nothing Spirax Sarco tried (and it tried very hard) could revive the rest of Drayton. It was an albatross around the neck of Spirax Sarco. One Director later observed, 'this take-over was the worst thing Spirax Sarco had ever done'.

Perhaps the major consequence of this ill-fated deal, and one of the most immediate, was that it left Spirax Sarco unable to afford the chance to

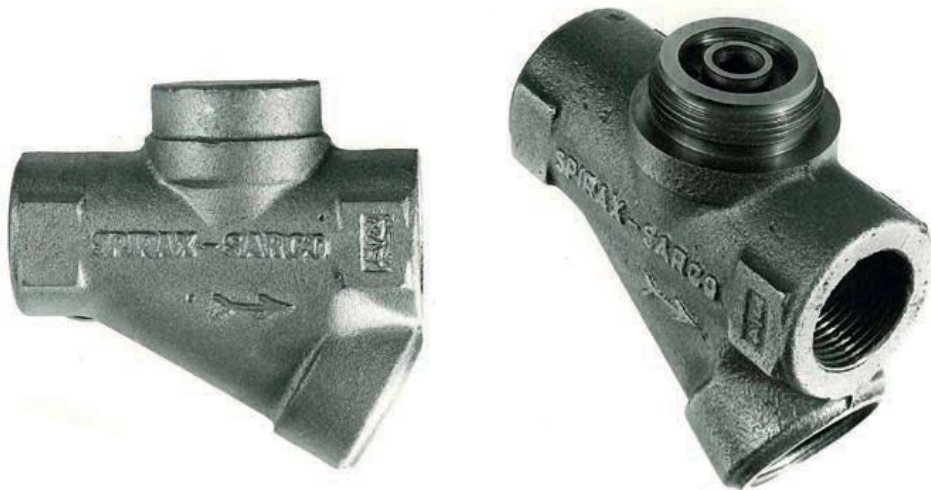
reunite the US company with the rest of the Sarco/Spirax business. Prior to the Drayton acquisition, Spirax Sarco had been making positive noises to Sarco Co. Inc. about the possibility of buying the business, whose leaders were seeking an opportunity to sell as they neared retirement. That was why one of the first international visits made by Lionel Northcroft after the flotation of Spirax-Sarco Engineering in 1959 was to the USA. As the investing public scrambled to buy shares in the UK business, his flight to the USA was a calculated part of what he described as his 'pursuance of our new-found policy of international collaboration with all the Sarco

associates'. Two years later, finally giving up its higgledy-piggledy plant in Bethlehem in favour of a brand-new purpose-built factory a few miles down the road in Allentown, the US company made itself more attractive to outside suitors. It was unfortunate that the decision to buy Drayton precluded Spirax Sarco from being among them. Instead, in 1964 Sarco Co. Inc. became part of White Consolidated Industries, a fashionable conglomerate bent on an acquisition spree to diversify away from its old-fashioned loss-making sewing machine business. The deal was not advantageous for Sarco Co. Inc. The company became subsumed within the conglomerate, losing its identity and direction. It took almost another 20 years before the US business was reunited with the UK business.

As for Drayton, one false dawn followed another as Spirax Sarco struggled to sort out the business. Annual Reports regularly recorded hopelessly optimistic assessments of the business's future. 'The Group is on the point,' said Lionel Northcroft, in 1969, 'of seeing the

last of its lame ducks restored to proper forward propulsion.' Drayton never went anywhere. Its poor performance reduced the profits available for investment in the rest of the Group and made the Directors much more cautious about making other significant acquisitions. Over the years bits and pieces of the business were closed down or sold off, and eventually what was left was sold in 1993 for a fraction in real terms of what Drayton had cost 30 years before. Yet the final disposal of Drayton did mark a positive step forward, for in its place Spirax Sarco had already acquired Watson-Marlow, which would turn out to be an unforeseen global success.

It was only in 1965 that figures for sales were publicly issued for the first time, split between the UK and the international companies. The pattern over the next few years was for a steady increase in the share of sales taken by the latter. In 1965 the Group's sales totalled more than £6 million, of which UK companies accounted for 77 per cent. Sales made by European companies made up 15 per cent of sales, with the balance



Thermodynamic steam trap, Spirax Sarco, c. 1958

made up by companies in the rest of the world. Profits were split in exactly the same proportions. In reality, the contribution in turnover and profits from international sales was already greater than reported, since the published figures do not take into account the significant exports made from the UK to all those agents and distributors dotted around the world. Ironically, since both strategies were pursued in parallel, international sales proved an invaluable counterweight to the drag on performance resulting from the UK diversification programme. This was the conclusion of a financial review of the business carried out prior to the appointment of Northcroft's successor, Tony Brown, in 1968.

No wonder that the 1968 Annual Report stressed that the international companies were already 'a remarkable story of increased turnover and profits'. In 1969, the Annual Report described Spirax-Sarco Engineering as 'truly an international company but one with a firm home base'; international companies accounted for a third of sales by value.

Tony Brown took over from Northcroft as Group Managing Director and was also appointed Deputy Group Chairman, succeeding Northcroft as Group Chairman on the latter's retirement in 1971. Brown took the opportunity to pay tribute in that year's Annual Report to his predecessor, who had done so much to shape the business over four decades:

His energy has been applied to the development of the company from its earliest years with a rare mixture of breadth of vision, capacity for painstaking detail and appreciation of the troubles and frailties of humanity; he has never lost the ability to deal with matters of broad commercial policy and yet in the next

instant to inquire after the health of a sick pensioner. Some of this attitude to life and work has ... helped to form a very sound base for the future of your Group.

Lionel Northcroft's name stands alongside those of Clement Wells and Herbert Smith as the true founders of the business that prospers today.

Under Brown's leadership, Spirax Sarco accelerated the profitable policy of international expansion while embarking as far as possible on the elimination of under-performing businesses. As one of Brown's colleagues, Chris Tappin, later observed, 'In the 1960s Spirax had become a diversified group of companies and was in danger of losing its way. [Brown] masterminded the policy of concentrating the Group's resources of people, marketing power and money into developing the Spirax Sarco business into the global organisation which it has now become.' This strategy soon showed results. As part of the Group's long-term aspiration of becoming sole owner of the various Sarco businesses, Sarco Germany became wholly owned in 1968. The following year, as part of another long-term ambition to establish a direct presence in existing sales territories, either instead of or alongside existing agents, a branch office was formed in Denmark. The Danish branch proved an immediate success, breaking even within six months and making good profits. In 1970, negotiations also began to take over Sarco France in its entirety.

By 1971, with a surge in European sales, as well as a drop in UK sales, the proportion of international sales stood at 46 per cent. With over a quarter of the Group's profits coming from international sales that year, it was already recognised that Spirax Sarco's spreading global footprint could help to even out varying economic performances in different countries.

7

FIG. 1 AIR VENT ON SIDE
REMOTE FROM STEAM
INLET

STEAM IN

PEDESTAL
PAN

APPROX. 3 FT.
OFF INLET

1971-1990

'New methods, new motivations,
new attitudes to selling'

SIGHT GLASS

NO. 40 TRAP -
STRAINER UNIT
SS PATTERN

CONDENSATE RETURN

THESE UNITS CAN BE SUPPLIED IN $\frac{1}{2}$ " OR $\frac{3}{4}$ " SIZE.

SS PATTERN DENOTES SIDE INLET STRAINER WITH SIDE OUTLET

SA DENOTES SIDE INLET STRAINER WITH ANGLE TRAP

AS DENOTES ANGLE STRAINER WITH SIDE OUTLET TRAP

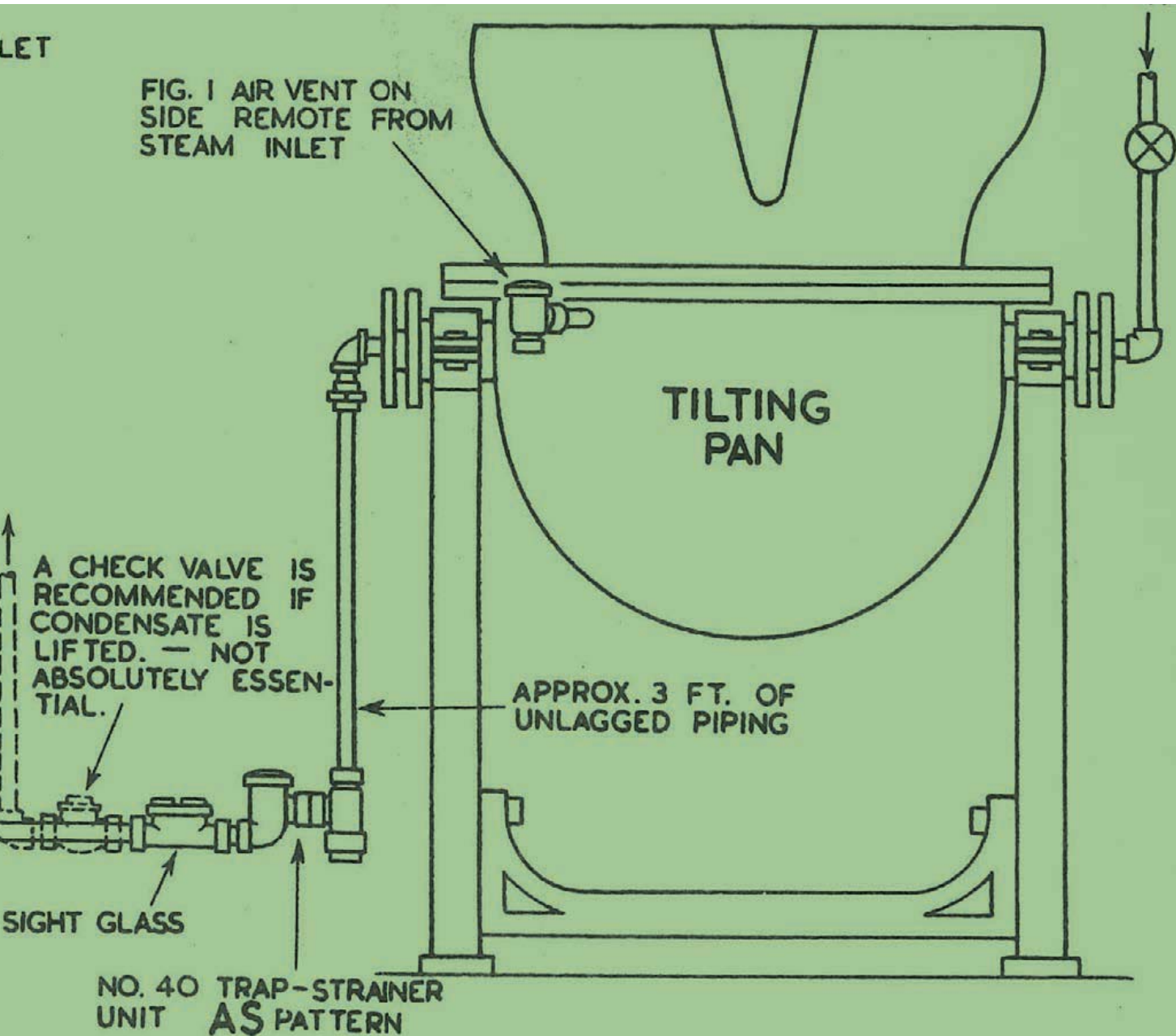
AA DENOTES ANGLE STRAINER WITH ANGLE TRAP

SPIRAX THERMOSTATIC
No. 40 TRAP-STRAINER UNITS
ON SLOW BOILING PANS.
UP TO 40 P.S.I.

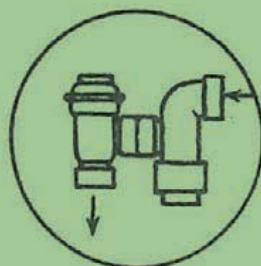
—CANTEEN & KITCHEN EQUIPMENT—

LET

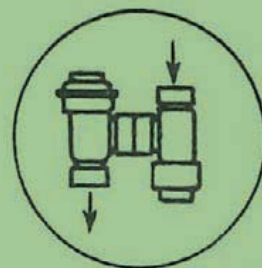
FIG. 1 AIR VENT ON
SIDE REMOTE FROM
STEAM INLET



TRAP



SA PATTERN



AA PATTERN

SPIRAX-SARCO LTD.
CHELTENHAM GLOS.

DRN. BP.

CHKD.

APPD.

DATE.

DWG. NO. **T65**

‘During a period rocked by crises, Spirax Sarco increased sales in real terms by two and a half times and profits by three times’

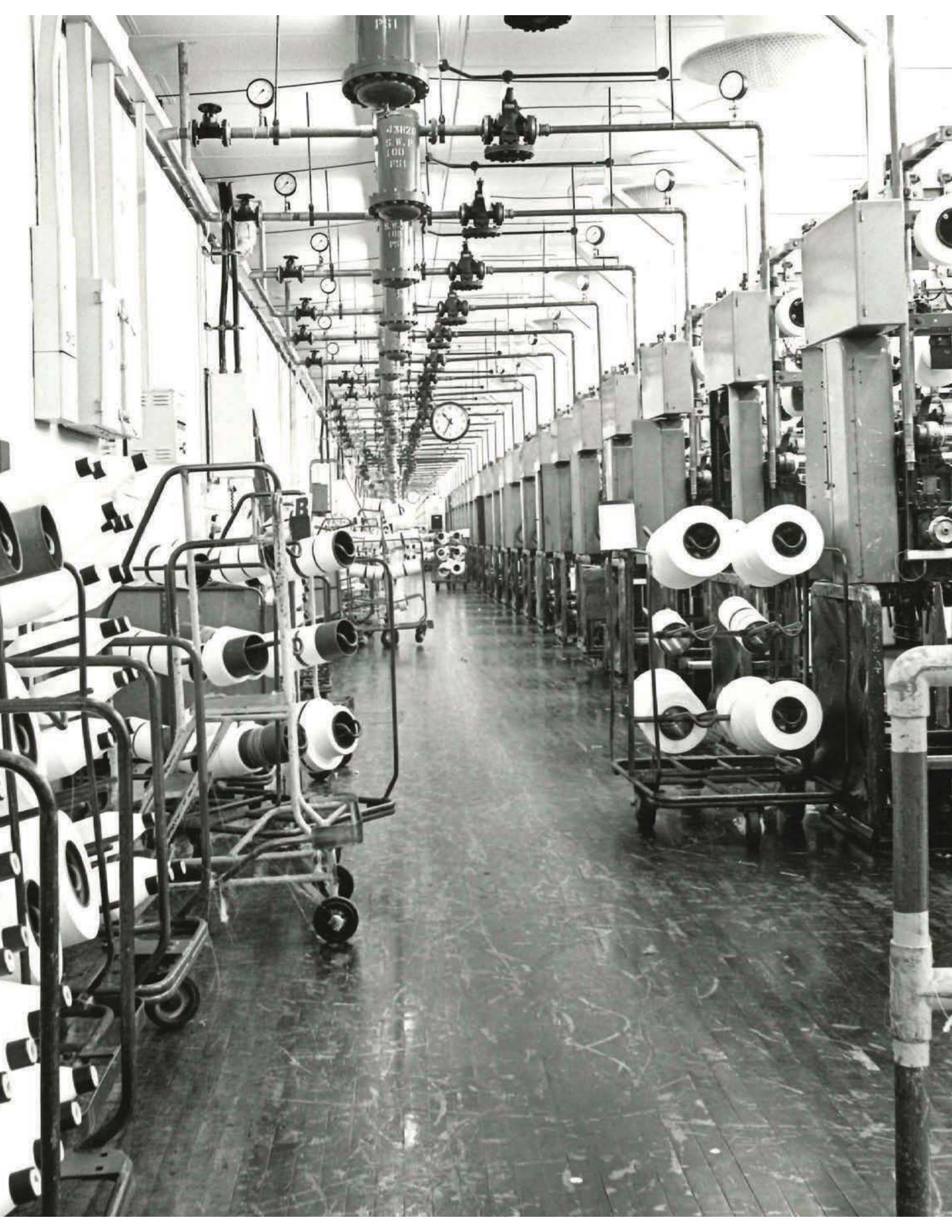
The 1970s and 1980s were momentous years for Spirax Sarco. The international transformation of the business continued apace. As Marcus Steel, who joined the business in 1972, and later became Group Chief Executive, recalled, ‘the requirement to expand overseas never went away because the UK was not a dynamic market’. In 1971 the international companies accounted for 46 per cent of all sales; in 1990 international sales made up 77 per cent of the Group’s turnover. During a period rocked repeatedly by economic and political crises, Spirax Sarco increased sales in real terms by two and a half times and profits by three times.

Pursuing international expansion during this period, the Group brought back together under one umbrella all those various parts of the Sarco/ Spirax organisation that had gone their separate ways in the post-war period. In many countries around the world, where it was appropriate, the Group set up its own sales companies, based on direct selling; in others, the Group helped long-established agents and distributors to make the Spirax Sarco technical approach to selling, based on knowledge, service and products, an integral part of the way they did business.

Where new markets were opening up, particularly in the emerging industrial economies of many Asian countries, Spirax Sarco made every effort to steal a march on its competitors by entering these markets at the earliest opportunity. While the Group’s business model was robust enough and flexible enough to adapt to differing local circumstances and cultures, in those territories where progress proved more difficult than anticipated, Spirax Sarco never pulled out: this was a business with a long-term vision. As Tony Brown commented in 1975, all this was about ‘gaining a greater measure of control over our world markets’.

A critical event which kick-started this journey was reaching a new agreement on international sales with Sarco Co. Inc. in the USA. For 18 months from the beginning of 1971, Spirax Sarco worked to renegotiate the restrictive agreements made with the American company in the 1950s. An agreement was reached in the summer of 1972, covering a further 15 years to 1987, giving Spirax Sarco exclusive worldwide rights other than in North America and Puerto Rico. As a result, Sarco International ceased to operate as a separate sales organisation.

Opposite: Spirax Sarco pressure reducing valves installed at ICI Fibres, Gloucester, 1970s



A COMPANY HISTORY SUMMARY

SPIRAX SARCO IN ARGENTINA

Sarco products were first sold in Argentina in 1940 through the agency of Sociedad Argentina Técnica Y Comercial in Buenos Aires. In 1953 the first Sarco products were made under licence in the country.

In 1963 Sarco Argentina was formed as a joint venture between Spirax Sarco and Alfonso Aguilar, a local machine tools manufacturer. In 1964 a factory was opened in Buenos Aires, making TD traps and ball valves, supplying Argentina and Uruguay. By 1970 Sarco Argentina was one of Spirax Sarco's fastest-growing companies, with profits growing 70 per cent that year alone. The factory was extended in 1972 and in 1981 a completely new factory was opened.

In 1983 Sarco Argentina became a wholly owned subsidiary of Spirax Sarco, changing its name to Spirax Sarco Argentina. Three years later the first exports outside Latin America were made to Canada.

From 1995 Spirax Sarco Argentina began supplying Series 25 pressure reducing valves to China. By then the company was already a centre of excellence for valve production.

In 1999 a new training centre was opened which was widely copied by other Spirax Sarco companies around the world. In the same year the Argentine factory began fabricating engineered systems. Since then the factory has been upgraded and extended several times, most recently in 2016.



Spirax Sarco Argentina's manufacturing facility, Buenos Aires, c. 1983

As well as allowing the Group to trade more freely, the new agreement also made it possible for Spirax Sarco to supply its Latin American markets from its factories in Argentina, Brazil and Mexico, supplemented by shipments from the UK. Coinciding with the agreement, Sarco Argentina and Sarco Sul Americana both completed extensions to their respective factories by the end of 1972. No time was lost in recruiting 'our own marketing men', as the 1972 Annual Report put it, and sending them out to support main agents in the more substantial territories in Latin America. In the following year an office was set up in Colombia, acting as a hub for agents in countries such as Peru (Ingeniera Termodinamica) and Chile (Termodinamica), and another office was opened in Venezuela to support local agents in 1978.

The Group was also pursuing its objective to achieve outright ownership of the various Sarco companies in which it had an interest. In Latin America that began with Sarco Argentina, which became a wholly owned subsidiary of Spirax Sarco in 1983, changing its name to Spirax Sarco Argentina.

In Brazil, once a controlling interest in Sarco Sul Americana had been acquired, two senior managers were despatched from the UK in 1973 to commence 'the Spiracisation programme'. By the late 1980s, the Brazilian business was employing 400 people, including 20 sales engineers. In January 1991, following the retirement of long-serving General Manager Cicero Macedo, Spirax Sarco acquired his 15 per cent minority shareholding.

In Mexico the Group had first sought an investment in its local manufacturing licensee, EPV, in 1973. Persistence paid off, and seven years later the two sides agreed to form a joint venture, Spirax Sarco Mexicana, with Spirax Sarco holding 49 per cent, the maximum permitted under Mexican law. By

then the factory was employing 132 people. The first General Manager was Derek Law, who had previously managed exports from the UK, working alongside his Mexican colleagues, Arturo Caballero and Edmundo Gil. Once again Spirax Sarco was following the practice of appointing an experienced manager from the UK, giving time for the business to train its own local managers, with one of them eventually taking over.

The first conference for Spirax Sarco's Latin American companies, agents and distributors took place in Colombia in 1976. It was small – just 26 people attended – but they came from all over the continent, demonstrating the inroads Spirax Sarco was making. Among them were Alfonso Aguilar and Carlos Serio (Argentina), Cicero Macedo and Joe Vieira (Brazil), Wilhelm Niehaus and Roberto Nappe (Chile), Alvaro Sierra and Hector Betancourt (Colombia), Domingo Caballero and Alberto Davila (Ecuador), Roberto Lindo (El Salvador), Edmundo Gil (Mexico), Emilio Shironoshita (Peru), Sacha Kronfeld (Uruguay), and Frank Nunez and Guillermo Torres (Venezuela). Many of them would have fitted the description given in 1980 by Simon Gegg, who looked after the Group's international operations for several years: he wrote of 'the "lone rangers" spreading the Spirax gospel in their own countries without day to day contact with HQ'.

In Europe, Sarco France became a wholly owned part of Spirax Sarco. The disposal of an unwanted business acquired in the 1960s yielded the cash to buy out the Group's French partners, Albert Ludi and Marcel Bardin, who were eager to retire. The deal was completed in 1971, also bringing with it a 23 per cent stake in the Belgian business, giving the Group total ownership of both companies.

The acquisition was not only seen as an important step towards rationalising sales and production in Europe, it was also in preparation for the UK's

entry into what was then called the Common Market. This, it was believed, would offer greater opportunities for the Group to expand its relatively small market share in the mature European economies. Keith Watson was sent over to run the company and apply the Group's technical, selling and administrative knowledge. 'Keith Watson really got us moving and with a new enthusiasm,' observed an article in *Spirax Sarco News*, with 'New methods, new motivations, new attitudes to selling'. Spirax Sarco subsequently moved the French company out of its decaying central Parisian property into modern premises, including a distribution centre, on land at Trappes on the western outskirts of the city.

Tony Brown was determined, as he told his colleagues in 1972, that 'our three companies in Continental Europe should be "spiracised", adopting the same systems and philosophy'. The Sarco companies in France, Belgium and Germany, as well as Spirax Sarco's Danish branch, were all brought into line with the UK. The Group still considered Germany to be an important market, despite considerable competition, and the business was slowly rebuilt. In December 1973 the Group also acquired Clement Wells's original partner in Sarco Germany, AG für Warmemessung, based in Zurich, changing its name to Spirax-Sarco AG in 1974. An international development team was set up in the UK and the Group created a new post with responsibility for all European operations. By 1975 the Board was congratulating those concerned 'on the success that has been achieved in welding together the steam trapping operations of the Group'.

The Group was also interested in buying out its licensees in Italy and Spain, but neither was particularly receptive at the time, and in any case the Group, always reluctant to borrow, was not flush with cash. In Italy, where the Sarco name had become strongly identified with Jucker, the Group was in danger of losing control of the

brand. When Jucker also began exporting Sarco product, the Group decided it had to act, setting up its own sales company under the Spirax Sarco name in September 1984. When the company moved into premises in Segrate, Milan, in January 1985, *Spirax Sarco News* announced that 'The doors of Spirax Sarco srl are now open, the stock is on the shelves, the salesmen are spreading the word and the first orders have been received.' But Spirax Sarco found it hard to compete against Jucker, who handled the competition by cutting prices, and the new company made modest recurring losses.

The Group would have liked to acquire its associate in Spain, Industrial Mas Nieto, but it was many years until this took place. The Spanish business steadily expanded its manufacturing facilities, which employed more than 60 people by the late 1980s. The founder's sons, Luis and José, had taken charge of the business, which employed 13 sales engineers in Barcelona, Bilbao, Cartagena, Gijón, La Coruña, Madrid, Seville, Valencia and Zaragoza.

As part of an endeavour to establish a stronger presence in the growing oil and petrochemical industry, the Group formed a joint venture (Spirax-Sarco BV) with its Rotterdam-based Dutch agents, Econosto, in 1976. It was also intended to meet the requirements of international customers with activities in the port who preferred dealing directly with the Group rather than with an agent. It was one of the Group's less successful ventures, coming to an end four years later. The Group would make repeated attempts to gain a foothold in the oil and petrochemical sector, but it was only much later, when a dedicated team was set up, that greater progress was made.

Many of the smaller markets, such as Cyprus, Greece, Lebanon, Malta and Turkey, were covered by the Group's UK export sales team. In several smaller European markets, often in countries where the Group had been represented



Spirax Sarco Brazil's customer service fleet outside its manufacturing facility, Cotia, São Paulo, 1984

by agents for many years, new sales companies were set up. Alongside the Danish company, others were established in Austria (1976), Sweden (1977) and Finland (1979). Spirax Sarco owed much to Erik Arnberg for developing the market in Scandinavia from the 1940s through the 1970s. He had headed the Danish office until he opened up the markets for Spirax Sarco in Finland and Sweden before he retired in 1982.

While setting up a sales company was the preferred route, the Group's policy was flexible. When the Group decided to revive its moribund business in Portugal, a sales company was just one of the options, the others being the revitalisation of the existing business or the appointment of a new agent. The Group opted to establish a sales company, after acquiring a 95.5 per cent stake in its distributor in 1984. By then the Group had direct sales coverage of most European markets.

Until the fall of Communism opened up markets in Eastern Europe after 1989, most European markets were mature. In some markets, like Germany, local competition, in this case Gestra, was well entrenched. Yet it was still possible to revive a business that appeared to have reached a plateau. Belgium was a case in point: a small company with a small but loyal customer base, well run but apparently with few prospects of growth. When a new manager was appointed in 1988, the simple reaffirmation of the Spirax Sarco approach, based on knowledge, service and products, coupled with enthusiastic leadership, produced increased sales and profits. In markets like this the Group's objective was a steady increase in market share, and growth came not from the major engineering projects associated more closely with newly industrialising nations but from building up repeat business in repairs and maintenance. Working in the Group's favour was the developing trend to cut back on direct

maintenance teams, which left many businesses more reliant on Spirax Sarco for routine work.

The Group had made forays into the Communist countries of Eastern Europe even before the Iron Curtain was drawn back. The German company employed a manager specifically for selling into the east. A party of Czech engineers visited the UK in 1975. Two years later, for the first time in 40 years, Spirax Sarco was supplying the Polish shipbuilding industry through the state buying organisation. In 1980 a regional sales engineer for Eastern Europe was appointed, based in Austria. But the real opportunities for business would come only after 1989, as the toppling of Communist regimes brought about the emergence of freer markets.

Europe was always challenging, hard work, perhaps less exciting than developing a completely new market on the other side of

the world, but an important part of the Group's operations. As shareholders were told in 1983, 'in Continental Europe we are dealing with mature industrial economies: our progress must be geared, therefore, to greater market development and penetration, and the introduction of new products'. Five years later European turnover exceeded turnover from the UK and Ireland for the first time. Profits too were at similar levels to the UK. The pace of growth in Europe kept up with expansion in the rest of the world. With Group turnover of nearly £144 million in 1990, including a small contribution from Watson-Marlow, Continental Europe accounted for nearly a third of the Group's sales.

Given the maturity of European markets, the Group was eager to exploit the potential of emerging markets at the other side of the world. This had been under way since the early 1970s, once the Group had the ability to trade



Manufacturing, Spirax Sarco UK, Cheltenham, 1970s



Manufacturing, Spirax Sarco UK, Cheltenham, 1970s

more freely. In 1971 Ray Harding, one of Spirax Sarco's senior executives, spoke of building up a 'blood bank' of able young men willing to turn the Group into a truly international business. 'We started a policy,' Harding wrote later, 'of sending out our own missionaries to the more important markets outside Europe; their task is to put over the Spirax philosophy and the full Spirax message with a view to strengthening our position and the position of our distributors in those areas.' It was, he added, all about gaining 'a wider and deeper coverage more quickly in those areas where our presence has not been vigorously felt so far'.

Typical of this pioneering band was Chris Ball, who later became responsible for the Group's international operations. In 1972 he

travelled to East Africa to support Spirax Sarco agents and distributors in Kenya, Tanzania and Uganda. In Kenya he appointed a new agent in Nairobi, working alongside it while he trained it in the ways of Spirax Sarco, a process he repeated with well-established agents in Tanzania and Uganda. 'I started to learn how easy it was to transpose the way we did business in the UK to the rest of the world.' Other young engineers were sent out on 'extended tours of duty' to assist agents in other parts of Africa as well as Asia and Australia.

Bestobell had held the Spirax agency in both Australia and South Africa for many years. While Sarco/Spirax had been well served in earlier years by Bestobell, the brand's growth was hindered by being just one product among many represented

by the same agent. In 1973 UK managers were sent to both countries with the task of accelerating sales. Denis Rooney in South Africa and Rodger Smith in Australia quickly concluded that a direct presence would be advantageous and sales companies were set up in each country in the same year. The South African company was based just outside Johannesburg, where there was already a small factory, eventually setting up a branch in Durban as well. In Australia premises were taken on the outskirts of Sydney, in Blacktown, followed by a small branch in Melbourne and others in Adelaide, Brisbane and Perth. By 1989 direct selling accounted for 93 per cent of all Spirax Sarco sales in Australia.

The leading economy in Asia was Japan, which had grown rapidly during the 1960s and 1970s, discarding its reputation for shoddily made goods, as now famous Japanese brand names began exporting quality products around the world. As with China in later years, overseas businesses were eager to enter the market, and under pressure from other governments, the Japanese government was steadily liberalising the economy. Once again Spirax Sarco was an early entrant, opening a branch in Tokyo in 1973. This was a strategic move, intended to provide competition for Japan's leading steam trap manufacturer and put a brake on any plans the Japanese may have had for expanding internationally.

The Group did not expect the business to become profitable for several years, recognising that although trade barriers were being dismantled, the very different Japanese business culture remained a significant challenge. The deep reluctance of Japanese business to favour overseas competitors in their domestic market, despite the often inferior quality of the products available, seriously blunted the efforts of the Japanese branch to make any immediate inroads through the direct selling approach that, until then, had proved almost universally applicable.

It also made penetrating the market a slow process. The Group was uncertain of the best approach to take, whether to operate through distributors or to concentrate on direct selling, so it used a combination of both.

By 1977, other branches had been set up in Kyushu, Sapporo and Osaka in a bid to develop closer relations with customers. The compromise was to follow a path similar to the one pursued by Sarco for many years in the USA, combining regional sales engineers alongside a network of distributors. Even so, Spirax Sarco's progress breaking into the Japanese market proved slow. It wasn't for many years that the company would become profitable. Spirax Sarco's long-term view and ability to maintain a direct sales presence in challenging markets have played an important role in the Group's success.

Japan was the launch pad for the Group's entry into another emerging market where, by contrast, it made rapid progress, quickly achieving market leadership. In 1974 Peter Woodcock, who was running the Japanese branch, became the first Spirax Sarco manager to visit South Korea. The country was still virgin territory for foreign businesses in the 1970s. It was an austere place, strongly influenced by the military, with very few international residents and very limited facilities for them. But the country was in the middle of a state-sponsored economic transformation that turned it from one of the world's poorest countries in the early 1960s into the world's twelfth-largest trading nation by 1990. The Korean economy's average annual growth rate during the 1960s and 1970s was just over 9 per cent. By the mid-1970s the attraction for engineering businesses like Spirax Sarco was the rapid growth of the country's heavy industries, which accounted for half of all the country's manufacturing by 1980.

Following a second visit in 1975, the Group decided to enter the market. A talented engineering graduate, In Soon Park, was

appointed resident engineer in 1976. Working out of a room in Seoul's Koreana Hotel, his energetic salesmanship encouraged the Group to begin discussions with the Korean Economic Planning Board in 1977 about setting up a new business.

The state would permit only a joint venture, something the Group had experienced in other countries, such as Mexico, and, like Mexico, the regulations then in force prohibited any foreign investor having more than a 50 per cent interest. Exceptionally, Spirax Sarco was permitted to hold 60 per cent of the enterprise, only the third British company to be granted this dispensation. At the time the market was dominated by foreign imports, supplemented by a handful of small local manufacturers turning out lower-quality products, and the government welcomed the idea of one of the world's leading steam specialists establishing a base in the country. Moreover, South Korea, like Japan, was heavily dependent for energy on imports, and the concept of saving energy through increased efficiency as a result of improved steam process technology was attractive. As Simon Gegg wrote, the country was 'a rapidly growing and developing industrial market which requires our technology and our products not only to increase productivity but also to assist their highly encouraged energy conservation policy'.

Spirax Sarco (Korea) was formed in May 1978, with Chris Ball as General Manager and Peter Doggett as Production Manager. It was, said the Group's Annual Report that year, 'an essential part of our long-term corporate strategy of growth'. Within a year the original partner in the venture, the Sam Yang Comprehensive Valve Company, a local steam trap maker, had been replaced by Wan Huh, but the relationship with minority investors was an unhappy one.

It was the discontent of the Group's minority partners at the performance of this start-up business, which unsurprisingly failed to make

a profit in its first two years, that led the Group to consider closing it down. Sent out to do that in February 1980, Chris Tappin, the Group's Financial Director, changed his mind after seeing for himself the potential of the business and listening to Chris Ball's arguments. In that year the company recorded its first profits. Since it was clear that the short-term views of the minority partners were at odds with the Group's long-term vision, based on reinvesting profits and waiving dividends, the former agreed to sell their 40 per cent interest to the Group. The government's requirement for a local stake in the business was eventually satisfied by distributing shares to employees. The experience made the Group wary about entering into other joint ventures.

In Soon Park was joined by two English-speaking engineering graduates, Wook Chang and Dae Sub Yeom. They quickly took to the Spirax Sarco direct selling philosophy: 'we were breaking the mould,' said Chris Ball, 'in the way the Koreans did business.' Spirax Sarco filled a gap in the crowded market for steam traps left by competitors who sold traps as ironmongery, to recall Lionel Northcroft, and whose poor service and inability to offer effective technical solutions left many customers dissatisfied. The new company quickly raised its profile through a series of lectures on energy saving given by In Soon Park around the country. Energy conservation was an important selling point, also helped by Wook Chang's connections from his previous position with the Korea Energy Management Association, which opened doors to all the major boiler users in the country. Customers were invited to attend training seminars in local hotels, a centrally organised training course was established and technical bulletins were widely distributed.

All this was supported by an expanding infrastructure. A series of regional offices were set up, beginning with Taegu, Kwangju and Busan in 1979. The flexibility of the Spirax Sarco approach was again evident in the appointment of a network

SPIRAX SARCO IN SOUTH KOREA

Spirax Sarco was exporting to South Korea in the 1960s but it was only in 1974, as the country was beginning to industrialise, that executives first visited the country. In 1976 In Soon Park became Spirax Sarco's first resident engineer, and on 26 May 1978 a joint venture company was formed with Chris Ball as the first General Manager.

After a difficult start, the business overcame the threat of closure because of the huge potential of the South Korean market. With the advantage of being one of the first foreign enterprises to enter the market, combined with the Spirax Sarco direct technical selling approach, the company was soon doing well.

In 1979 a small factory and warehouse was acquired in Bupyeong and the first regional offices were opened in Taegu, Kwangju and Busan. More sales engineers were appointed to assist a nationwide network of resellers, which overcame transport and other logistical problems.

In 1984 In Soon Park became General Manager. By 1990, with ten regional offices, Spirax Sarco Korea was the Group's fourth-largest international business. In 1992 the company moved into purpose-built premises just outside Seoul.

The company survived the Asian economic crisis of 1997–98, remaining profitable even though sales halved and the costs of imported products doubled as the currency collapsed. By 2000 sales had recovered to their previous level as the company steadily extended the range of products it was offering to customers, including engineered steam packages. New premises were opened in 2009. In 2014 the company was the first one in the Group to achieve the energy management standard ISO 50001.

Today Spirax Sarco Korea is second only to China in the Asia Pacific region and remains one of the Group's largest companies.



Spirax Sarco technical consultants review a boiler control panel on a customer site, South Korea, 2017

of resellers as a link between the business and end users in order to overcome practical transport and logistical hurdles. They were backed by the technical advice of the company's growing number of regional sales engineers. The company was also tapping into the potential of major Korean businesses spreading their wings outside the country, developing contacts with personnel in the overseas offices of companies like Daewoo and Hyundai. Establishing strong personal relationships (very important in Asian culture) at every level within every customer's organisation was a vital factor in the company's success. It had rapidly become, observed Chris Ball, 'a recognised force in the Korean steam equipment market'.

The first three General Managers all came from the UK, each making his own contribution, before In Soon Park took over as General Manager in 1984, with Jae Sun Lee as Production Manager. By 1989, under local leadership, Spirax Sarco Korea was the Group's largest international business.

Historically Korea's near neighbour, China, had been one of the largest and most advanced economies in the world, but it had long been in decline. It was only after the death of Mao Zedong that measures were taken to liberalise the economy. In the late 1970s his successor, Deng Xiaoping, launched ambitious economic reforms, aimed partly at encouraging international investment. Spirax Sarco had first sought permission to organise a commercial visit in 1975. Eighteen months later permission was granted, and Derek Law flew to China in 1977. The country, he found, was still dominated by state-controlled industries, poorly run and inefficient, and there was nothing like an open market. But the fact that any steam traps being made were generally sub-standard and their use elementary suggested there was a definite opportunity for Spirax Sarco. Two years later the Group was represented at

the British Energy Exhibition held in the country. Although none of the nearly 300 British firms exhibiting came away with any orders, 'China is a good market,' wrote Derek Law, 'and its potential will become very much bigger in the next decade or two.' The Group was persistent, with Law making another visit in 1980 to try and negotiate terms for a permanent presence. 'With China cautiously opening its doors to the West,' he wrote, 'you would not be surprised to hear that most of our competitors are after this market.' It was a first step, with compliments paid to the Group by Chinese officials for the range and quality of its products and for the way Spirax Sarco was the only company to demonstrate its expertise both practically (through plant surveys) and theoretically (through lectures). 'The potential is big and it will be rewarding; but it will inevitably involve a considerable amount of time and patient bargaining before we have established ourselves firmly in the market,' said the *Spirax News*. The good impression made by the Group was confirmed when a delegation of Chinese engineers visited the UK in the autumn of 1980. *Spirax News* reported that 'In the words of the Chinese, all our competitors have talked only of their products with no guidance on their correct use or efficient plant design and layout.'

Progress was painfully slow. Another small step forward came in 1984, when the Group agreed to train a number of Chinese engineers. Finally, in 1985, Spirax Sarco entered the Chinese market for the first time, and an agreement seemed imminent. The political reverberations caused by the events in Tiananmen Square caused the Group to postpone plans, but by the autumn of 1989 a memorandum of understanding had been concluded with potential Chinese partners, agreeing in principle to the formation of a joint venture manufacturing company. It was only the start of further protracted negotiations, but persistence was paying off.

As the first forays were being made into South Korea and China, the Group was simultaneously exploring the potential of other markets in the Asia Pacific region. An office was set up in Singapore under Paul Bernon, appointed General Manager for South East Asia in 1976. The Group was already represented by long-established distributors in Singapore, Malaysia (Bestobell again), Hong Kong, the Philippines, Taiwan and Thailand. In 1979 the Group's first conference solely for international managers, and the first one overseas, was held in Singapore, bringing together General Managers from Australia, Japan, Korea, Singapore and South Africa.

A pattern was emerging for the development of under-performing or new sales territories. As Chris Ball reflected, 'we convinced ourselves we could do it anywhere.' Generally, personnel were sent out to help distributors to improve their performance before they were persuaded to sell their business, which was then absorbed within a new operating company led by an experienced manager who built up the local team with the ultimate aim of handing over leadership to them. 'It was rewarding,' said Chris Ball, 'to see a team of people grow and prosper.'

The process was always adapted to local circumstances. New operating companies were formed in countries such as Singapore and Malaysia, working alongside existing distributors. In Indonesia a small sales team based in Singapore began opening up the market in 1986, which led four years later to an office in Jakarta. Since direct selling was not permitted by law, the Indonesian branch worked through appointed agents. The chance to develop sales in Taiwan came with the removal of import restrictions in 1987, and the Group worked for a couple of years with a new distributor, Longbridge, before taking over the business and absorbing it within a new company formed in 1989. In Thailand, after acquiring Boonyium & Associates, who had been the Group's distributor for some 30 years, another

wholly owned sales company, Spirax Boonyium, began trading in April 1990.

The growth enjoyed by the Group during the 1970s and early 1980s finally gave it the capacity to acquire the last pieces needed to complete the reunification of the Sarco/Spirax family. Until then the idea of acquiring the Sarco companies in North America was out of the question: they were simply unaffordable. Links between Spirax Sarco and Sarco Co. Inc. had been renewed on an informal basis during the 1970s; for several years senior executives from the US business attended Spirax Sarco's annual international sales conference in the UK. Yet in truth there was no grand plan to add the American or Canadian business to the Group; they were not, after all, businesses in which Spirax Sarco had any financial interest. Moreover, Sarco Co. Inc. was languishing, part of a major US conglomerate, unloved, ignored and starved of investment.

When the idea of returning to the USA was revived in the early 1980s, making an offer for Sarco Co. Inc. was the Group's third option. The first was based on taking over a major international competitor, which would have strengthened the Group's international presence as well as providing a foothold in the US market. When those tentative discussions failed, the Group considered taking a stake in Sarco Canada's US subsidiary. It was only when this idea was also rebuffed that the focus switched to Sarco Co. Inc. Still based in Allentown and employing 350 people, with thousands of customers, Sarco was operating through a combination of branch offices scattered across the states and a network of distributors.

The Group Board approved a bid based on a maximum offer of \$18 million. Sarco Co. Inc.'s parent company, White Consolidated Industries, was beginning to dispose of non-core activities, which included Sarco, and was a willing seller, yet still drove a hard bargain. The price finally

agreed for Sarco was \$29.9 million; Tony Brown, the Group's chairman, refused to go any higher in the belief that \$30 million would be a step too far for the Board. The acquisition was announced in March 1983 and completed the following month, when the business was renamed Spirax Sarco Inc. Two months later the Group added Escodyne, Sarco Co. Inc.'s Canadian subsidiary. 'For the first time,' wrote Tony Brown in the 1983 Annual Report, 'the Group has achieved a significant presence in the major North American markets.'

Brown himself led the process of 'spiracisation', spending several months in Allentown. The change in philosophy led to more directly employed sales personnel and more investment in sales and marketing, adding a wider range of Spirax Sarco products. A similar process was applied in Canada. It soon became clear that turning around the North American businesses would require time and patience. 'It must be emphasised,' read the following year's Annual Report, 'that the successful absorption of a large operating unit of this nature, although possessing a similar but narrower range of products to our own, and which had been run autonomously as part of a conglomerate whose main business was very different, is not a short-term exercise.'

The Allentown factory was in need of support, direction and investment. The plant was heavily unionised, in contrast to the Group's other worldwide manufacturing operations, but a transparent approach to management was fostered by Mick Gill (sent over from the UK as Vice-President of Manufacturing). This, along with badly needed investment, improving efficiency and modernising manufacturing, helped to secure jobs and produce harmonious working relations.

Transforming Spirax Sarco Inc.'s sales operations was also challenging. Simon Gegg, who became President of Spirax Sarco Inc. in 1985, discovered there was a reluctance to venture outside existing territories. Efforts to increase direct sales also

proved challenging. When customers were offered the chance of buying direct, many of them continued to insist on buying through their long-established local distributor. Nevertheless, expanding the American direct sales team helped to connect the company with more customers, bolstered by other elements of the Spirax Sarco approach, particularly offering technical advice and training, as well as prompt delivery of products from stock.

Sarco Co. Inc.'s Canadian subsidiary, Escodyne, was not Sarco's original Canadian business. Prior to the management buyout of the American business in the 1950s, the unwritten agreement was that no other Sarco company would operate in Canada other than through Sarco Canada. This agreement broke down after the buyout, and Sarco Co. Inc. set up Escodyne specifically to compete against Sarco Canada. Matters weren't helped by the pressure placed on Sarco Canada to become part of White Consolidated Industries. Sarco Canada reacted by setting up a US subsidiary, Erwel Inc., to manufacture Sarco-designed products under pre-1952 patents, the business in which the Group had considered acquiring an interest prior to taking over Sarco Co. Inc.

When Escodyne became part of the Group, it was renamed Spirax Sarco, which prompted an objection from Sarco Canada, and the name had to be changed to Spirax Engineering in 1986. By then the process of 'spiracisation' in Canada was well under way, and the impact of a direct sales team selling systems and knowledge seriously weakened Sarco Canada. Selling products at the lowest price through distributors, it could not compete and steadily lost market share to Spirax Engineering. Negotiations began between the two sides, and in January 1989 Sarco Canada and its US subsidiary became part of the Group. Spirax Sarco now comprised all the previous parts of the original Sarco/Spirax business. The Erwel factory was closed and production

transferred to Allentown. In 1990 Spirax Sarco Canada moved into new purpose-built premises in Concord, on the outskirts of Toronto, just down the road from its previous location in Woodbridge.

Bringing the Sarco/Spirax family back together again was an achievement that gave Tony Brown much satisfaction. He took pride in the Group's history, writing to one of the Group's associates in 1985 that 'it is right to draw attention to the fact that [Clement Wells] was the true founder of our worldwide business, which, over the years, I and my colleagues have devoted ourselves to putting together again as a united family.' The Group Board backed this strategy completely, resisting the temptation to become inward-looking; it was receptive to arguments for further international growth, and always willing to make things happen.

What one executive, Andrew Wilkinson, called 'The Spirax Technical Story' remained central to the Group's progress. It was very effective. In 1980 the Group's Spanish associate, Industrial Mas Nieto, was asked by contractors to an existing customer, a user of TD traps, to tender against a specification based on the thermostatic trap of a competitor. 'Our engineers had to work hard using the technical arguments that Spirax has developed through the years to convince [the contractors] that the TD.3-2 [trap] should be offered to the customer as a bona fide alternative, superior in every way to the [competitor's traps].' They succeeded, winning an order for more than a thousand traps.

For Andrew Wilkinson, Spirax Sarco's technical strength and offering of quality products, combined with first-class advice that enabled customers to get the best out of their plant and machinery, allowed the Group to become 'very close to its customers'. '[The Group] has realised,' said Wilkinson, that

the customer needs information, he also needs detailed advice, ex-stock deliveries,

and efficient commercial methods and expert after sales service ... what a wealth of information we have gathered over a period of 40 years or more and because of the efforts of those pioneers we have developed a range of products incredibly well adapted to meet practically any problem which steam users will throw at us.

Strong customer relationships fortified the Group against cut-price competitors even in depressed markets. For Wilkinson, 'to sell a single steam trap at all costs when what is really at stake is the company's technical policy is unthinkable.' And, as one of his colleagues, Chris Ball, noted, 'the customers knew they just had to pick up the phone and we could solve their problems.'

Relationships were cemented not only face to face on customer premises, but also through the regular training courses organised for customers from the early 1970s onwards. Engineers came to the UK from all over the world for training every year. In 1977, for example, they came from Belgium, Denmark, Germany, Greece, Italy, the Netherlands, Malta, Portugal, Australia, Chile, Ecuador, Iran, Japan, Nigeria and South Africa. Training had been offered in countries outside the UK, including India and Brazil, for many years, but it was in this period that the Group began to invest seriously in advanced training facilities as more new products were launched. By 1990 there were 29 training centres spread across the world, including three in the USA.

In 1974, as the Group began to expand worldwide, the Board had agreed in principle that 'the dependence of world markets on production at Cheltenham should as a matter of policy be reduced in future.' With industrial unrest in the UK threatening production, there was concern that supplies to customers could be disrupted. It was decided that new plants would be established and existing ones strengthened around the world. After rejecting the idea of closing down

the French factory, the Group instead invested in its modernisation. Products were standardised and efficiency increased under Works Manager Hervé Bouveret, making Châtellerault an integral part of Spirax Sarco's worldwide manufacturing capacity. As well as supplying customers across Europe, the factory also helped the Group to fulfil orders to international customers outside Europe. This decision made the production units in Germany – a second small unit had been opened in the Black Forest in 1973 – superfluous, and they were closed in 1984.

In Brazil a new factory was opened in Cotia in Greater São Paulo in 1978. Within a few years this was producing a complete range of standard steam and compressed-air products, from traps to strainers, for supply to other countries in Latin America and beyond. In Argentina a new factory was opened in Don Torcuato on the outskirts of Buenos Aires in 1981, making a range of float traps and ball valves, the latter an area in which the factory still specialises. In Mexico the Monterrey factory was expanded in 1986 and new offices were added at the same time.

In 1980 Spirax Sarco acquired the outstanding 40 per cent shareholding in Spirax-Sarco Korea Ltd and set up a small factory at Bupyeong, just outside Seoul. It made and assembled a select range of products to complement others imported from the UK. Acquired from a bankrupt business, the factory was in a poor condition, 'with a roof resembling a colander. In those days nothing worked, there was only one water tap and one telephone and no heating.' With the arrival of plant and equipment from the UK, the factory began assembling strainers and sight glasses. Opened officially on 14 November 1980, within a year it was turning out 1,300 finished products every month, from strainers and sight glasses to pumps, valves and traps. 'Quality, price and delivery of our Spirax products are of prime importance to our Korean customers,' noted the

Group's newsletter in 1982. 'The fact that we have a Korean input into our products, to international standards, gives us a better chance of winning an order over a competitor whose products are totally imported.'

Maintaining supplies to customers was not just about creating new factories. Sufficient warehousing was also critical to ensure operating companies held enough stock to make prompt deliveries. Countries without a Spirax Sarco factory, such as Australia, Singapore, South Africa and Japan, relied on shipments of goods from the UK. It was important to regularly review the levels of stock in order to strike a balance between prompt customer deliveries and capital investment.

More money was invested in product development. Prior to the 1970s this had taken place rather haphazardly. 'There is trouble ahead for this Group,' wrote Tony Brown, 'if we neglect this vital weakness in our structure.' Putting this right began in 1971 with the appointment of Dr Richard Woods as assistant to the Technical Director. New development facilities were opened in Cheltenham in the following year. In 1977 an international new products committee was formed, formalising existing discussions between different parts of the Group. Technology played its part, with the advent of computer-aided design. Under Richard Woods, whose main responsibility was research and development, improvements were made to existing products, one example being the new high-pressure, high-temperature TD120 thermodynamic trap introduced in 1985; and completely new products were launched, including a range of micro-processor-based electronic temperature controls, which also appeared in 1985. These new additions complemented a core range comprising steam traps, pressure controls, temperature controls and valves, pipeline ancillaries, condensate return pumps, humidifiers and steam meters.



Operative product testing for leaks, St George's Road manufacturing site, Cheltenham, 1984



Operative soldering logic boards for R12E test points, St George's Road manufacturing site, Cheltenham, 1984

Another key development occurred after Spirax Sarco failed to persuade the owners of German competitor Gestra to sell the business in 1988. Part of the reason for Spirax Sarco's interest lay in Gestra's boiler house control systems. Instead, Spirax Sarco began developing its own boiler house products and controls. This was spearheaded by a former Gestra employee, Tony Urbani, who joined Spirax Sarco after leaving Gestra following its takeover by Siebe in 1988. A number of key people followed Tony from Gestra, including Gestra's leading expert on boiler house controls, Heino Zimmermann. The boiler house team was formed in September 1989. Sales engineers were trained in the new products, the first of which – a boiler blowdown system for small boilers – was launched about a year later. By 1993 boiler house controls had become a successful (and profitable) part of the business, although Tony Urbani believed that it was only a decade later that they really became completely established within the company.

More money was invested in marketing. 'This Group,' wrote Tony Brown in 1972, 'lacks proper marketing effort.' 'The need for all of us in Spirax Sarco,' wrote Chris Tappin in 1982, 'is to remember we are part of essentially a marketing organisation and that everyone in the company, wherever in the world, is a salesman.' It was only in 1985, however, that a separate marketing department was formed. Eight years later, Tony Urbani became the company's Marketing Director.

The widening of the product range encouraged the Group for the first time in many years to make a number of small-scale acquisitions. Acquired in 1988, HygroMatik, based in Germany, specialised in electronically controlled steam humidifiers, complementing the steam-operated humidifiers already sold by the Group. Another was ABCO Technology, acquired in 1986, whose energy-monitoring systems helped the Group to enter the

market for boiler house controls. By far the most important occurred in 1990 when the Group took over peristaltic pump maker Watson-Marlow, based in Falmouth, although no one at the time appreciated just how significant that acquisition would be.

International expansion had transformed the business. In 1968 the Group had just seven international operations, most only partially owned, with little management control; by 1990 this had grown to 30 operating companies, supported by 61 sales offices and more than 440 sales engineers. In addition, there were distributors in a further 63 countries. In 1968 international sales made up around 30 per cent of turnover and 30 per cent of trading profits; by 1990 nearly 80 per cent of sales and trading profit came from outside the UK. Turnover in 1968 was £7.25 million and trading profits £800,000; in 1990 the figures were £144 million and £25.5 million: in real terms the Group had increased turnover nearly three times, and trading profits more than four times. Moreover, the Group's accounts managed every year to report an increase in trading profits, a record stretching back to 1967.

There was little complacency among senior executives, who tended to take a critical and conservative view of the Group's performance. The Group was always wary of potential predators in the wings, ready to make a bid should performance falter. David Meredith, who became Group Accountant in 1988, believed that an important cultural influence within Spirax Sarco was a propensity to overrate the competition, preventing any self-satisfaction, recognising imperfections in the business, always striving to do things better. David subsequently served for nearly 24 years as Group Finance Director, believed to be the second-longest tenure in the FTSE350. Throughout that time he was an invaluable contributor to the Company's success, not only because of his financial acumen, but



Spirax Sarco research and development test centre, St George's Road, Cheltenham, c. 1980

also from his role overseeing the integration and development of Watson-Marlow after its acquisition in 1990.

Given the fluctuations of the world economy, the Group achieved an impressive financial performance in this period, demonstrating its characteristic resilience. When the UK was experiencing raging inflation, coupled with the oil price shock, the Group’s Annual Report for 1973 underlined how ‘this increasing geographical diversity of market has greatly strengthened the Group’s ability to withstand any vagaries of the UK economy.’ Of course, the unprecedented rise in oil prices also worked to the Group’s advantage as energy conservation became more important. As the Annual Report noted in 1979, ‘the majority of our Group products and skills have always been, and still are, closely linked to fuel and water economy and improved plant efficiency. We therefore play a vital part in helping engineers to achieve these objectives.’

Other parts of the Spirax Sarco world were also afflicted by economic turmoil, but managers in countries like Argentina, which suffered political as well as economic disruption during the 1970s, were experienced in dealing with such ups and downs. Volatile exchange rates, however, could have a disproportionate impact on the Group’s results. In some years the value of sterling could inflate the real value of the contribution made by the Group’s international interests, in others it could mask their growth. The impact in the accounts was mitigated from 1985 by showing

international results at average rather than year-end exchange rates. As the world entered yet another recession a few years later, aggravated by the short-lived 1990–91 war in the Gulf, the Group remained unperturbed, deriving stability from its wide geographical spread and diverse customer base.

The Group’s success had been achieved by adapting to local conditions the tried and tested Spirax Sarco business model, based on first-class technical and commercial service, quality products, technical education and a commitment to application engineering. As Chris Tappin wrote in 1982, the Group had to continue ‘remembering the lessons and the basic philosophies learnt from our predecessors and adapting them to new market conditions, environments and demands’. Recruiting the right people at the outset was another factor in the Group’s success, handing them responsibility, offering them autonomy within agreed guidelines, and ensuring local leaders always remained accountable, supported by frequent visits from senior executives who travelled extensively around the growing Spirax Sarco global organisation. Developing strong customer relationships remained crucial as well. As Marcus Steel summed up, ‘it was definitely all about relationships.’ The Group also became adept at the integration of new businesses, which grew into a very structured process, with each new outpost the result of lengthy, considered research and discussion, based on a clear understanding of how each new business related to the Group overall.

8

The Watson-Marlow story

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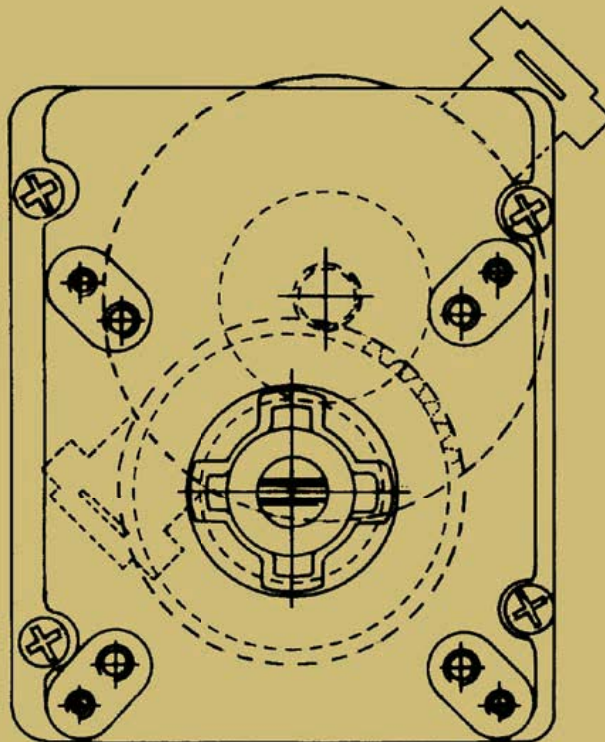
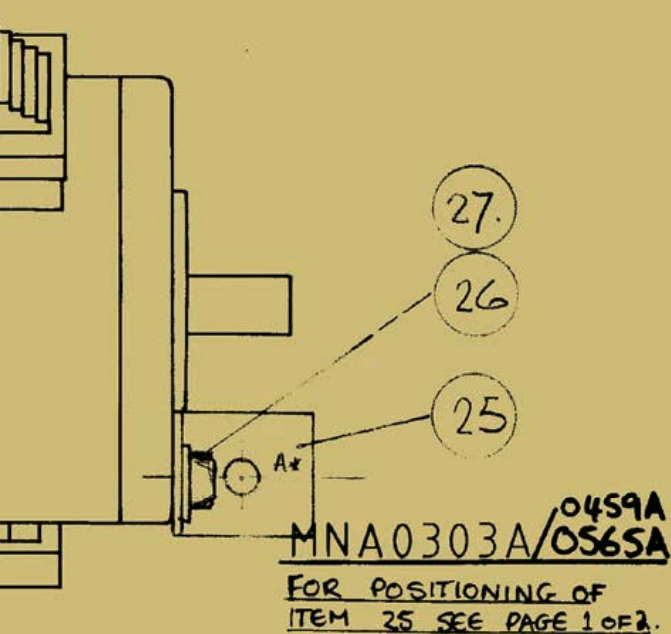
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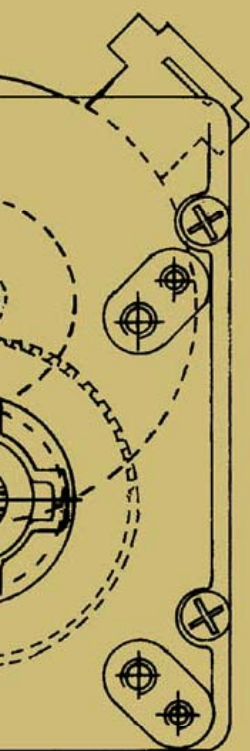
All rights reserved. This drawing is to be used for reference purposes only and no part may be reproduced, stored in a retrieval system or used by a third party for any other purpose without written permission from Watson-Marlow.

DIMENSIONS SURFACE MACHINING REMOVE

TOLE



4. FINAL ASSEMBLY:-



- A. Place motor vertically into holding fixture i.e. pinion shaft up.
- B. Fit rear casing to motor (Ensuring that MOTOR LOCATOR stays in correct position) and retain. Fit screw to smaller hole first using thread-lock.
- C. Lubricate output shaft gear-wheel with
MNA459A/0565A/MNA0303A: CASTROL MSS GREASE to just fill
MNA0304A: CASTROL MSS GREASE to just fill
all the teeth around the periphery and fit to rear bearing casing.
- D. Place front casing assembly over the output shaft. Insert and tighten 4 case screws. Oil may ease thread formation.
- E. Check for backlash freedom in the gears by using a small key or spanner on the output shaft tang.

Dimensions in millimetres
Surface texture values in μm
Where marked $\sqrt{\quad}$
Remove burrs and sharp edges

MATERIAL
SPEC. BS
FINISH

TITLE

ASSY: GEARED
UNIT (E.M.D.)

DRAWN
TRACE
APPROV
REF. DR
FIRST U
SIMILAR
SUPERS

Tolerances unless otherwise
stated

Watson-Marlow Ltd

ORIGINAL SCALE

1:1

‘It was a place where you were looked after, and it still is’

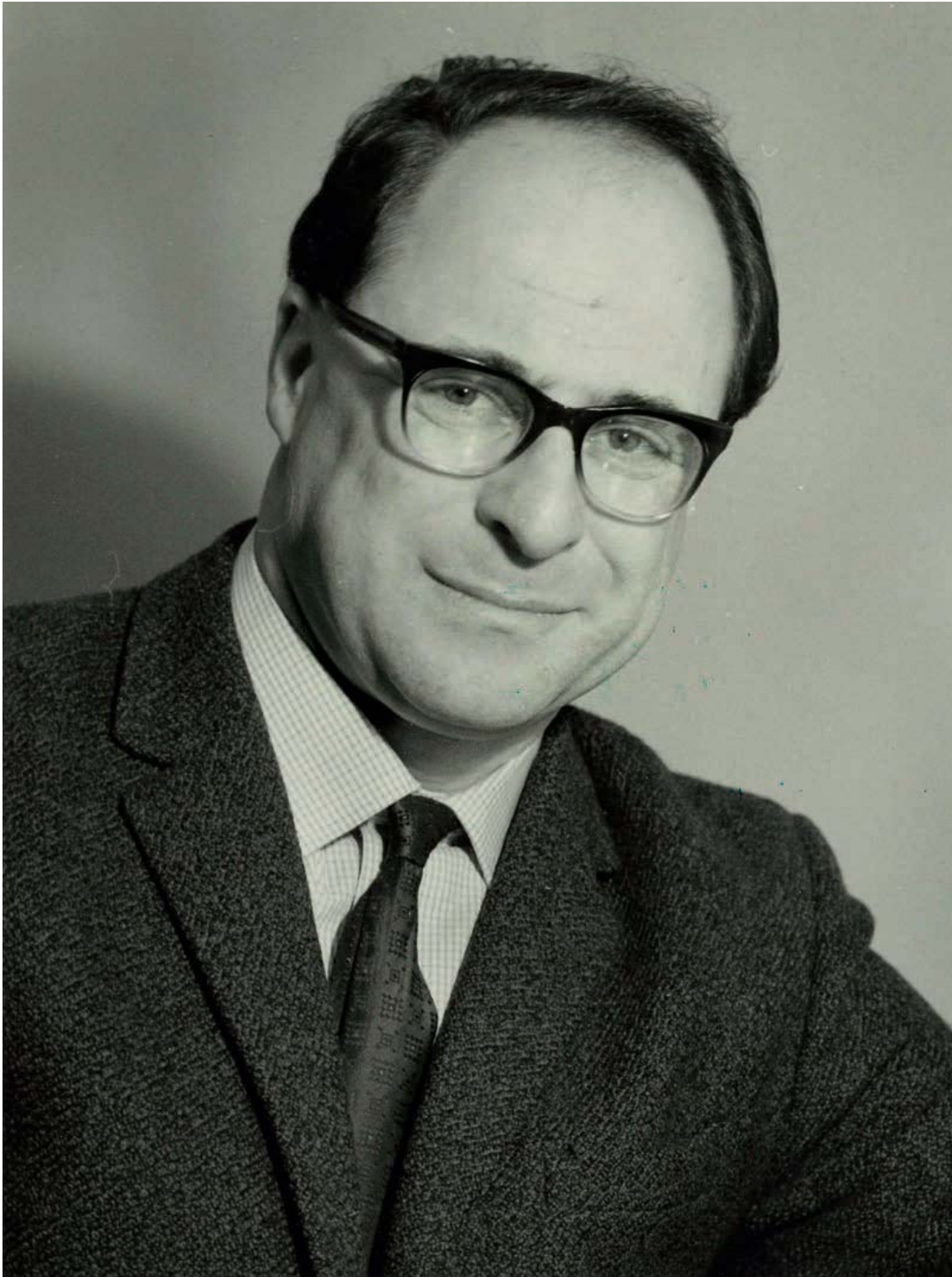
In June 1990 Spirax Sarco bought Watson-Marlow from its parent company, Smith & Nephew, for £15.2 million. Within ten years this company, based in Falmouth on the south coast of Cornwall, had grown from being the largest maker of peristaltic pumps in the UK into the world's leading company in its sector. At the time the company seemed too small, operating in too specialist a field, to be a strategic acquisition, yet this was exactly what it turned out to be, transforming its performance under the nurturing care of its new parent. The company barely rated a mention in the Group's Annual Reports for some years; in 2018 it accounted for approximately a quarter of the Group's turnover and a third of its operating profits.

Watson-Marlow was part of a package of small acquisitions made by Spirax Sarco during 1990. Eager to diversify into related businesses, the Group had been looking at a number of opportunities. Although Watson-Marlow had made great strides during the previous few years, this had largely been in spite of its parent company, for which Watson-Marlow was never part of its mainstream activities. When Smith & Nephew bought the business in 1977, the two companies had so little in common that some people believed the purchase must have been an oversight. Their relationship was never easy, and

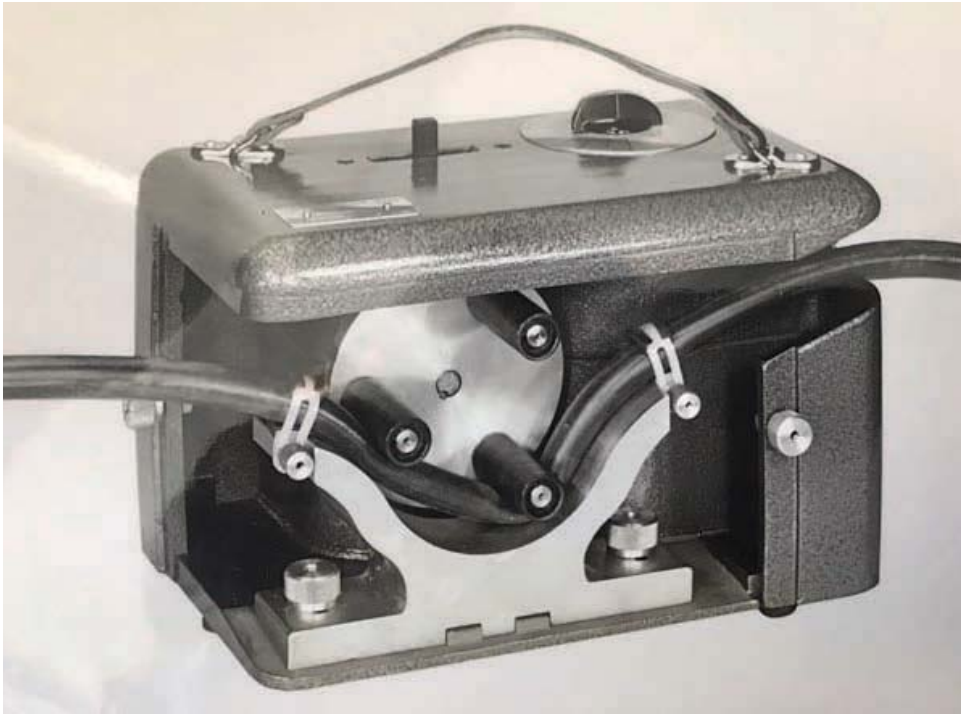
there was always tension over Watson-Marlow's need for capital as it expanded. In a pointed comment made at the time of the acquisition, a spokesperson for Watson-Marlow stressed that 'Spirax-Sarco is in engineering whereas Smith & Nephew is in pharmaceuticals and maybe did not appreciate how much has to be put into our market. We will now be developing products faster.'

In Spirax Sarco the company found an ideal home. The Group, said the press announcement issued at the time, saw Watson-Marlow as 'a natural extension to its specialist steam controls and heating controls businesses'. The Group operated in similar markets to Watson-Marlow, was well-established in the process engineering sector and knew all about engineering and product development. It was willing to back a business it believed had great possibilities, leave its management to carry on running it, invest in its international expansion and encourage it to take on the Group's direct sales philosophy. Without this side of the equation, Watson-Marlow would never have achieved its potential.

The founder of the business was Bernard Refson. Born in the north-east of England in 1928, he was naturally inventive. He took out his first patent shortly after graduating from the



Bernard Refson, founder of Watson-Marlow



The original HR Flow Inducer (pump) from Watson-Marlow

University of Durham. It was only a gimmick, a trigger-activated figure of a man playing golf strokes – and it was a miserable failure. He ended up joining a company called British Filters, where he worked as a publicity officer. Formed in 1938, British Filters originally specialised in filtration for the automotive industry, which led the company to develop filters for many other processes. It still exists today, based in Plymouth, but for many years it was located in the small Buckinghamshire town of Marlow, which would later lend its name to Bernard Refson's business.

For whatever reason (Refson wrote that 'my work ... ceased to have relevance to their requirements') Refson parted company with British Filters in November 1957. Until then, he wrote, 'I had no

very clear idea of being in business at all. My leaving British Filters precipitated a situation which had developed almost casually out of my inventions.' He was clearly experimenting with pumps before he left British Filters, and over the next six months his activities, he wrote, 'were almost entirely concerned with the development of a pump and valve which are new inventions'. His interest had been awakened by the problems the company had with the pumps it was using to send fluids through filters. His inventive mind came up with an air-operated alternative which he was certain would be more efficient. British Filters rejected his idea, but Refson remained convinced. This was the very first of Refson's pumps, housed in a stainless steel casing, which he called the valve pump.

It was during the development of the valve pump that the supplier of the stainless steel casing asked him if he could help a friend of his, a farmer who wanted a pump that could transfer milk direct from a cow in the middle of a field to a road tanker. This prompted Refson's first peristaltic pump, the HR, the initials apparently standing for 'Heath Robinson', since Refson thought the prototype resembled one of the hare-brained creations of the famous cartoonist. The story was elaborated in *Spirax Sarco News* in 2006:

Working in his garden shed, he used a lathe, a curved wooden track and Bunsen burner tubing to make his first peristaltic pump. He refined his design, patented his adjustable track, made six pumps and went into business. He planned to sell one pump a month. He sold all six in one month and realised he had a success on his hands.

It is generally recognised as the first technically and commercially viable peristaltic pump for use outside the laboratory. 'This was made possible,' commented one industry journal, 'by the method of incorporating the tube, through which alone the fluid flows, into the mechanism. Not only does this permit a great variety of types and sizes of tube to be used, but it makes layout and installation, replacement or sterilisation extremely quick and simple, no tools being required.'

Developing the pump consumed Refson's every waking hour for several months. He told his tax inspector in 1958 that he had done very little private motoring in the previous year, 'as I have no time in which to do it!' Several prototypes were tested by potential customers. The first pump for sale was produced in April 1958. Refson took on his first employee, Bill Wing, to help him with the first batch of six pumps. It was thanks to Refson's skill as a technical journalist and his talent for self-promotion that all six were soon sold. In a winning combination of engineering expertise, technical know-how and marketing, the foundations of

Refson's business had much in common with those of Spirax Sarco.

Soon afterwards the Watson-Marlow Air Pump Company was formed. When the first balance sheet for the year ending 31 March 1959 was prepared, total assets amounted to £1,016, approximately £20,000 in 2018 values. There is an abundance of apocryphal stories as to why he chose the name Watson rather than his own, but the true reason remains unknown. It remained the Watson-Marlow Air Pump Company for many years before the name was shortened.

The peristaltic pump was not a new idea. As one trade journal put it in 1973, 'the first man to milk a cow was applying the basic principles'. The first patent was granted to an American inventor, Eugene Allen, from Grand Rapids, Michigan, in November 1881. His application was entitled 'Instrument for Transfusion of Blood'. He saw his pump as a life-saving device, an altruistic objective that would have appealed to Bernard Refson, who had studied moral and mental philosophy at university. Describing his invention, Allen said,

A transfusion of blood has not as yet been successfully practiced as a method of treatment for disease, from the fact that the operation has hitherto been attended with great danger to life from the imperfect methods employed, whereby air and coagulated blood have been introduced into the veins of the patient, either of which causes death. Until means are provided by which danger from these causes is entirely removed the practice cannot meet with favor, or even be properly tested.

Believing that transfusion of blood, when fully understood and properly conducted, will be successfully employed in the treatment of a large class of cases, my attention has been directed to the invention or discovery of methods and

means whereby the operation might be performed with safety to the patient, and the result of my endeavors in this direction has been the production of the within-described apparatus.

The leading feature of the apparatus is the elastic hose provided with points of firm material, and furnished with an external propelling agency, whereby the blood is propelled through it by means of a moving pressure applied upon its sides in about the same manner as though stripped through the fingers of the human hand, thus dispensing with all suction-valves, which, on account of the sticky and fibrinous nature of blood, will always clog and produce clots, that must be avoided in an instrument for transfusion of blood.

Like many inventions, its potential remained undeveloped until the 1930s when Michael

DeBakey, a medical student, pioneered its use to ensure a continuous flow of blood during operations. Moreover, the blood being pumped was prevented from coming into contact with the mechanism, ensuring it remained uncontaminated. The roller pump, as it was described, would become part of the modern heart-lung machine, and made open-heart surgery possible. Beyond medicine, little thought was given to the wider use of the peristaltic pump. By the 1950s they were still confined to light duties in laboratories, hospitals and similar settings.

A succinct and clear description of the peristaltic pump was given by one of the company's Marketing Managers, Mike Sullivan, in 2004. They consist of:


a tube or hose laid out in the curved track of a pumphead and have a central rotor with usually two or three rollers



Miniature HR Flow Inducer (pump) from Watson-Marlow

PUMPING DOSING METERING

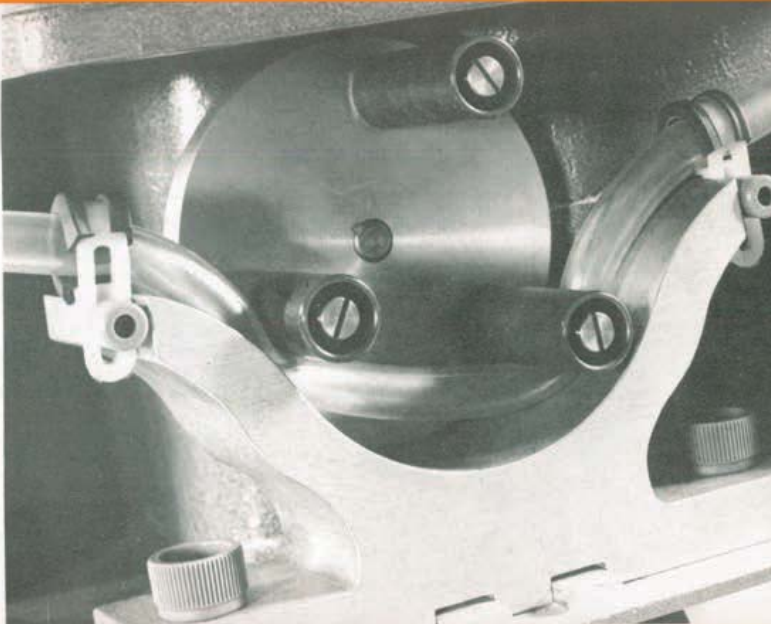
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set at the periphery. As the rotor turns, the advancing roller progressively squeezes the tube, forcing the fluid in the tube forward. The tube behind the roller simultaneously returns to its normal shape, creating a vacuum. This allows more fluid to be drawn in, which in turn is forced forward by the rotating rotor.

By the time this description was written, some six million peristaltic pumps were in use around the world. Their advantages had become widely recognised: they could handle difficult fluids and suspended solids with ease; they had the capability for precision dosing and metering; they lacked valves or seals which could leak, corrode or clog; and above all the liquid being pumped was contained entirely within the tube, preventing any contamination of the liquid or, when pumping abrasive or corrosive materials, damage to the pump. As one later Watson-Marlow brochure put it, 'if a fluid will pass through a tube, then a peristaltic pump can speed its flow, control its flow rate or dispense it in precise volumes'. Another advantage was the gentle way these pumps transferred fluids. One early application of the Watson-Marlow pump, reported one trade paper, was the transportation of live smelts (fish): 'during tests in which the smelts in their aquatic environment were re-circulated, they so enjoyed the trip that, after a few circuits, they were queuing up to enjoy the ride.'

But this massive advance was a long way in the future. The HR pump enjoyed reasonable success, leading to the introduction of larger and smaller versions, the LHR ('Large Heath Robinson') and the MHR ('Mini-Heath Robinson'). The LHR, the largest of Watson-Marlow's early pumps, had a capacity of nine litres an hour; the MHR could pump as little as one cubic centimetre of liquid every three months. The company also produced a range of different models for each pump.

Learning from the performance of the early pumps, the company made constant improvements. The life and efficiency of early pumps were hindered because methods of securing the tubing restricted the size of tubing that could be used. This changed as improvements in design allowed the incorporation of a greater variety of types and sizes of tubing. Natural rubber, used in the early pumps, also proved unreliable for use as tubing. In extreme cases the tubing could fail within half an hour, unable to resist being fully squeezed. This was overcome as other more durable materials were developed in the late 1950s, including neoprene and PVC. Another problem arose when the tube was bent through a critical angle, causing it to kink and the tube walls to touch, closing off the pump completely. This led to the development of rotors which created progressive kinks along the tube, moving them along, pushing the liquid ahead of them.

The success of the pumps soon made it necessary to find premises larger than Bernard Refson's garden shed. He leased the disused stables next to Marlow's railway station, adding offices, stores and an assembly shop as the business expanded. The upper floor of the old stables housed the company's research laboratory and mechanical workshop.

The great breakthrough made by Bernard Refson and Watson-Marlow in the first ten years of the company's existence was finding new uses beyond the laboratory for the peristaltic pump. A surviving order book from the early 1960s shows just how widely the pumps were beginning to be used. As well as the pharmaceutical companies you would expect to find as customers, such as Merck Sharp & Dohme, Glaxo Laboratories and Beecham Research Laboratories, there were customers from many other sectors of industry. Arthur Guinness & Son, Joshua Tetley, Charrington, Ind Coope and Watney Coombe Reid represented the brewing industry;



Watson-Marlow's peristaltic pumps in an early renal dialysis application, 1960s

Max Factor and Revlon, cosmetics; Dunlop Rubber and Pirelli General, tyre manufacturers; Lyons, Nestlé and Unilever, the food industry; Procter & Gamble and Albright & Wilson, detergent manufacturers; Bemrose and De La Rue, the printing industry. Others included the Ford Motor Company, the National Coal Board and Tate & Lyle, the sugar refiners. As one newspaper reported in 1970, Watson-Marlow's pumps pumped everything 'from blood, dog food and Christmas glitter to sewage and raspberry ripple for ice cream'. They pumped beer, circulated cerium oxide to lens polishing machines and fed colour inks. They were used in agriculture and engineering, in ceramics, chemicals and dyeing, in electronics, water treatment and food, in glass, mining and paints, in paper, photography and rubber, in sewage treatment, tanning and textiles. But also prominent among the list of these early customers were hospitals from across the UK,

for the greatest success of the pumps in the 1960s lay in the new field of renal dialysis, for which the company supplied pumps in their thousands.

This began with an order from the Royal Free Hospital in London, where renal dialysis was being pioneered. It became so important a market that by the end of the 1960s, while Watson-Marlow was making flow inducers and ancillary pumps impervious to most industrial chemicals, it was also operating a dedicated medical division. In fact, after approaches from several manufacturers seeking Watson-Marlow pumps for use in their kidney dialysis machines, the company began making its own machines.

The company had some initial success, and by 1967 orders were coming in not only from the UK but also from a number of European countries and

even from South Africa. By now the company was investing heavily in the development of a dialysis machine for use by patients in their own homes. This turned out to be a commercial dead end for the business: the prototype was too complex to use or maintain. At the same time the makers whose approaches Watson-Marlow had turned down began making their own pumps, reducing demand for the company's products. The failure of an expensive capital project, combined with competition from other pump makers, created something of a financial crisis for the business, leading to a number of people losing their jobs in 1974. It was bitterly disappointing for Bernard Refson. Despite his achievements, he became convinced that the potential for peristaltic pumps was limited, and in seeking a new direction, he wanted to pursue the development of products that had little to do with the original business. As he put it in 1973, 'we are developing away like mad on other things'. This was in spite of the fact that by 1977 the company had built up a range of peristaltic pumps which encompassed micro-metering versions to industrial models delivering 9,000 litres an hour.

Before then the company had moved out of Marlow to a new location. More space was needed as production expanded and too many restrictions hindered Watson-Marlow's existing site. Instead, the company investigated a number of alternatives, even considering the idea of relocating to Canada. Persuaded by an attractive package of grants and other financial incentives, the company decided to stay in the UK. Watson-Marlow moved to Falmouth on the south coast of Cornwall, bringing much-needed employment to an economically disadvantaged part of the country. On a 17-acre site the company developed a purpose-built complex comprising offices, warehouse, laboratories and factory. To start off this new venture Bernard Refson brought with him a core group of a dozen people from Marlow. The business moved to Falmouth before the new factory was completed in April

1969, working out of temporary premises on the town's waterfront.

In these early years the company was also developing other characteristics that would later prove attractive to Spirax Sarco. Firstly, Watson-Marlow was eager to develop international sales. Bernard Refson himself had flown out to South Africa to win export orders for his renal dialysis machines. By the early 1970s the company was actively promoting its products across Europe from the Netherlands and West Germany to the Soviet Union. It was attending exhibitions all over Europe, including one in Moscow in 1973. Several years previously there had been a failed attempt to break into the US market, using engineering distributors. During the early 1970s the company tried again, limiting its ambition to a smaller market, selling only miniature flow inducers to research and technology outlets, which required less effort and investment. Only sporadic sales were achieved, often through connections with British scientists working in the USA. Even so, by 1974 nearly half the company's turnover of £850,000 came from international sales.

The second characteristic with echoes of Spirax Sarco was the realisation by the company that selling a product was not enough. 'In our experience,' one executive wrote, 'we only need to solve a problem for a key member of a given industry and then we receive many enquiries from recommendations.' Three key points underpinned the company's approach to sales: one, 'If Watson-Marlow say the [pump] will meet your application, it will'; two, 'If your application is new, you will get first-class advice with balanced judgement'; and three, 'The customer must benefit from every sale'.

Thirdly, Bernard Refson believed strongly in the central importance of the human contribution to business. 'Watson-Marlow,' new members of staff were told,

does not employ 'labour', only people. The whole idea of labour as a faceless mass of hands to push levers or pens is out of place at Watson-Marlow, where individual rights, needs and abilities are fully considered, and where the relationship of everyone's work to the products and the success of the company is clearly understood. Ideas of moral justice and human rights govern all aspects of Watson-Marlow's activities.

Trusting his team to be good timekeepers, Refson abolished clocking on, so common in many UK factories. When people fell ill, they could expect up to six months' full pay. Still a small company, the personal touch was evident. Bernard Refson would personally let every employee know when their pay was being increased. Newcomers on their first day were introduced to all their colleagues over lunch. There was a social club offering a wide variety of activities. 'It was a place where you were looked after,' said one long-serving employee in 2018, 'and it still is.' It was hardly surprising that Watson-Marlow built up a strong team of loyal people.

By the early 1970s Watson-Marlow was making 90 per cent of all peristaltic pumps being sold in the UK. The company was growing rapidly, around 30 per cent every year, and the workforce had increased to more than 80, including a small team of research and development personnel. But the failed kidney machine venture had soaked up a lot of capital, hindering future expansion. Product development became even more crucial. All this required capital. For a company that had never borrowed, it was now imperative to find an outside investor.

That investor was the UK medical equipment maker Smith & Nephew, which acquired Watson-Marlow for £1.3 million in 1977. Bernard Refson retired from executive management, although he remained a Director for some time. The new owner planned that the company should develop

a range of products for the medical market, becoming part of the group's pharmaceutical division, but this strategy was as misguided as the one latterly adopted by Bernard Refson. It was based on the mistaken assumption that a major part of Watson-Marlow's sales came from the medical sector, and this was no longer true. The real success of the company had been in developing sales into a huge variety of other commercial and industrial sectors. The challenge, and opportunity, was to make the most of the potential these new avenues presented.

For Smith & Nephew, Watson-Marlow failed to become part of its core business. Indeed, in the early 1980s, disappointed by sales into the UK medical sector, Smith & Nephew instructed Watson-Marlow to wind down sales of peristaltic pumps into the UK market. Watson-Marlow was able to convince Smith & Nephew to stay the execution of the UK business, but the relationship between the two businesses was never comfortable, and there was always tension over Watson-Marlow's need for capital as it rapidly expanded.

Despite the uneasy relationship with its parent, Watson-Marlow grew. Perhaps because Smith & Nephew was soon taking little interest in its latest acquisition, Watson-Marlow's management, led by Director George Coe, was allowed considerable latitude in running the business. Watson-Marlow's management recognised, as Bernard Refson and Smith & Nephew had not, the huge worldwide potential for the use of peristaltic pumps.

Marketing had never been one of the company's strengths, but this started to change with the appointment of Chris Gadsden as Marketing Manager in 1981. Combining improved marketing with a relentless focus on product development, the company saw considerable success. By the end of 1981 the company's policy was 'to provide more technically advanced products



501 Modular Peristaltic Pump System, 1979

to take Watson-Marlow into the heart of the new laboratory and industrial process technologies'. The results from focusing, for example, on markets such as food processing were remarkable. 'Every day there was another process application,' remembered Heather Beale, who joined the marketing department in 1975. 'We were just a small team, so we had to limit how much we did, but every time you moved into another industry, you discovered another application.'

Surprisingly, few makers of other types of pump recognised the potential threat posed by the expanding use of peristaltic pumps. 'It was quite easy,' recalled Heather Beale, 'to sell pumps into the process markets.' Other peristaltic pump

makers rigidly confined themselves to the limited markets offered by traditional applications. On the other hand, many customers in a wide range of processing industries welcomed Watson-Marlow with open arms, often after countless attempts without success to devise an effective solution themselves. For them, peristaltic pumps were a revelation, and they looked upon Watson-Marlow as their own pump manufacturing arm.

The UK market, which had almost been written off by Smith & Nephew, was revived thanks to a national team of sales engineers working alongside a network of distributors. Sales conferences, selective advertising, exhibitions with eye-catching stands, all played their part,

while sales demonstrations carried out on the customer's premises proved a winning way of securing orders from first-time users. Efforts to win more international sales proved even more successful. Watson-Marlow became the leading supplier of peristaltic pumps in Europe, while new distributors were appointed in countries as distant as Singapore, Malaysia and Indonesia. Under Export Manager Bill McKean, sales through international distributors nearly doubled between 1980 and 1983. 'Our dedication to identifying and satisfying market trends and needs,' stated the company's newsletter, *Exflow*, in 1983, 'will ensure the success story continues.'

Ambitious sales and marketing objectives could be met only through investment in the latest production technology and a programme of rapid product innovation. A huge leap forward in the design of peristaltic pumps had been made in the late 1970s. Launched in 1979, the 501R was the first in a new series of pumps, with an innovative pumphead that simplified the way tubing was changed, saving time and increasing efficiency.

This new design opened up a huge market for accurate mid-flow pumping at flow rates of up to two litres every minute. A bigger pump with a higher flow rate based on the same principles soon followed, accompanied a few years later by the smaller 101R, which quickly became the most widely used peristaltic pump in the burgeoning biotechnology sector. Once again the range benefited from improvements arising from lessons learned in the field. Numerous other changes would be implemented, with better motor drives giving better control over the speed of the pumphead, while the adoption of microchip technology during the 1980s improved the way the pumps were controlled, reduced the number of components needed and allowed smaller, more compact pumps to be made.

In 1984 the 700 series was launched after three years of development by a team led by Chief

Mechanical Development Engineer Stefan Gustafsson and Chief Electronics Development Engineer Peter Ibbotson. 'At the heart of every 700 series pump,' proclaimed *Exflow*, 'is Stefan Gustafsson's brilliant new 701R pumphead which develops the roller-driven principle we first introduced in the cassette pump.' Rather than the three rollers fitted to most peristaltic pumps, the 700 series came with four rollers. By reducing drag, this significantly increased the life of the tubing.

As for tubing itself, another innovation came with the launch under the Watson-Marlow name of a new tubing material, Marprene. Superior to existing tubing materials, such as silicone and neoprene, it was offered to Watson-Marlow by the material's manufacturer, Norton Abrasives. The two sides reached an agreement giving Watson-Marlow exclusive use of Marprene under its own name in the UK and Europe. Tested for a year before it was launched, one of the original samples had run without a problem for the entire period. Marprene tubing also improved suction, since the material had the ability to return quickly to normal size after being occluded by the pump's rollers. Suitable for every application other than particularly aggressive chemicals, and yielding a lifetime performance comparable with diaphragm pumps, Marprene offered the possibility of extending the use of peristaltic pumps into yet more new applications. As the agreement with Norton came to an end, however, so did the patent covering Marprene, allowing other manufacturers to supply it more cheaply.

Watson-Marlow had a winning formula, managed almost as an independent business, investing in product development, sales and marketing. Additional resources were needed to ensure that output kept up with demand (the factory was extended in 1988), and customers continued to enjoy prompt deliveries. Largely through steadily increasing exports, Watson-Marlow's sales grew every year from 1981 onwards, rising from around

£1 million in 1980 to £6 million in 1991, the year immediately following its acquisition by Spirax Sarco. The impact already being made by the company was evident from one of its brochures from the late 1980s. All you had to do to see the contribution made by peristaltic pumps, said the brochure, was to look around:

The glaze on the tiles in your bathroom may have been applied by a Watson-Marlow pump, and we probably helped in the development, production and testing of every pharmaceutical and cosmetic in the wall cabinet. In your kitchen we may have pumped the flavour on your breakfast cereal, the ink to the printing on the milk carton, and the surface on to the worktops. Even the tin on the can of baked beans may have been extracted with the help of one of our bigger pumps.

The list was endless, from pumping the batter on to fish fingers and sauces into bottles to pumping the paste on to ready-pasted wallpaper and metering the dye that coloured roof tiles.

Although Watson-Marlow was still a small business when it was acquired by Spirax Sarco in the summer of 1990, it was full of potential. Spirax Sarco proved to be the perfect parent to help the company make the most of that potential. One of the first benefits of this relationship was the appointment of Richard Woods as Watson-Marlow's Managing Director. As Spirax Sarco's Technical Director, he was the ideal person to lead a business for which product development was critical. He made a superb job of transforming the business, particularly on the production side.

Research and development was crucial for the business, and several new pump ranges were introduced, including the company's first pump with a computerised drive, the 505Di in 1990, and the 500 and 600 series of compact, low-cost, close-coupled pumps in 1997. Work was also under way to upgrade the company's core series

of pumps (520/620/720) from analogue to digital drives. The company was also ambitious to break into the market for major industrial applications, launching its largest pump, the 900 series, in 1994, although this had limited success.

In 1994–95 the factory in Falmouth was extended, and five years later the company built a clean room to make its own silicone tubing, Pumpsil, for the first time. This was an important strategic decision, backed by Spirax Sarco, at a time when consolidation among tubing manufacturers was taking place, which could have left the company vulnerable. It was also a move that enhanced the company's position at the premier end of the industry. A world-beating innovation was laser-coding the tubing for traceability, critical for many customers in processing industries. Biopharmaceutical customers also appreciated the two-stage silicone curing process that eliminated any risk of leachate contamination. Making tubing also gave the company an unrivalled understanding of how tubing behaved in a peristaltic pump. Additionally, the new plant made it possible for the company to begin selling tubing alone as a consumable. Since a lot of tubing was used only once, this yielded valuable repeat business. The plant was a great success, and the company was surprised by just how quickly most customers switched to Watson-Marlow's own product.

After the appointment of Richard Woods as Managing Director, there was a fundamental change in the company's production strategy. For many years the practice had been to make pumps for stock, regardless of demand. This worked when customers requested products that were in stock, but led to delivery delays when products were out of stock. As sales increased, this had to change to ensure prompt deliveries to customers for whom a pump breakdown was a serious matter. Instead, under Richard Woods, the company gradually moved to producing pumps to order, sharply reducing delivery times and the

investment tied up in stock. Part of this process involved the development of a common core assembly, which could be configured with up to 200 variations, cutting the time to produce each pump from three hours to one. Standardising as many components as possible to improve efficiency while retaining sufficient flexibility to adapt pumps to meet customer specifications is a policy that still continues. Shipments were being made three times every week to Europe and once a week to the USA. All this was helped by an expanding network of sales offices and distributors all over the world.

This shift stemmed partly from feedback from customers, with the company introducing annual customer satisfaction surveys in 1993. Other changes introduced after listening to customers included improved technical support, faster and easier repairs and better communications through twice-yearly news bulletins and the launch of the first website in 1996. The company's philosophy centred on 'Solving Pumping Problems', selling solutions rather than products – also a core Spirax Sarco philosophy.

Following its acquisition by Spirax Sarco, the company was eager to capitalise on the initial success it had achieved internationally before rivals woke up to the enormous possibilities of the worldwide market. Once again Watson-Marlow was soon benefiting from the backing of its parent.

The first place where this occurred was in the USA. Less than a year after Watson-Marlow became part of Spirax Sarco, the company took over its North American distributor, Bacon Technical Industries, which became Watson-Marlow Inc. The original business was small, with a sales office in Marblehead, Massachusetts, close to the coast north-east of Boston, with stock and customer service located at White River Junction in Vermont. In beginning to make

inroads in such a vast market, the business had decided to focus almost entirely on the emerging biotechnology industry, which accounted for 90 per cent of Watson-Marlow Inc.'s \$600,000 sales in 1991. Sales had been developed through the same method used by Spirax Sarco's own US subsidiary, selling products through a handful of agents whose portfolio included complementary products sold to the same customers. For Watson-Marlow Inc., the challenge was to broaden the customer base, as it faced plenty of cheap competition from alternative pump types in a marketplace with little experience of using peristaltic pumps in process applications. As in most other parts of the world, US peristaltic pump makers confined their attention to limited traditional markets.

The transformation of Watson-Marlow's fortunes in the USA was led by Jay Whalen. After commercial experience elsewhere, including a spell with a small peristaltic pump manufacturer, he had been part of the team involved in the acquisition of Bacon Technologies. One of the first moves after acquisition was to consolidate the operations of the small business on one site in Wilmington, on the outskirts of Boston. It has remained there ever since, moving to larger purpose-built premises in 2000. Spirax Sarco provided invaluable administrative support, a role it would repeat around the world. The US company was able to concentrate on expanding sales, applying the Spirax Sarco direct sales model. This was applied worldwide, setting the pattern for Watson-Marlow's international growth. In the USA the company replaced distributors with representatives of local manufacturers, supporting them in every way, enhancing their local reputation, boosting their confidence and making sure they saw Watson-Marlow as a trusted partner. They were backed up by regional sales engineers – usually young, recently qualified mechanical engineers. For Jay Whalen, 'our representatives were our number one customers.'

Jay knew the model was working when he arrived in the Wilmington office one morning to find that an order had been received overnight by fax – in other words, someone out west had been selling while everyone back east had gone home. Jay himself was supported by Watson-Marlow's Export Manager, Bill McKean, in his efforts to promote the company's name through the trade press or countless personal meetings with representatives, customers and trade associations. Success through direct sales, unusual in the US pump industry, came steadily, incrementally, year on year, benefiting from the Spirax Sarco tradition of planning for the long term. By the end of the 1990s the USA had become Watson-Marlow's main growth area. Today the USA is the company's largest market, with sales of more than \$100 million a year.

Another important factor that helped to accelerate US sales was dividing the market into discrete groups of customers who shared similar characteristics, a process promoted by Jay Whalen as market sectorisation. Initially, even when the company was still selling only one pump range, customers were divided into 'clean' and 'dirty' sectors, each with its own catalogue. Gradually the process became more sophisticated, dividing customers into smaller discrete groups, covering areas such as biopharmaceuticals, chemicals, food and beverages, mining, water and wastewater, and Original Equipment Manufacturers (OEM), including medical and clinical diagnostics. At the same time teams of sales engineers were focused on serving specific sectors, developing an intimate knowledge of each as well as the appropriate product applications, boosting their reputation in the eyes of their customers. Here too was a link with the technical selling embedded within Spirax Sarco.

Jay Whalen went on to play a leading role in the international success of Watson-Marlow as a whole, applying lessons learned in the US

market. He became Sales and Marketing Director and later President of the worldwide group, and an Executive Director on the Spirax-Sarco Engineering plc Board.

Watson-Marlow was also expanding steadily outside the USA. Spirax Sarco played an invaluable role. Initially the strategy was to integrate Watson-Marlow within existing Spirax Sarco businesses around the world, but an attempt to do this in Korea in the early 1990s failed because the existing business concentrated entirely on steam. Instead, Watson-Marlow was encouraged to set up its own satellites, which often happened, as in the USA, as a result of establishing direct sales teams to take over distribution. In addition, having learned from the Korean episode, in parts of the world where Watson-Marlow was entering the market for the first time, existing Spirax Sarco businesses helped to incubate these fledgling operations, but with separate Watson-Marlow sales teams under their own General Managers.

During the 1990s, other than in the USA, Watson-Marlow's priority was expanding its position in Europe. This was partly because of the introduction of the European Single Market in 1992, which turned the European Union into a single territory without any internal trade borders or other regulatory obstacles hindering trade. Moreover, there had been enormous growth in the European market for peristaltic pumps, and this was expected to continue. Watson-Marlow's first step came in 1993, when the company took a 55 per cent stake in its Dutch distributor, based in Rotterdam, which became Watson-Marlow BV. Soon afterwards the company also took over its distributor in Belgium. These were used as a means of entering the German market after the company had ended its relationship with its German distributor. As the company adopted its direct selling approach across the continent, other sales companies soon followed in France, Germany and Italy.



Bredel pumps installed at a sustainable biomass power station, Denmark, 2016

As well as expanding its existing presence in Europe, Watson-Marlow, backed by Spirax Sarco, also began acquiring complementary businesses to widen its product range. The first of these acquisitions was in 1996, when Watson-Marlow paid £17 million for a Dutch company, Bredel Hose Pumps. The leading global manufacturer of industrial peristaltic pumps, Bredel had created a high-pressure, high-flow hose pump in 1972, adapting the reliability and low maintenance of the peristaltic pump for intensive industrial use.

Watson-Marlow had struggled to compete in this important part of the market. In particular, the company lacked the expertise needed to develop the resilient rubber hose these industrial pumps needed. Initially the company had plugged this gap in its range by distributing the larger hose pumps made by a French company, Delasco, before launching its own large pump, the 900 series, in 1994.

The opportunity to acquire Bredel arose through a chance conversation Jay Whalen had with an executive from Waukesha (Bredel's US parent company), which led Jay to conclude that Bredel might be available. He called Watson-Marlow's

Sales and Marketing Director, Chris Gadsden, and three months later, on 31 December 1996, Bredel became part of Watson-Marlow. Taking over Bredel allowed Watson-Marlow to stop making its own large hose pumps, concentrate on developing peristaltic pumps for processing industries and begin marketing the combined range worldwide.

The deal was so notable for Watson-Marlow that for several years the name of the business was changed to Watson-Marlow Bredel. Integrating the business was a challenge, partly because of the different culture, partly because Bredel relied exclusively on distributors (one frustration was waiting for UK distribution agreements to expire) and partly because of a contrast in approach to management. Bredel's existing management, with their accumulated expertise and proven track record, continued to run the business successfully, and significant change came only as they stepped down. Bredel soon experienced the advantages of being part of the wider group, one being the redevelopment of Bredel's factory in 2001. For Watson-Marlow, Bredel, in addition to its technical know-how, brought an established customer base and opened up new opportunities, particularly in the



asepticSU™ single-use technology from Watson-Marlow and FP50 automated filling and stoppering machine installed at Cancer Research facility, UK

industrial and waste water sectors, and in areas such as ceramics and mining where viscous materials were handled. The acquisition also had a considerable impact on the fortunes of Watson-Marlow Inc., since it included Bredel's significant US distribution business, which added 40 per cent to Watson-Marlow Inc.'s turnover. As Jay Whalen later recalled, 'Bredel didn't just add sales volume, it transformed the company by giving us critical mass and by strengthening our industrial and municipal base.'

A second, smaller acquisition followed in 2000. Based in Sweden, Alitea produced precision pumpheads that were subsequently built into other manufacturers' machines, particularly in the medical, clinical diagnostic and biotechnology sectors. This strengthened Watson-Marlow's interest in the OEM and high-precision markets. A couple of years later Watson-Marlow also took over its Swedish distributor, establishing its own direct sales office.

After a decade as part of Spirax Sarco, Watson-Marlow had tripled in size. More than a hundred people were employed in the company's growing international operations, which included Brazil, China, Korea and Malaysia, as well as the UK, Europe and the USA. More than 80 per cent of everything the company made was exported through subsidiaries, distributors and agents in more than 60 countries. With a range of pumps covering flows from 0.0002 millilitres per minute to 80,000 litres an hour, the company was the world's largest maker of peristaltic pumps, having half of the total global market.

The first decade of the new millennium produced ever more rapid growth as Chris Gadsden took over from Richard Woods as Managing Director in 2002, Jay Whalen became Sales and Marketing Director and David Meredith became the Group Director responsible for the business, a role he held from 1998 to 2010. By 2000 Watson-Marlow's sales had grown significantly, but they

were still less than £20 million; by 2010, when Chris Gadsden handed over to Jay Whalen, turnover exceeded £100 million, while nearly a quarter of the Group's operating profits came from Watson-Marlow. It was becoming so important to the Group that in 2009, for the first time, Watson-Marlow was reported separately in the Annual Report. Growth continued under Jay Whalen: in 2018 Watson-Marlow's £265 million turnover accounted for nearly a quarter of the Group's sales and, at £85 million, almost a third of its operating profits.

Several factors account for this continuing success story. There was what one trade journal described as 'the unstoppable march' of peristaltic pumps. Largely thanks to the company's marketing, there was a growing awareness of the capabilities of peristaltic pumps, as a result of which they were steadily displacing alternative pumps. In 2010 Watson-Marlow emphasised that one of its major tasks continued to be 'to educate customers about the intrinsic advantages of peristaltic pumps so that they will increasingly be used to solve difficult pumping problems. These intrinsic advantages make peristaltics one of the fastest growing sectors of the global pumping market.' This campaign of conversion caught rival pump manufacturers almost unawares, with the result that by 2010 Watson-Marlow was the largest European manufacturer of any type of positive displacement pump.

At the beginning of the 2000s, the company held a strong position in the North American and European markets, which accounted for 80 per cent of sales. As with Spirax Sarco, it became a priority for Watson-Marlow to be among the first peristaltic pump manufacturers to open up new markets in emerging economies. When Jay Whalen became Sales and Marketing Director, he began looking for opportunities to further broaden the company's global presence based on the successful strategy of sectorisation. As well as



A Flexicon table-top filling machine

taking over existing distributors, the company pioneered markets in Africa, Asia Pacific and Latin America, where peristaltic pumping was largely underdeveloped. New sales companies or offices were opened in countries such as Chile, India, Malaysia, Indonesia, Thailand, Vietnam and the United Arab Emirates. In addition, from 2004 onwards, a network of after-sales centres was set up worldwide, combining service and technical support. The creation of a new operating company in Singapore in 2014 showed how important links still were with existing Spirax Sarco businesses: Watson-Marlow made use of the local Spirax Sarco premises, warehousing, logistics and computer systems, and it was Spirax Sarco that set up the new company.

The growing strength of the business made it possible to begin looking for suitable acquisitions to continue the expansion of the company's range. Initially these acquisitions were confined to the pump industry, but increasingly they

also encompassed non-pump manufacturing businesses in related fields, as a consequence of the company's strategy to expand its product offering along the fluid path. Each individual business that was added to the company continued trading under its own well-established name. The broader nature of the business resulting from this strategy led to a change of name in 2014; Watson-Marlow Pumps Group became the Watson-Marlow Fluid Technology Group. This change was prompted by Spirax Sarco's new Group Chief Executive, Nicholas Anderson. He believed the business needed a name that more appropriately defined its potential market. The Watson-Marlow team came up with the current name, which encapsulates the strategic direction of the business.

The first acquisition in this latest phase was the Danish company Flexicon, together with its US subsidiary, in 2008. As its UK distributor, Watson-Marlow was already familiar with Flexicon. Founded in 1986, Flexicon designs and manufactures peristaltic filling systems, primarily for the pharmaceutical, biotechnology and diagnostic industries. This acquisition further strengthened Watson-Marlow's offering in the pharmaceutical and biotechnology industries, which accounted for almost half of all Watson-Marlow sales at that time.

Another significant addition was made in 2009 when Watson-Marlow paid £22 million for the German pump maker MasoSine, then part of the Sundyne Corporation. This was the first time Watson-Marlow had acquired a non-peristaltic pump business: for 25 years MasoSine had been producing another form of displacement pump: beautifully made, high-quality sine pumps. MasoSine technology had been hailed as a revolutionary step forward in displacement pumping, providing a powerful pump capable of delivering 90,000 litres per hour. Since the pumps do not rely on flexible tubing, they are able to pump at much higher pressures, while

still having minimal contact with the material being handled. These advantages make them suitable for very viscous materials, such as soups and sauces, sausage meat and ready meals, dairy products and confectionery. As this list suggests, MasoSine opened up a whole new market in food and beverages for Watson-Marlow. As a press release at the time of acquisition put it, 'the technical fit between MasoSine and Watson-Marlow pumps is excellent, and the wavelike action of the sinusoidal rotor can be visualised as a stainless-steel peristaltic pump.'

The first non-pump business acquired by Watson-Marlow was BioPure Technology in 2014. Founded in the UK in 1998, BioPure, which designs and manufactures single-use tubing connector systems for the biopharmaceutical

sector, lacked the capital for further growth. Since Watson-Marlow was already working with BioPure, promoting pumps and connectors to customers for use in their own equipment, it seemed a logical step to bring BioPure within the business, where it complemented Flexicon's peristaltic filling systems. As Jay Whalen commented on Watson-Marlow's acquisition strategy, 'We know what fits; we see opportunities other companies don't.' This was followed by the acquisition of two small US businesses in 2015: ASEPCO, a Californian company specialising in the design and production of high-purity aseptic valves; and Flow Smart, based in Delaware, a producer of sanitary gaskets, silicone transfer tubing and reinforced silicone hoses designed to reduce the risk of contamination within biotechnology production processes.



Flexicon filling machine in pharmaceutical application

While these acquisitions were relatively small, in 2016 the company paid £61 million for another UK business, Aflex Hose, and its US subsidiary. Specialising in the design and production of market-leading PTFE-lined flexible hoses for use in several industries, it complemented Flow Smart's silicone hoses and other related products. Eighteen months after the acquisition, the Group Board approved an £18 million investment to build a new modern plant with increased capacity in which to consolidate Aflex's four existing factories.

The company was also reinvesting in its own facilities. By 2008 the original tubing plant was too small and under increasing pressure. At a time

when the global economy was entering the most severe depression since the 1930s, Spirax Sarco expressed its long-term faith in the business by approving a request to invest £6 million in a new plant, part of the costs being met through a grant from the European Union. Simultaneously the company funded the automation of a significant part of the manufacturing of silicone tubing, substantially increasing efficiency. In fact, the company was one of the first in the world to carry out automation for tubing production. The new plant was commissioned in 2009.

Three years later Watson-Marlow underlined its commitment to continuous improvement across all its operations through the Global Excellence



Watson-Marlow tubing manufacture, Falmouth, Cornwall



Qdos chemical metering peristaltic pump, Watson-Marlow

in Manufacturing (GEM) initiative. GEM was designed to involve all employees in the sharing of best practice and encouraged them to identify opportunities to improve the business and its processes. Watson-Marlow also utilises advancing technology wherever possible, such as using robots to automate routine processes. The global business has also benefited from an enterprise resource planning (ERP) project that is standardising production processes, streamlining customer ordering, improving manufacturing efficiency and boosting customer service.

To capture a rising share of the widening market for peristaltic pumps, Watson-Marlow has concentrated its research and development

activities on creating what it describes as 'breakthrough products', aimed at winning sales from other positive displacement pumps. One example is the Qdos range, introduced in 2012, which significantly increased the company's addressable market by some £200 million.

These pumps were designed to compete directly against diaphragm pumps for metering chemicals in the water, wastewater and industrial process sectors. They also had the advantages of longer life, reduced maintenance and lower life-cycle costs. The original Qdos 30 was joined by the larger Qdos 60 in 2014 and the Qdos 120 in 2016. Within two years of the launch, the new pumps had helped to increase overall cases



Watson-Marlow Quantum peristaltic bioprocessing pump with patented ReNu SU Technology® cartridge

pump sales by almost a quarter. The success of the pump was recognised in 2018 when Watson-Marlow received a Queen's Award for Enterprise: Innovation. This stream of innovation also flowed from other parts of the business, such as the launch of the MasoSine Certa range of sine pumps in 2016 and the Quantum range of peristaltic bio-processing pumps in 2017.

The Qdos pump was testimony to the benefits of the improved partnership which had flowered between sales and marketing and production during the previous few years. Learning from mistakes made in bringing a previous pump range to market too early, the company moved towards a more collaborative relationship, with

feedback from customers flowing through sales and marketing to production. Central to the way the company operates is the belief that, as one spokesperson put it, it is 'our responsibility to see that our clients get the right solution to their needs', a tenet shared with Spirax Sarco.

New products like Qdos were developed with specific sectors of the market in mind, and as a result sold more successfully. The fruits of sectorisation, as it became known, were evident. As Jay Whalen remarked, 'we talk sectors, not product line.'

As the largest factory in the Watson-Marlow group, and with its accumulated expertise,

Falmouth became the company's global development centre, with localised research and development also taking place within Watson-Marlow's acquired businesses. Today 90 per cent of production from Falmouth is shipped to Watson-Marlow's international markets, with daily shipments to Europe and North America and weekly shipments to Asia Pacific. Through a process entitled 'Made to Order', orders for tubing are fulfilled the same day and for pumps in two days.

Culture is an important contributor to the company's success. Watson-Marlow has much in common with its parent, as do the businesses which Watson-Marlow has acquired in recent years. Part of this culture, centred on honesty, integrity and dealing fairly with customers, suppliers and employees, can be traced all the way back to Bernard Refson. It is also a people-first culture, and one of the challenges of growth is to retain it, a challenge recognised by Jay Whalen and his team; it is entrepreneurial, allowing General Managers significant freedom to manage their own parts of the business; and it is focused on quality: the company turns out expensive but beautifully made products, with technical support second to none. This culture

– where the customer counts – applies across the Watson-Marlow group, and is a priority when identifying potential acquisitions.

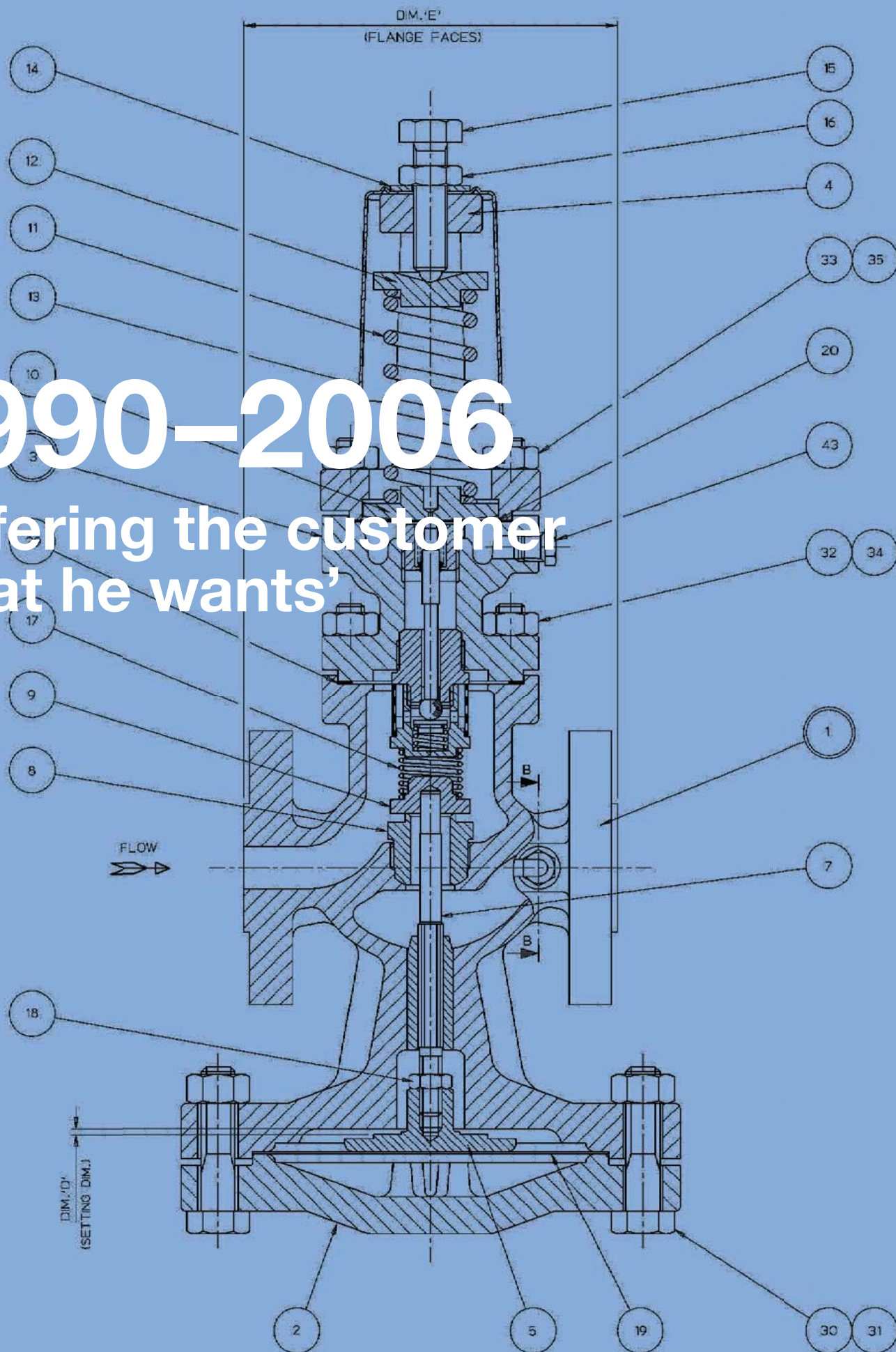
Today the Watson-Marlow Fluid Technology Group is a global manufacturing business, the leader in its field, covering peristaltic and niche pumps, tubing and hoses, single-use and fluid path technologies, concentrated in the pharmaceutical and biotechnology, food processing, water and wastewater, mining and precious metal processing industries. In 2018 Watson-Marlow comprised ten manufacturing plants and had a direct sales presence in 34 countries.

Watson-Marlow's performance since it was acquired by Spirax Sarco has exceeded all expectations. A combination of factors resulted in the company's exceptional growth – the widening market created by general economic growth; international expansion; the cumulative impact of well-judged acquisitions; increasing market share through direct selling; winning market share from other types of pump; developing innovative new products; and the support of its parent company. Like its parent, Watson-Marlow operates in a market that remains full of potential.

9

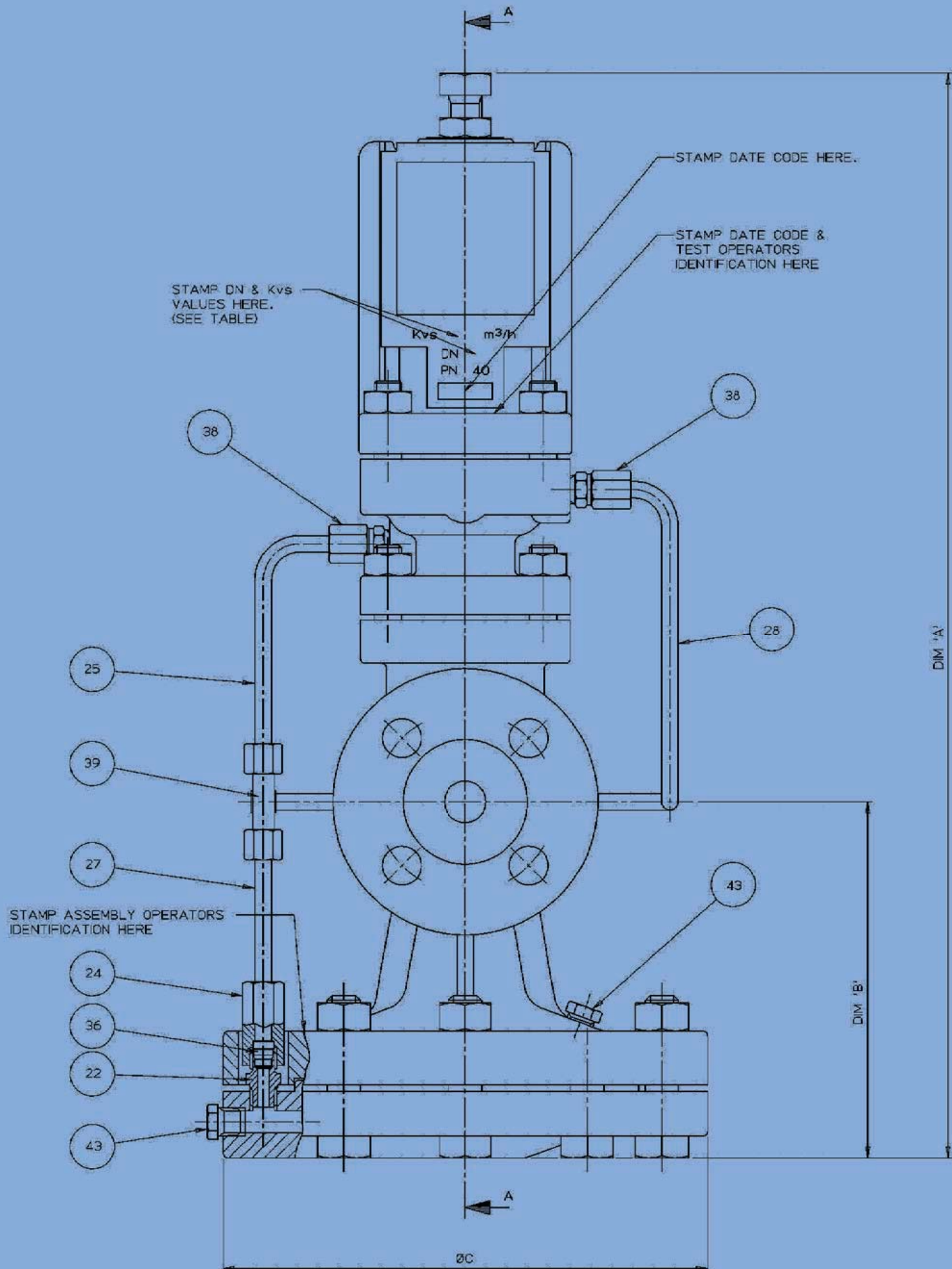
1990–2006

‘Offering the customer
what he wants’



SECTION A-A

SPRING HOUSING & COVER SHOWN
90° OUT OF ORIENTATION



‘Within a year heat exchange packages had become one of Spirax Sarco’s four main sales growth initiatives’

In 1995 Spirax-Sarco Engineering’s worldwide annual revenues exceeded £250 million for the first time. Of total sales of £251 million, £128 million, more than half, came from outside the UK and Europe, as did almost half of the Group’s operating profits of £44 million. Just over a decade later, in 2006, Group sales had reached £384 million, with operating profits of £62 million, reflecting the further consolidation of Spirax Sarco’s international interests, expansion into new territories, organic growth and increased investment in worldwide manufacturing.

This was achieved under successive Group Chief Executives: Tim Fortune, appointed in 1992, and Marcus Steel, appointed in 1998, supported by a restructured Board, initially chaired by Chris Tappin. The new Board comprised, in addition to Marcus Steel, who looked after supply, David Meredith (finance), Chris Ball (international) and Graham Marchand (Europe).

An increasingly important contributor to the Group’s success was Watson-Marlow, which began to expand around the globe, often using Spirax Sarco’s own operations as a base. As well as organic growth, Watson-Marlow also grew through acquisition. The Dutch heavy-duty pump manufacturer Bredel was added in

1996, with Alitea and Flexicon following in the next few years. The international expansion of Watson-Marlow was exemplified by its progress in China. Beginning as a division of Spirax Sarco China in 2003, the business went from strength to strength.

Within Spirax Sarco the most important development was setting up a sales organisation in China. Previous plans to enter into a joint manufacturing venture with Chinese partners came to nothing, partly because of the Group’s reluctance to do so, following its unhappy experience in South Korea. For the time being sales were still managed from Singapore, which supplied products to China, as did Spirax Sarco’s operation in Hong Kong, which was also supplied via Singapore, but in 1993 a sales office was opened in Shanghai. With sales trebling every year, there was certainly a market for Spirax Sarco’s products, which were of much better quality than anything then being made in China, and priced accordingly.

At the same time senior executives were making repeated visits, trying to find a way of gaining a direct foothold in the country. A small, dedicated ‘China Team’ was formed, comprising Spirax Sarco’s International Director, Chris Ball, with

Tim Kent, Peter Smith and Peter Moreton. Every invitation for the Group to invest in China was resolutely resisted until foreign investors were allowed to have complete ownership of any new business. It was a patient waiting game that paid off. The attitude of the Chinese authorities began to soften, and eventually it was hinted that wholly owned foreign enterprises would be permitted. In the summer of 1995 Tim Fortune accompanied Chris Ball to China to persuade the authorities that the Group's presence would enhance Chinese industry, indicating that the Group was prepared to set up a new factory.

By September that year, Spirax Sarco Engineering (China) Ltd was up and running, thought to be one of the first wholly owned foreign enterprises in China, and certainly the first business from outside the country to compete in the steam process market. The company's first General Manager, Alan Black, was joined by David Watts as Production Manager and John Kay as Sales Manager. One of the challenges was finding the right people to join the company's expanding sales team: the older generation, it seemed, had been drained of initiative under the Communist regime, and the company turned instead to the younger generation, recent university graduates who were more open-minded and who spoke English well. Head office was one room in a government hotel, the Jin Jiang Hotel, in Shanghai. As more people joined the sales team, a second room was taken. Sales engineers travelled to and from customers on electric bicycles or, when they broke down, as they often did, by bus.

The quality of Spirax Sarco's premium products stood out in a market dominated by inferior, cut-price alternatives. Sales took off as the company applied the traditional Spirax Sarco approach to selling. By the summer of 1996 it was reported to the Group Board that 'the selling resources of the company were being developed at the fastest rate achievable in practice.' Alan Black, accompanied by his Commercial Manager, who

acted as interpreter, spent a lot of time flying all over the country, setting up a sales network. The major cities were the first priority – Beijing was the first regional office – followed by regional sub-offices. Chinese customers were soon being offered the technical knowledge, full customer service and products supplied promptly from stock already being enjoyed by Spirax Sarco customers in other parts of the Asia Pacific region. The Chinese sales team proved ardent advocates of the Spirax Sarco way of doing things. Alan Black recalled accompanying a senior sales engineer to negotiate a deal with a customer. From the snippets of conversation Alan Black was able to understand, he appreciated how much the engineer clearly understood the importance of the Spirax Sarco philosophy of knowledge, service and products. As they left, the engineer wore a disappointed expression. Had the deal been secured? Yes, it had. Then why the look of disappointment? Because, said the engineer, he had been forced to concede a discount ... of 2 per cent.

Before the first year's trading had been completed, the company had found more appropriate premises, had fitted out a training centre and set up the first customer training course. First steps were also taken in manufacturing, with the first batch of locally manufactured products assembled, and plans made for a purpose-built head office and factory. It was determined that the manufacturing facility would utilise castings sourced from a local foundry and import essential components from the factories in the UK and France, while machining and assembly would be carried out in Shanghai. There were many challenges to overcome in seeing the project through to completion, including sourcing plant and equipment within China. However, finding a local supplier was not one of them, as Spirax Sarco already had a good relationship with a reputable local foundry, which had sent machined components to the US company when the latter was relocating its own factory.

A COMPANY HISTORY SUMMARY

SPIRAX SARCO IN CHINA

Spirax Sarco executives made their first visit to China in 1977 and the Group first entered the Chinese market in 1985. A sales office, reporting to Spirax Sarco Singapore, was opened in Shanghai in 1993. In 1995 the Group established one of the first wholly owned foreign enterprises, Spirax-Sarco Engineering (China) Ltd, with Alan Black as the first General Manager.

Over the next few years the first regional office was opened in Beijing (1996), with others following in several major cities; a training centre was opened for customers in Shanghai; the company began assembling its first products; and plans were made for purpose-built offices and factory.

In 1998 the new premises in Shanghai were opened and the factory began manufacturing, by which time Spirax Sarco had 15 regional offices across China.

A new factory was built in 2010, when the company received several awards for its contribution towards energy saving. By 2013, there were more than 40 regional offices, the company employed 480 people and the Chinese sales team was the largest in the Group. By the time the manufacturing facility was expanded in 2017, the company employed 500 people, with a further 50 employees of Watson-Marlow China, and was well established not only as the most important Spirax Sarco business in the Asia Pacific region but as one of the most important in the Group.

Watson-Marlow China began as a trading division of Spirax Sarco China in 2003. The business began producing goods for sale in China in 2015 and two years later moved into new premises on the Spirax Sarco site.



Engineer conducting a steam system audit, Spirax Sarco China, 2017



The British Prime Minister, Tony Blair, opening Spirax Sarco's office and manufacturing site in Shanghai, China, on 12 October 1998

The new premises, Energy House, were opened on 12 October 1998 by the UK's Prime Minister, Tony Blair, and the Deputy Mayor of Shanghai, Zhou Mu Yao. By then Spirax Sarco had built up a network of 15 regional sales offices. Within a year another five had been established, and in October 1999 the new factory machined and assembled the first FT14 ball float steam trap. As the company's reputation grew, and its presence expanded, more and more sales were coming from local customers rather than relying on projects dependent on inward foreign investment. The Chinese economy was moving into top gear, investing massively in a wide variety of infrastructure projects, recording an annual average growth rate for the period from 1995 to 2005 of more than 9 per cent.

In 2002 Wook Chang became the Chinese company's third General Manager, succeeding Tony Moulder, who himself had replaced Alan Black. During the next few years he set up the marketing team, hosted the first national sales conference, attended by 80 regional sales engineers, arranged a series of regional seminars to promote the business more widely and secured the quality management standard ISO 9001. By the time the company completed its first ten years in 2005, it was operating a network of 27 sales offices alongside the Shanghai head office and factory, and had already claimed a place within the Group's top ten performers. It was an outstanding achievement, accomplished by an enthusiastic team making the most of the opportunities presented by the accelerating Chinese economy.

For many years, until it was eclipsed by the Chinese company, the Group's largest business in the Asia Pacific region was the Spirax Sarco company in South Korea. Benefiting from the continued success of the South Korean economy, the company moved into a larger purpose-built factory and warehouse just outside Seoul in 1992.

A couple of years later the Group's Annual Report noted how 'our dynamic company in Korea achieved another record year'. As in China, the company prospered through an energetic and committed team, with the Group Board observing in 1995 that there was 'a very strong sales and marketing oriented management team looking to develop the Korean company's business and identifying new applications and products'. The company was the fourth-largest of Spirax Sarco's international operations.

Unexpected clouds were darkening the economic horizon. The storm broke in July 1997 following the devaluation of the Thai currency, which set off a financial and economic collapse that quickly spread throughout the region. South Korea was one of the worst-hit countries. The response of the team leading Spirax Sarco Korea was outstanding, and highlighted the importance placed by the Group on the quality of recruitment. With the rising value of sterling in the face of the collapse of the local currency, imports doubled in price, while sales halved as the impact of the financial crisis led to the cancellation of many major projects that made up a large part of new business. The company was particularly vulnerable since it relied on imports, as local manufacturing was very limited.

Yet although profits fell sharply, the business never lost money, taking advantage of its direct relationship with customers, giving it better control over prices. Under clear-sighted management, this was an outstanding example of the resilience often demonstrated by the Group's operations in the more volatile parts of the world. The impact of

the crisis was felt in the Group's results because of the relative strength of sterling against collapsing Asian currencies. In 1997 and 1998 this reduced operating profits by a total of over £12 million, equivalent to more than a quarter of the operating profits for 1996. But the Group, sticking to its long-term approach, was never tempted to cut back its sales organisation in the region, which paid off when conditions improved. Despite the economic crisis, most Asian economies bounced back, and several years after the event had more than made up lost ground.

Spirax Sarco was taking advantage of the many other opportunities available in the region. In the early 1990s, Spirax Sarco was able to improve results from the market in Thailand by injecting a greater sense of urgency into the business, combined with better training for managers and sales personnel. From Singapore, Spirax Sarco made progress in Hong Kong, Indonesia, Malaysia and the Philippines. Singapore also supported Spirax Sarco's entry into the small Vietnamese market in 1996, sending out technical sales engineers to help the newly appointed distributor who, it was reported, 'applied essentially the Spirax sales approach'.

Japan remained one of the more challenging markets. There, the Board heard in 1993, Spirax Sarco had been 'working hard to increase our reputation and presence in a very demanding market'. Some success was achieved by launching products developed specifically for the Japanese market. Slowly, steadily, by the middle of the decade, the Japanese business, it was reported, had become 'a credible supplier to significant industrial users'. In 2000, to cement its reputation, permanent freehold purpose-built premises, comprising offices, warehouse and training centre, were opened in Tokyo. Nevertheless, the Japanese branch remained unprofitable, but losses were accepted as part of the struggle; the Group refused to concede in developing an ultimately successful business.

By then, Spirax Sarco had been in Japan for more than a quarter of a century.

Although Spirax Sarco's joint venture in India was doing well, there were frequent reports that it had begun exporting products into other Asian markets, which the Group was unhappy about. Despite holding a large stake in its joint venture, Spirax-Marshall, Spirax Sarco lacked any say in the management of the business; there was increased frustration with the joint venture, and relationships weren't always as warm as they had been before. Outright acquisition by Spirax Sarco was repeatedly rejected by the partners. As for other joint ventures outside Europe, the Brazilian company was acquired outright in 1991 and changed its name to Spirax Sarco Ind e Com Ltda, but the law still forbade the Group

from taking full control of the Mexican business at that time.

By the early 1990s new markets were emerging in Europe, in the nation states newly freed from Communist rule. Spirax Sarco's UK export department led the campaign to open up these markets. A Spirax Sarco sales office was opened in Czechoslovakia in 1991. The post of sales engineer was filled by an excellent candidate with international experience and an understanding of manufacturing. When the country split into two separate nations in 1993, the Spirax Sarco office in Prague continued to supply Slovakia. In 1995 a Spirax Sarco sales company was formed in the Czech Republic under General Manager Jan Taubel. Ten years later business had grown sufficiently for the company to move into



Sales engineers, Spirax Sarco Korea, c. 1994

larger premises in Prague, by which time it was employing five sales engineers and 12 other staff. In Poland there had been failed attempts to enter the market during the 1980s, but Spirax Sarco had more success in the early 1990s, opening a branch in Warsaw as Poles flocked to vote in the first free elections following the fall of the Communist regime. An experienced controls engineer, equipped with good English as well as international experience, was appointed as regional sales engineer in 1991. At first sales relied on direct imports paid for by hard currency, but in 1995, following local pressure for a greater supply of Spirax Sarco products sold in Polish currency, a small sales company was set up. By 2005 this was employing 17 people and turning over sales of several million pounds a year.

The Group's few Russian steam customers had been supplied for many years by the Spirax Sarco company in Finland. Penetrating the Russian market was fraught with difficulties. In 1995 Derek Law set up a sales office in St Petersburg, staffed by two sales engineers, but progress ground to a halt after the Russian government defaulted on its debt in 1998. This hiatus did not deter Spirax Sarco; Board members once again took the long view when they agreed in that year that there was 'considerable business opportunity in Russia in the longer term'. An article in *Spirax Sarco News* a few years later recorded how:

during this period of economic turmoil our team had few sales leads to follow and so focused upon the creation of a library of Russian literature and a better documented customer database. The sales team continued to call on customers, expressing the view that Spirax was not like other foreign investors, who had fled from the economic problems, Spirax was in Russia to stay.

As the Russian economy began to improve, the task was to capture business from Russian-owned businesses, given the loss of foreign

investment. This was a complex process, since Spirax Sarco refused to become exposed to the volatility of the Russian currency, but a way was found to carry on trading and receive payment in dollars. The resulting boost in sales encouraged the Group to increase its investment in the country in 2001.

Although the Group was still faced with immense challenges, bureaucratic as well as geographic, the reason for proceeding in Russia remained the same as with any other emerging market. As an article in *Spirax Sarco News* noted in July 2002, 'Spirax has a major opportunity to get in at the start.' Once again Spirax Sarco was following the same strategy as it had in China, concentrating on key cities and then working outwards, investing in training and education, selling solutions, offering technical backup and establishing a reputation for quality. By the end of 2002 Spirax Sarco's presence was still small – eight people working in two sales offices in St Petersburg and Moscow as well as a regional office – and every product was sold through the export department of the UK company, but it was a start. In 2005 a Spirax Sarco sales company was formed, based in St Petersburg, employing 24 people, including 16 engineers. Profits were still elusive, but by then the Russian company was covering Yaroslavl, Voronezh, Nizhny Novgorod, Ufa, Kazan and Yekaterinburg, as well as St Petersburg and Moscow. As in China, the company recruited able young engineering graduates, more open-minded than the older generation, prepared to accept the concept of a 'sales engineer' in a culture where the idea of selling itself had not yet taken root.

Spirax Sarco sales offices were also established in a handful of other Eastern European countries, including Hungary, Romania and Ukraine. These were opened under the umbrella of the UK company's export department. The practice was to relinquish responsibility for them only when business had developed

sufficiently to convert them into sales companies. These offices were in small, often unstable markets, where industry was old-fashioned and wasteful, and where business relied on orders from exporters with access to the foreign currency needed to pay for imports from the UK.

The Group's total European sales, including Watson-Marlow, rose significantly during this period. In 1990 European sales, excluding the UK and the Republic of Ireland, stood at £43 million, making up nearly 30 per cent of turnover; by 2006 they had reached £137 million, accounting for 36 per cent of total sales. As for the contribution made by European sales to operating profits, this rose from 25 per cent to 36 per cent. For almost all of this period Spirax Sarco's European Director was Graham Marchand, who played a significant role in consolidating the company's European interests.

In continental Europe's major market, Germany, Spirax Sarco had always struggled to make inroads, largely because of strong local competition, notably Gestra, a well-established competitor. Nevertheless, the German sales company, based in Konstanz, was always profitable.

Several long-standing Spirax Sarco European joint ventures became wholly owned businesses during this period. In Italy, the attempt to compete directly with Jucker had failed, largely because of bitter price competition, which led both businesses to lose money, leaving Spirax Sarco with only two alternatives. Since withdrawing from a market was something Spirax Sarco rarely contemplated, the only option was to wait for an appropriate moment to revive discussions with Jucker about buying the latter's steam business. Patience, another Spirax Sarco virtue, was needed, since once negotiations got under way again, they lasted on and off for four years. In May 1993, Spirax Sarco acquired Jucker's industrial division, comprising steam

specialties, control valves, heat exchangers and pneumatic instruments.

Integrating the two Italian businesses also required patience. People on both sides showed some reluctance to accept integration, and it took time to cast aside old prejudices. There were four sites and two factories, employing too many people for the business as a whole to support. Stock was also held and managed by an outside company, and there were eight regional sales offices, some with their own stock and some that shared with Jucker's other businesses. The factories were old and inefficient, and communication across the sites was not easy. Graham Marchand, who had moved to Italy to run the operation, recalled that 'what we'd acquired was an aggregate of different companies, each one with its own organisation, tradition and problems. It became obvious that in order to meet worldwide Spirax Sarco standards of products and services, the Italian subsidiary would have to undergo major changes in all areas, transforming the difficulties into new opportunities to grow.'

To pilot the familiar process of 'spiracisation', with the aim of turning two disparate businesses into one, Matteo Palena was recruited as General Manager. His experience, energy and vision proved crucial. Over the next few years he overhauled the way sales were handled and regained control over warehousing and distribution, critical for service standards; he recruited new people with new skills and consolidated all central activities in purpose-built premises on one site in Milan. The product range was rationalised, the company invested in new valve assembly and test facilities, and a new training centre, based on the recently developed centre in Argentina, was opened. This action transformed a business that was making a loss in 1987 into one that made annual profits in excess of £3 million by 2006. Of the 200 or so people working for the business by then, more than two-thirds of them had been on the payroll since

Jucker's acquisition by Spirax Sarco. Moreover, the acquisition of Jucker's steam business had brought new products into the Group as well as expertise in controls, instrumentation and heat exchange, all of which contributed to Spirax Sarco's overall growth. Turning around the business in Italy, reflected Graham Marchand, was 'the best thing I ever did for the Group'.

In March 1993 the Group also acquired a 25 per cent stake in its Spanish manufacturing licensee, Industrial Mas Nieto. Relations with Mas Nieto had always been good, but Spirax Sarco received only a royalty on sales. An agreement was soon reached with the Mas family to take an initial stake in the business, and this increased over the next few years, reaching 95 per cent by 1997, when Spirax Sarco also took over the associated sales company, Mas Nieto. Spirax Sarco invested in an expanded product range, modernised the factory and added a new training centre. An able Brazilian executive, Octavio de Souza, who had been running the Group's Portuguese business, was appointed General Manager to help the business meet the Group's worldwide standards. Under his leadership, the business was soon flourishing. The Group Board was told in 1998 that the Spanish business was 'a strong company focused on the customer and providing the required service'.

In France the Châtellerault factory had long played a major part in supplying Spirax Sarco's operations around the world in alliance with the Cheltenham factories in the UK, but the French company had struggled to make the most of its domestic market. To try and improve this situation, the French company adopted a template similar to the one pursued for many years in the USA, combining a technical direct sales approach in partnership with key distributors. A number of well-established regional distribution businesses were chosen as the French company's partners, committed to adopting the Spirax Sarco philosophy of knowledge, service and products.

These relationships were cemented through training given to the partners' sales teams (the French company opened a new training centre in 2001), regional conferences and joint participation in professional exhibitions.

Elsewhere in Europe, Spirax Sarco set up its own sales company in Norway in 1993, having failed to buy the Spirax business from long-standing distributors Sigurd Sorum. Norway was a small, mature market that was faced with similar challenges to the UK market. An article in *Spirax Sarco News* in 2003, marking the tenth anniversary of the Norwegian company, observed that for the business to win a greater share of the spending on new plants by steam users, 'we have to look either for new business areas or broaden our range of products and services to the existing customer base'.

Total Group sales in the UK and the Republic of Ireland, including exports from the UK, continued to increase, growing from £33 million in 1990 to £54 million in 2006, while profits slightly more than doubled, rising from £5 million to nearly £11 million. As a proportion of total Group turnover, UK sales fell from 23 per cent to 14 per cent over the same period. From 1992 Spirax Sarco's UK operation became part of Graham Marchand's responsibilities as European Director. It was a tough market. The country's industrial base had been eroded as a result of government policies in the 1980s and there was a trend for major steam users to move production out of the UK. Thus Spirax Sarco in the UK faced the same challenge as Spirax Sarco in Norway, albeit on a much larger scale: how to sustain a presence in a market that had lost much of its industrial base. While several options were explored, the answer came through the promotion and sale of more system solutions and process control applications. Rather than individual products, the company began designing and supplying fully assembled packages, delivered complete for the customer to connect and operate.



EasiHeat™ heat exchange package, Spirax Sarco

One innovation was what Tony Urbani, Spirax Sarco UK's Marketing Director, described in 2000 as 'the steam heat exchange revolution'. Traditionally the transfer of steam energy from one medium to another had been achieved through simple, bulky and inefficient 'shell and tube' heat exchangers. By comparison, the plate heat exchanger was more compact and more efficient, but it was designed for use with liquids, and had many shortcomings when used with steam. In 1997 this led the Swedish company Alfa Laval, specialists in heat transfer, separation and fluid handling, to join forces with Spirax Sarco in developing an advanced steam plate heat exchanger for use with existing Spirax Sarco systems. As a package, the cost of the new integrated system was usually less than one featuring traditional heat exchangers.

In 1999 the two sides signed a formal partnership agreement (renewed two years later) and Spirax Sarco issued its own steam heat transfer strategy, setting out the opportunities available to the business through the partnership agreement. In the following year came the launch of the new range of plate heat exchangers by Alfa Laval. Training sessions brought together people from both companies, including many different parts of Spirax Sarco, committed to producing 'an innovative packaged heat exchange solution'. In September 2000 the new EasiHeat™ range of compact steam heat exchange packages was launched, providing an easy, efficient, space-saving and instant method of heating water.

Within a year heat exchange packages had become one of Spirax Sarco's four main sales

growth initiatives. They were popular with customers because many of them, in outsourcing responsibility for plant and maintenance, were losing the skills to design, specify and manage the installation of their own packages. Devising ready-to-install packages also removed the possibility that demand would otherwise be met by third-party assemblers, thus threatening the valuable direct link between Spirax Sarco and its customers.

Interestingly, putting together components to form packaged heat exchange solutions was not new: Spirax Sarco companies in Australia and Canada had done this for some years, but it was the search for new markets in the UK, and the resulting alliance with Alfa Laval, that was the catalyst for a company-wide initiative. This was complemented by a new range of compact corrugated heat tube exchangers, called Turflow, made by Spirax Sarco's Italian company.

This was an initiative with huge global potential. As well as standard packages, Spirax Sarco designed packages to meet specific requirements for a diverse range of customers, from a pharmaceutical company in Sweden and a brewery in China to a hotel and convention centre in Argentina and a chemical company in the UK. More and more Spirax Sarco companies adopted the initiative, with some of those in the Asia Pacific region supplied from the Chinese factory in Shanghai. The success of heat exchange solutions gave Spirax Sarco the confidence to design and produce other sophisticated systems for users, beginning the drive towards selling more application-based packages. It also led to a major investment in a new production facility based at the site in Runnings Road in Cheltenham, where an existing property was redeveloped. In 2002 the Engineered Systems Manufacturing Unit was opened in Cheltenham as a fabrication facility for heat exchange packages. It was, reported *Spirax Sarco News*, 'a modern factory

offering a flexible approach to the fabrication of a wide range of engineered systems'.

At around the same time, Spirax Sarco made a concerted effort to establish its place in the control valves market. Spirax Sarco had first entered the market for electronic controls in the late 1980s, and enjoyed some success over the next ten years. But sales of control products declined in the early years of the new millennium. In 2003, David Organ, who had joined Spirax Sarco in 1988 and had been involved in the early development of control valves, was tasked with expanding Spirax Sarco's market share. The aim was to double sales by 2008. The project team was drawn from ten operating companies and developed a global strategy for better products, better sales training and better marketing. As a result, sales of controls rose from £23 million to £48 million in five years. To bring this success story up to date, by 2018 Spirax Sarco had nearly a 15 per cent share of the £1.3 billion global market in controls.

Changing industrial trends were reflected in several other Spirax Sarco sales initiatives. Steam systems management was one; another was the promotion of service, surveys and maintenance, both picked up on the diminishing plant engineering expertise in many clients. There was also another attempt to make more of an impact in the oil and petrochemical sector. As with heat exchange solutions, steam systems management had been pioneered for some years by several Spirax Sarco companies, but only in 2001 was it promoted across the whole steam business. It was an immediate success. As one manager commented in *Spirax Sarco News*, 'the reason for its success is that Spirax is offering the customer what he wants; someone who can look at his steam system offering advice and expertise to ensure it is operating safely and efficiently.'

The biggest test faced by Spirax Sarco during this period was the relocation of the US factory

from Allentown, Pennsylvania, to Blythewood, South Carolina. Realising the potential of the US business, operating in the largest steam-using market in the world, remained elusive. Even in the mid-1990s, nearly 15 years after it became part of the Group, the process of 'spiracisation' was still incomplete in the face of stubborn resistance to changing the culture of the business. The heavily unionised factory was part of the problem, and the Group reluctantly decided to move the factory to a state with the lowest rate of organised labour in the country. The opportunity would also be taken to build a modern factory on a greenfield site.

The move was disastrous. The Allentown workforce, facing the imminent loss of their jobs, did everything they could to obstruct it, even sabotaging some of the machines sent down to South Carolina. The company was faced with a shortage of skilled labour, since few skilled workers from Allentown were prepared to move, and the availability of skilled labour in South Carolina had been seriously exaggerated by the state authorities. The logistics of the project were not well executed, and offers of help from UK factory executives were turned down. Quality suffered, output was lost and service standards deteriorated. While most customers remained



Turflow heat exchange package

remarkably loyal, some left. From being Spirax Sarco's second-most profitable business in 1997, the company made a small loss. With previous experience of the business, Mick Gill was sent out to stabilise the situation as Vice-President of Manufacturing. In 2000 he was succeeded by Peter Moreton, who arrived in the USA with Tony Scrivin, who had been appointed as President and General Manager.

Following up a suggestion made by Don Harrison, Spirax Sarco Inc.'s Vice-President of Finance, they investigated a new manufacturing process, known as Demand Flow Technology (DFT), devised and promoted by the John Constanza Institute of Technology, based in Sarasota, Florida. They became convinced it would work and persuaded a reluctant Group Board to give the go-ahead. It was a huge undertaking, but it won the support of management and workforce, tired of fire-fighting and eager for success. Higher wages were offered for vacant posts to attract skilled personnel, training was improved and the first DFT line was up and running in October 2000. It was an immediate success, reducing lost time and wastage, and over the next year it was extended throughout the whole factory. The sales team, frustrated by the problems that spilled over from the factory and affected customer service, was quickly won over when Tony Scrivin used his first sales conference to promote the changes that were being made to improve factory efficiency. In 2000, the business exceeded the stretching profit target it had been set. In 2001, with the introduction of an employee profit sharing scheme, the company exceeded an even tougher target, achieving more than \$5 million in profits, in spite of the tragic events of 9/11 and the economic dislocation they caused. The company struggled to return to the profit levels seen prior

to relocation. Nevertheless, Tony Scrivin and his team had relaid the company's foundations.

In 2003 Tony Scrivin was succeeded by Mark Vernon. Appointed from outside the Group, he came with extensive experience in fluid management and process controls. In line with the traditional Spirax Sarco approach, he was given a great deal of freedom within his role. Under his leadership, Spirax Sarco Inc. followed the trends already apparent elsewhere in the Group, including the promotion of small engineered systems, especially heat exchange systems, and the repair and maintenance market for steam systems and components in major plants and refineries. The US business had historically concentrated on the sale of component products, such as steam traps and condensate pumps, and it was only starting to develop its approach towards systems and instruments, repairs and maintenance. Within three years this approach had helped the company increase sales from \$60 million to \$100 million, furthering the reputation of the business.

Throughout the relocation the US company had been supplied in part by other Spirax Sarco factories, notably in the UK, France and China. The factories in the UK were the most important. In 1998 the UK factories were supplying a third of all Spirax Sarco products sold internationally. This proportion subsequently declined, although the UK factories maintained volumes in real terms, as the business continued to grow worldwide and Spirax Sarco invested in more local manufacturing units around the world.

Investment in UK production was not neglected. A major step forward took place under Tim Fortune in the 1990s, when Spirax Sarco's



UK manufacturing was reorganised into three product units, covering steam traps and ancillary products, controls and metering, and boiler house systems. This triggered significant investment in plant and equipment, increased automation and improved test facilities. Each team focused more intensively on a narrower range of products, improving efficiency and enhancing quality. At the same time there was a move towards integrating marketing with the supply side, each product unit having its own marketing team. Moreover, every Spirax Sarco sales company had its own design facility, responding to requests from customers and feeding ideas into the teams based at the key factories. With a growing product range, this helped to ensure that no product was neglected.

This integration also helped to define future product development, supported by increased investment in research and development. Refreshing the range produced some major improvements in standard products. For instance, steam traps moved from thermostatic bellows to longer-lasting, more robust stainless steel capsules. The modular design of the FT14 ball float steam trap, with improved elements and floats, made it much easier to install and maintain. The thermodynamic range was improved through investment in greater automation. Computer-aided design technology, coupled with more advanced information systems, made it possible to launch new products more quickly. At the same time steps were taken to create a more international supply chain for raw materials, looking particularly at China, India, Eastern Europe and Latin America, securing significant cost savings.

These changes coincided with a review of manufacturing worldwide, instituted under Group Chief Executive Marcus Steel. This was based on the assumption that the business was too reliant on the factories in the UK and France, although manufacturing in both countries remained fundamental to Spirax Sarco. There had

been doubts about the value of the Châtellerault factory, but these were removed as it benefited from modernisation in the late 1990s. It also gained from the transfer of some production from the plants in Spain and Italy. While manufacturing in Italy remained important for local reasons as well as for the production of heat exchangers, production in Spain was wound down, and the small Spanish factory was closed in 2003.

The idea was to share production across Spirax Sarco's factories, helping to deliver better service and reduce delivery times for customers, as well as lowering transport costs. As the relocation of the US factory highlighted, company factories were able to support each other in times of need. Transferring some production from the UK and French factories also allowed them to specialise, with France becoming a centre of excellence for controls and ancillary equipment, while the UK concentrated on steam traps, pumps and instrumentation.

While factories in other parts of the world continued to deliver products aimed at their own domestic markets (steam traps built in Mexico were quite different from those made in the UK, for instance, since the condition of local industrial plants demanded they should be much more robust), some of them were also specialising, such as the Argentine factory, which was enlarged to meet growing demand for ball valves from across the rest of the steam business.

The Mexican factory had always supplied some products to the USA, but this increased as more labour-intensive production was transferred from the US factory. This gave the latter the chance to launch new products and supply the complete systems designed to meet individual customer requirements. The Group concluded that there was little benefit in closing any other plants since smaller factories, such as those in Brazil and Korea, were still vital for supplying their own local markets.

An important factor in the Group’s success was the quality of the people recruited and trained. The Group invested extensively in training, either directly or through the provision of grants to enable people to enhance their knowledge and skills. This approach also applied to customers who had the opportunity to attend a wide variety of courses at Spirax Sarco’s training centres, which numbered 35 worldwide by 2002.

Another key initiative was the LIFE programme, commenced in 2004. The acronym stood for Little Improvements From Everybody. The challenge for Spirax Sarco was how to improve efficiency while persuading people to work more closely together for the benefit of the wider business. The LIFE programme was based on convincing everyone to adopt lean manufacturing and continuous improvement. As Spirax Sarco’s first attempt at a global manufacturing strategy, it also brought together manufacturing managers from around the world on a regular basis for the first time to share best practice. The programme produced for all Spirax Sarco’s supply businesses a focus on joint purchasing of plant and equipment, global sourcing of raw materials and shared quality standards. The FT14, for instance, became Spirax Sarco’s standard ball float steam trap worldwide.

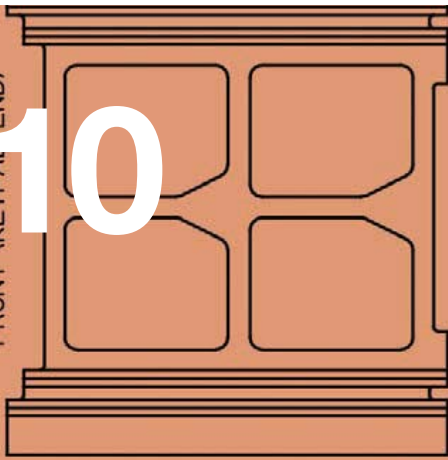
The Group’s consistently successful financial performance, almost regardless of setbacks either within its control, such as the poor handling of the relocation of the US factory, or those outside its control, such as the Asian economic crisis, was

impressive. The Group even remained profitable when those two events coincided in 1997–98, although margins were squeezed. Until then the Group had recorded record operating profits in every year since 1967. Reporting on the Group’s 26th consecutive year of record operating profits in 1993, the Chairman, Chris Tappin, observed that ‘this achievement is the direct consequence of your Board’s longstanding determination to focus the Group’s resources on the international development of the Spirax Sarco steam speciality business.’

A wider geographical presence, combined with a broad range of customers – in 2004 no industrial sector accounted for more than 10 per cent of sales, and no one individual customer for more than 1 per cent – reinforced the Group’s intrinsic resilience, displayed so often by its operations in the less stable parts of the world. Financial prudence was coupled with long-term vision: thus, when the world economy dipped, as it did from time to time, the Group exercised close control over costs but never abandoned investment. Further growth reflected the fact that, as the 1999 Annual Report put it, ‘although we are the largest individual supplier to the steam using market, we still have a relatively small share of the available market.’ There was never any sense of complacency. As Group Chief Executive Marcus Steel had stressed to his colleagues in 2001, ‘we must continue to improve on our performance in sales, productivity and profit in order to protect ourselves.’

10

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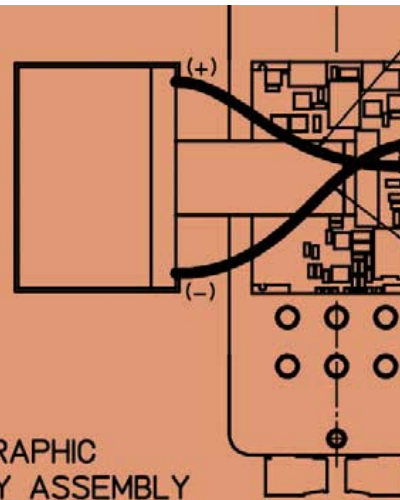


DUMMY BOARD - ITEM [6]
(WHERE REQUIRED)

NOTES 1 & 2 (SEE SHEET 2)
BEFORE FITTING DISPLAY PANEL
AS FOLLOWS:

PLUG GRAPHIC DISPLAY - ITEM [4]
INTO MICRO BOARD ASSY - ITEM [3]
AND SOLDER RED WIRE TO
POSITIVE TERMINAL (+) AND
BLACK WIRE TO NEGATIVE
TERMINAL (-) ON SIDE OF
GRAPHIC DISPLAY - ITEM [4]
USING UNLEADED SOLDER - ITEM [32]

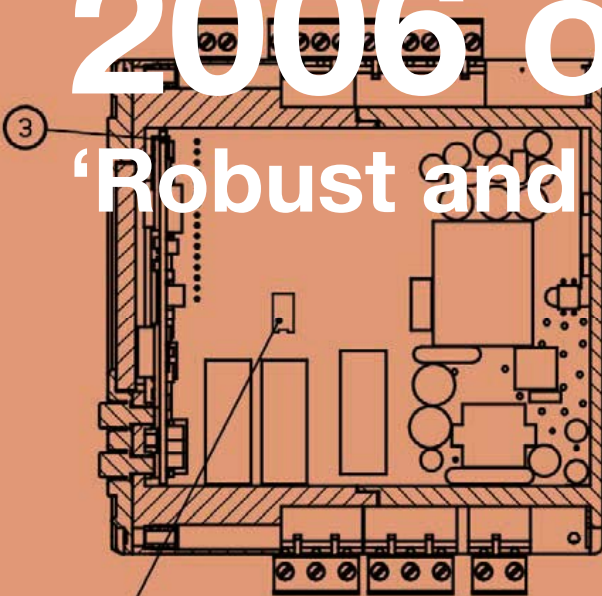
ON COMPLETION OF ABOVE, CONTINUE
WITH ASSEMBLY FROM NOTE 4
ONWARDS (SEE SHEET 2)



GRAPHIC
DISPLAY ASSEMBLY

2006 onwards

'Robust and sustainable growth'



SECTION A-A

RIBBON CABLE SOCKET
* LC2250 ONLY (ASSEMBLY 402529)
SEE NOTE 1 ON SHEET 2

ENCLOSURE
FRONT



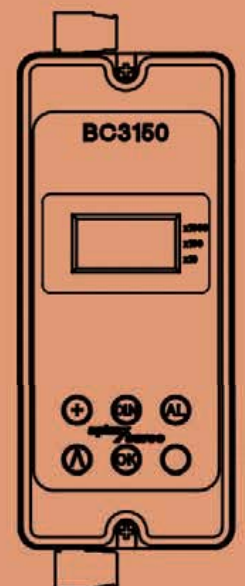
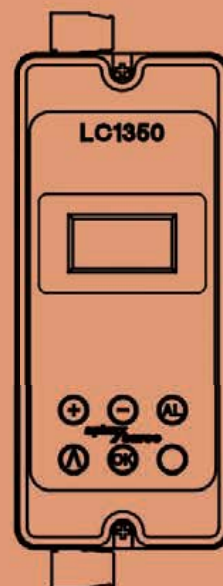
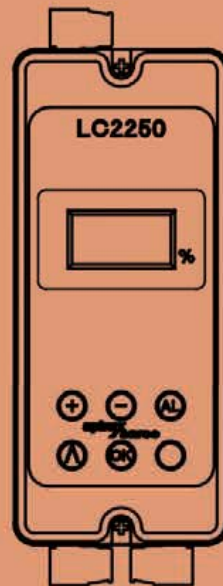
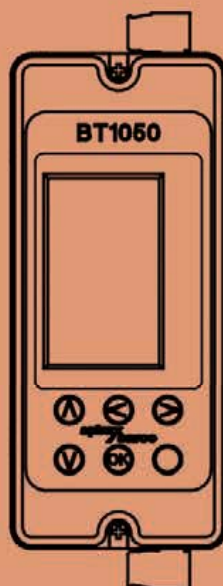
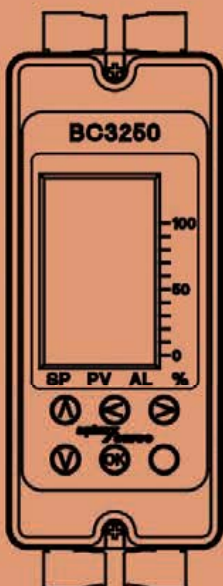
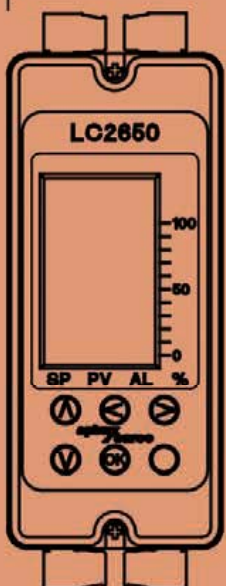
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CLARITY (SEE LABEL LOCATION DIAGRAMS
AND NOTE 6 ON SHEET 2)

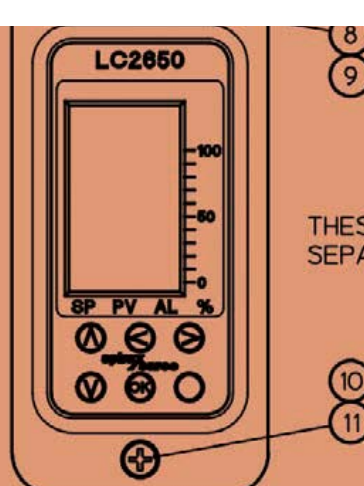
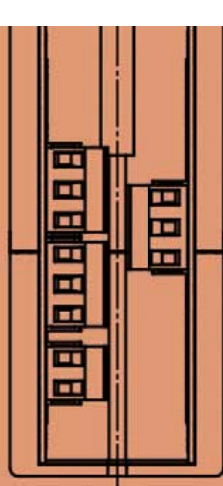
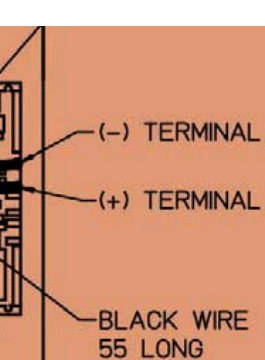
ENCLOSURE
REAR

* LC2250
ONLY
(ASSEMBLY
402529)

RIBBON CABLE SOCKETS
* LC2250 ONLY (ASSEMBLY 402529)
SEE NOTE 1 ON SHEET 2

FRONT VIEWS OF VARIANTS

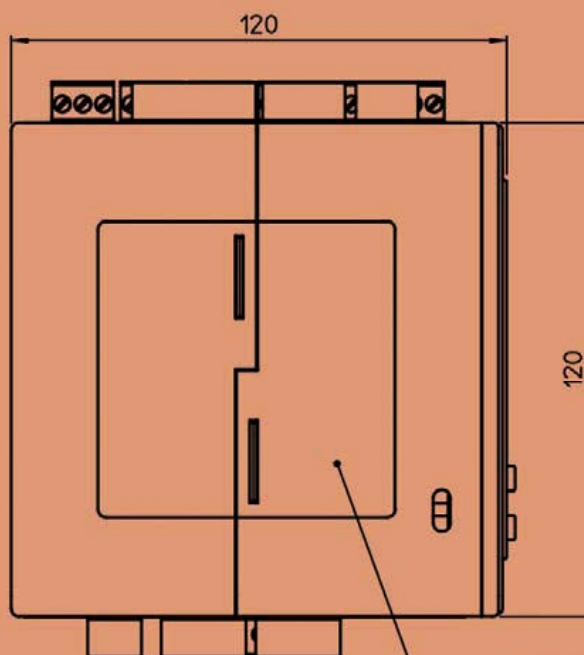
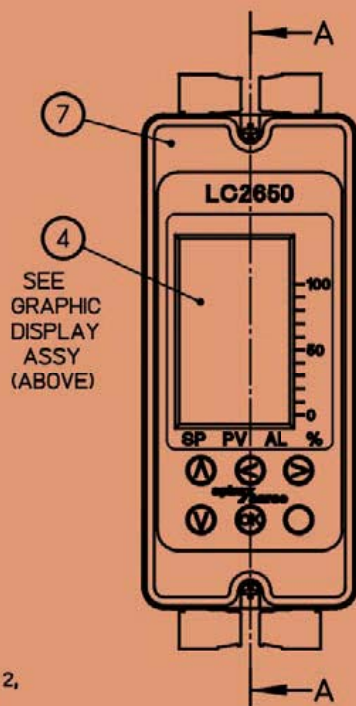
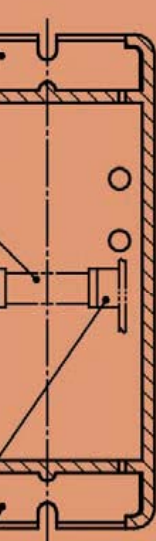




THESE ITEMS ARE INCLUDED
SEPARATELY FROM ASSEMBLY

BEZEL ARRANGEMENT
FOR PANEL MOUNTING

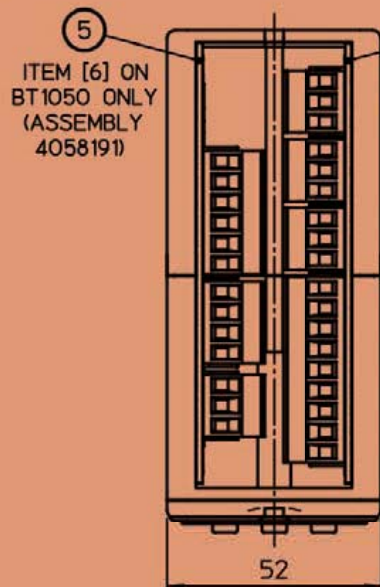
(SEE NOTE 2,
SHEET 2)



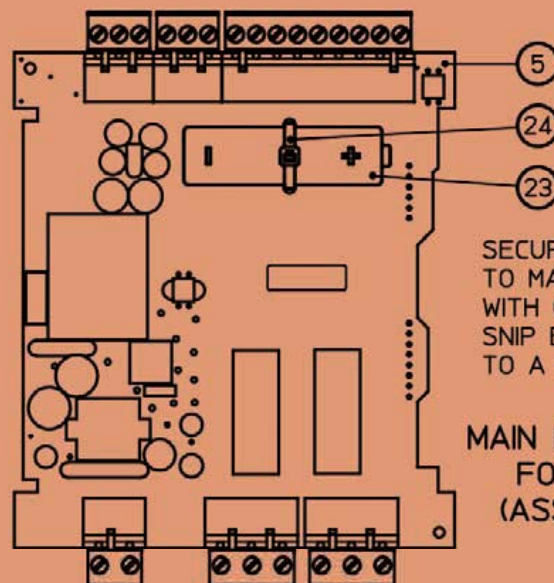
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AND NOTE 6 ON SHEET 2)

(SEE NOTE 2,
SHEET 2)

SECTION B-B



ITEM [5] ON
BT1050 ONLY
(ASSEMBLY
4058191)



SECURE BATTERY - ITEM [23]
TO MAIN BOARD - ITEM [5]
WITH CABLE TIE - ITEM [24].
SNIP EXCESS TAIL OF CABLE TIE
TO A REASONABLE LENGTH

MAIN BT BOARD - ITEM [5]
FOR BT1050 ONLY
(ASSEMBLY 4058191)

‘The Group’s shareholder return has outstripped the industry average by a margin of three to one; the dividend record has been outstanding’

Since 2006 the Group has continued to grow, achieving sales of £1.15 billion and operating profits of £265 million in 2018. In real terms sales have more than doubled, while operating profits have risen three times, illustrating the good progress made by the Group in improving margins. This result has been accomplished during the most serious worldwide economic downturn since the 1930s. The banking crisis, which originated in the USA and spread across the globe, shook investor confidence and slowed down economic growth as credit tightened and international trade declined.

Mark Vernon became Group Chief Executive in April 2008, just before the global financial crisis unfolded. He encouraged the Group’s traditional strategy of entering new markets early, which continued to pay dividends. In more mature markets, particularly Europe, increasing market share was the priority. The Group’s business model was undeniably strong, with direct selling remaining crucial to progress in most parts of the world. By 2018 direct sales accounted for over 70 per cent of the Group’s turnover, supplied by 1,600 local and regional sales engineers all over the world, with a direct sales presence in 62 countries. Relationships with distributors were still important, especially for customers’ maintenance and repair orders, and accounted for a little over a quarter of sales.



Spirax Sarco China, 2018

The Asia Pacific region still provided the most impressive growth, and China and Korea remained the two strongest markets. China had the largest sales team in the Group, and by 2013 there were more than 40 regional offices across the country. Although Spirax Sarco’s original factory in China had been extended, a larger facility was needed to keep pace with demand not only from China but also from other regional markets. Opened in 2010, the new factory in Shanghai was soon operating at capacity, and a major £13 million extension was completed in 2017. Elsewhere, following the usual pattern, Spirax Sarco took over its Indonesian distributor in 2013 and set up a sales company. New markets were identified in other countries such as Cambodia and Myanmar, where the first sales engineers were recruited in 2012.

2006 onwards: 'Robust and sustainable growth'



Spirax Sarco China training centre, 2017



Steam trap audit; engineers from Spirax Sarco Korea, 2012



Spirax Sarco China engineer on a customer site, 2017



Spirax Sarco offices, manufacturing facility and customer training centre,
Monterrey, Mexico, 2014

In Japan, however, Spirax Sarco was still losing money. Mark Vernon decided to try one more time, to start over again, resume growth and become profitable in Japan. A senior UK manager, Simon O'Brien, was sent out to rationalise operations and make another attempt at instilling the direct sales approach, in the hope that this would lead ultimately to the appointment of a suitable local manager. By establishing the direct sales model that had been so successful almost everywhere else in the world and encouraging employees to learn English to improve communications within the Group, O'Brien saved the business, produced a significant increase in sales and turned the company from loss-making to a small profit, setting the foundation for their profitable status at the time of writing.

In Europe a constant stream of new products, including the packaged solutions that had proved so successful in the UK, helped Spirax Sarco to win a bigger share of the market. The new company in Russia performed well in a relatively undeveloped market that still had much potential. Worldwide a number of other new Spirax Sarco companies were set up, including Turkey (2009), following the purchase of a former distributor; Chile and the Philippines (2012); Indonesia and the Middle East (2013); the Netherlands (2014); Egypt, Colombia and Peru (2015); Vietnam and East Africa (2017); and the Maghreb, Hungary and Romania (2018). In 2008 Spirax Sarco had acquired the final 5 per cent of its Spanish business. Watson-Marlow's geographic footprint also expanded significantly during this time.

Despite progress, Europe, Middle East and Africa (EMEA) was the largest but the least profitable division of the Group in 2011. Mark Vernon sought to recruit externally a new Director who could bring new practices and perspectives. Nicholas Anderson joined the Group in September 2011 as Divisional Director of EMEA, with responsibility for leading the turnaround of the region. Through a rigorous programme of improvements, Anderson was able to transform the operating margin in the EMEA division from 15.8 per cent in 2012 to 19.7 per cent in 2013. EMEA's increased profitability had a significant impact on the Group operating margin, contributing most of the increase from 20.6 per cent in 2012 to 22.0 per cent in 2013.

In 2012 the US company built a second production facility at Blythewood, for packaged solutions. To improve its response to customers demanding more sophisticated systems, the company strengthened its direct sales force, working alongside established distributors. Given its previous problems, Spirax Sarco Inc. was making solid progress, achieving around a 30 per cent share of the traditional steam market. Today there are still great opportunities for growth, since the company has only a very small share in related markets, such as control valves, metering and heat exchange packages. The company employs some 270 people, and has sales engineers in most states, as well as a head office and factories in Blythewood and a customer support office in Denver.

In Latin America, the Mexican company was growing in importance. In the five years before 2010 it recorded annual growth of more than 10 per cent. The Monterrey factory was also an integral part of the Group's global manufacturing strategy. For these reasons, and to justify plans for greater investment, Spirax Sarco acquired the business outright in May 2010. The Group invested £4 million in a new factory; twice the size of its predecessor, with the potential for three times the output, it was completed in 2014.

As well as supplying customers in Mexico, the USA and Canada, the new factory could also be used to supply customers elsewhere in Latin America. Further south, the Group acquired Spirax Sarco's Chilean distributor in 2012, forming another sales company.

To speed up the development and launch of new products to sustain sales, Mark Vernon was eager to increase funding for research and development, centred on the UK, and to give the R&D unit much more autonomy. Investment in R&D was doubled, and this had a tangible impact: after the completion of a world-class modern steam testing facility, nearly 40 new products were launched in 2012, as against 25 in the previous year. Among them was the world's first self-powered wireless flow meter, as a result of which the Group received a Queen's Award for Enterprise: Innovation in 2015.



Spirax Sarco's award-winning TVA Flowmeter



Charlton House, Cheltenham, the Group's headquarters

The new steam testing facility was linked with a wider project, codenamed Project Unity. A £20 million investment brought together all Spirax Sarco UK's steam manufacturing operations on one location on a site in Runnings Road, Cheltenham, acquired in 2008. Completed in 2013, the project was part of a £40 million worldwide investment programme launched in the teeth of the recession, which also covered a new factory in China, new offices in Korea, the second tubing plant for Watson-Marlow in Falmouth and a long-overdue refurbishment and modernisation of the Group's headquarters, Charlton House, in Cheltenham.

As part of this global investment programme, Vernon and his team also wanted to give the Group

a more professional edge. Human resources, for example, had long been devolved to local management, but standards were inconsistent, posing a risk in an increasingly complex area. A central human resources function was created for the first time, tasked with formalising a global management succession programme and raising performance standards.

Another key exercise was defining the Group's core values, setting out a culture both aspirational and concrete, which would underpin the long-term sustainability of the business by providing clear guidance for its people on cultural expectations and standards.

The impact of the global slowdown was evident from the Group's sales. Sales in Europe, including the UK, grew much more slowly than in most other parts of the world. Yet during one of the toughest years, 2009, only one of the Group's 57 global profit centres recorded a loss. In terms of organic growth, it was Watson-Marlow that turned in the most impressive performance, while within the Spirax Sarco business the Asia Pacific region performed strongly. As it had in the past, the Group responded to the onset of another economic crisis by pruning costs to protect investment in product development and geographical expansion. The Group was helped by continuing to decrease its reliance on major new projects as more business came from self-generated small projects, as well as from service, maintenance and repairs. By 2013 half of Group revenue came from replacement business, while 85 per cent of sales came out of customers' operating and maintenance budgets.

Moreover, prior to his retirement in January 2014, Vernon had secured enhanced margins, which had risen from 16.5 per cent in 2007, immediately before his tenure, to 22.0 per cent in 2013. In the circumstances this was a considerable achievement.

2006 onwards: 'Robust and sustainable growth'



The UK Steam Technology Laboratory, Cheltenham, 2015



UK Steam Training Centre, Cheltenham, 2011

Mark Vernon handed over as Group Chief Executive to Nicholas Anderson in January 2014. Like Vernon, Anderson came to the Group in 2011 with extensive international commercial experience. (He subsequently discovered that in the late 1960s his father, a lifelong customer of Spirax Sarco, had been offered the post of Sales Manager for Sarco Argentina.) He found the Group in good health, financially robust, with an excellent business model and a culture that allowed managers to be positive, constructive and creative: 'It was an open, transparent and caring organisation, a genuinely nice place with nice people, a really healthy and enjoyable working environment.'

Like his predecessor, however, Anderson recognised that parts of the business could become even better, and he was able to build

on the work already carried out under Vernon. In the transition period before he took over, Anderson commenced a strategic review of the Group. This was in two parts: a business strategy aimed at improving the performance of the core steam specialties business, strengthening organic sales growth and further improving profit margins in a sustainable manner; and a corporate strategy to identify appropriate acquisition targets in related areas that had the potential to add value to the Group, or those that could extend geographical coverage or technological expertise.

The steam business strategy, entitled 'Customer First', based on the proven direct sales model, aimed to get even closer to customers in order to better understand their businesses and, thus, encourage them to turn to the Group as their



Assembly operator preparing Spirax Sarco clean steam traps for packing within the ISO7 cleanroom, Cheltenham, 2016

preferred partner. Critical to this strategy was the objective of strengthening and improving the processes in every part of the business, from sales and manufacturing to the recruitment and development of talented people, from logistics and stock management to information technology. Investment in more advanced information technology was seen as crucial for supporting the development of outstanding and sustainable performance. The aim, said Anderson, was 'to invest in the internal structure of the organisation to underpin the success we are already achieving'.

More emphasis was also placed on key market sectors. Instead of covering every industry in a defined geographical territory, sales engineers started focusing on customers in specific sectors of industry, such as food processing, beverages,

healthcare, or oil and gas. A balance was preserved, however, with other sales engineers continuing to operate geographically to maintain a broad industrial coverage. This sectorisation strategy fed through to manufacturing as well, continuing the drive to launch new products for specific markets more quickly. In 2016 this led to the first dedicated sectorised manufacturing plant, the £1.6 million clean steam facility developed at Runnings Road, Cheltenham. Measures were also put in place to harness the Group's entrepreneurial ethos for the benefit of the business as a whole through sharing best practice, for example, and establishing common processes.

Another vital part of the initiative was the institution of the Spirax Sarco Academy in 2016. With an annual budget of over £1 million, the



Manufacturing Spirax Sarco clean steam sample coolers within the ISO7 cleanroom, Cheltenham, 2018

Academy was set up to oversee the learning and development programmes within the global steam specialties business. By the end of that first year, the Academy had produced training materials available in 16 languages, and nearly 1,100 people had taken part in its initial programmes.

Customer First also promoted continuing global expansion, based on the success of the UK export department in opening up new companies in emerging markets. The important role of the export department was recognised when it became an operating company in its own right, called EDM (EMEA Developing Markets), with sister companies established in South East Asia and Latin America.

The redefined corporate strategy resulted in the two largest acquisitions in the Group's history, completed in rapid succession in 2017. Historically most of the Group's acquisitions had been relatively small, other than Drayton many years before. Watson-Marlow had been hugely

successful, but its rapid expansion came after it joined the Group. Almost 90 per cent of the Group's growth had been organic, but as the business increased, small-scale acquisitions made less of an impact on its size and financial results. But two acquisitions in 2017, Gestra and Chromalox, did make a difference, significantly increasing Group revenue and resetting the basis for future organic growth.

Firstly, in May 2017, Spirax Sarco paid £160 million to acquire its long-established rival, Gestra. This came after several unsuccessful earlier attempts to buy the company, which the Group had described in 2003 as 'the most potent [European] competitor providing similar quality to Spirax'. The big advantage for Spirax Sarco was Gestra's leading position in the German market, which had never really been fruitful territory for the Group.

Although the two businesses had been rivals for many years, they were in fact complementary,

A COMPANY HISTORY SUMMARY

GESTRA

For many years an important competitor of Spirax Sarco, Gestra was founded by 25-year-old engineer and inventor Gustav Friedrich Gerdt in 1902. The name Gestra originated in 1911 as an abbreviation of the name of Gerdt and his partner Strauch. Located in Bremen, the business began in workshops close by the railway, which became an early customer. One of Gerdt's early inventions was a 'blow-off valve' that could safely drain the sludge that formed in the boilers of steam locomotives. A third of output was soon being sent for export.

Gustav Gerdt died in 1955 and his sons Herbert and Folkmar took over the business. Under their leadership the company began to expand outside Germany, establishing subsidiaries in France in 1956, Spain in 1957, Italy and Brazil in 1961, the UK in 1967 and the USA in 1976. Innovation in valve technology and, from the 1960s onwards, industrial electronics was at the heart of the business. Gestra became a public company in 1983, set up subsidiaries in

Portugal and Poland, and was acquired by Siebe (later Invensys) in 1988.

Although Gestra was the market leader in Germany, it failed to modernise production and was burdened by a network of unnecessary branch offices across the country. This led to financial crisis in the 1990s, and restructuring of the business, including consolidation of all manufacturing within one unit.

In 2002 Flowserve Corporation acquired Invensys's Flow Control division, which included Gestra. Flowserve invested in plant equipment in the existing factory, although plans for a much-needed new factory never materialised. By the time Gestra joined Spirax Sarco in 2017, it had sales of more than €92 million and operating profits of more than €15 million. More than 80 per cent of sales were made in Europe, including over 40 per cent in Germany, with the remainder coming from the Americas and the Asia Pacific region.



Gestra Manufacturing, Bremen, Germany, 1960

one strong in industries such as food and beverages and pharmaceuticals, the other in chemicals, power generation and boiler house controls. Nicholas Anderson took the decision to revive the well-known Gestra brand alongside the Spirax Sarco brand to maximise the value of both. As Watson-Marlow had discovered a generation earlier, Gestra also found Spirax Sarco to be a supportive parent, and was soon benefiting from the Group's worldwide network.

The second major acquisition was Chromalox, the US-based electrical heating solutions business. This had been considered as a potential acquisition on two previous occasions, before the corporate strategy of 2014 identified the electrical thermal heat transfer market as a suitable related market in which to invest. Although the medium was electric rather than steam, the purpose – the transfer of heat into industrial processes – was the same. Moreover, in addition to complementing the Group's steam specialties business, Chromalox also operated a technically focused direct sales model in the USA. It enjoyed a broad market base in a wide range of industries and, as with the rest

of the Group, most of its revenue derived from customers' operating and maintenance budgets rather than capital expenditure.

All this made it an ideal acquisition for the Group. As with Gestra, there was potential for expanding the business into new geographical markets. There was some concern about integrating two major acquisitions in the same year but, as Anderson observed, Chromalox was 'the most Spirax-like business' he had come across, and each acquisition drew on resources from different parts of the Group. The Group paid \$415 million (£319 million) for Chromalox, which had full-year revenues of £146 million in 2017, and it became a stand-alone business unit within the Group.

The acquisitions of Gestra and Chromalox in 2017 and a third business, Aflex Hose, bought in November 2016 for £61 million (which was an expansion into a related area for Watson-Marlow), expanded the Group's sales by nearly a third, and the number of people employed by 35 per cent.

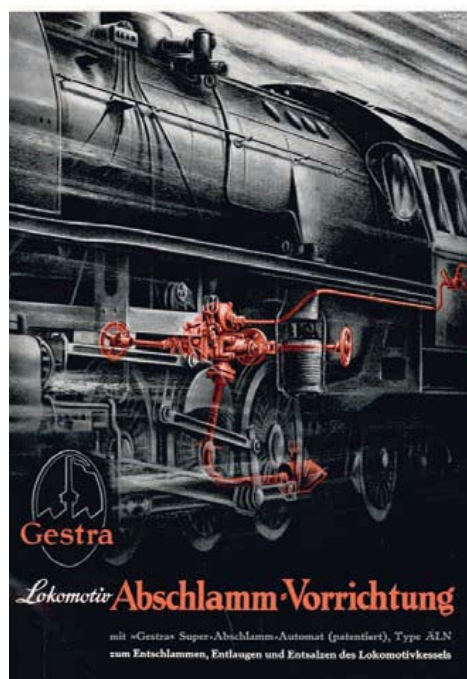


Gestra advertisement, 1921

2006 onwards: 'Robust and sustainable growth'



Gestra advertisement, 1929



Gestra advertisement, 1939

CHROMALOX

Chromalox was founded in 1917 by a young self-taught engineer, Edwin Wiegand, in Pittsburgh, Pennsylvania, in the USA. He was fascinated in particular by electrical conductivity, patenting in 1915 a resistance-heating element embedded in an insulating refractory and enclosed in a metal sheath. On the basis of this invention, he set up Chromalox, and began making the strip heater for what became the modern electric clothes iron.

The company boomed as more and more homes and factories adopted electricity. Wiegand was a prolific inventor and his many patents covering integrated heat and control products found widespread application in commercial and domestic markets. During the 1920s the company moved to a new factory in Homewood, a suburb of Pittsburgh, and adopted the name Chromalox, combining 'chrome', from the nichrome wire used in strip heaters, and 'locks', taken from the way a cement mix locks in a heating element.

During the 1930s the brand and technology were licensed around the world as patents continued to be filed for new inventions such as a version of a tubular heater, paving the way for the company to develop its reputation in industrial and commercial heating applications.

During the Second World War, Chromalox played an important part in meeting the military demand for portable heat on land and sea.

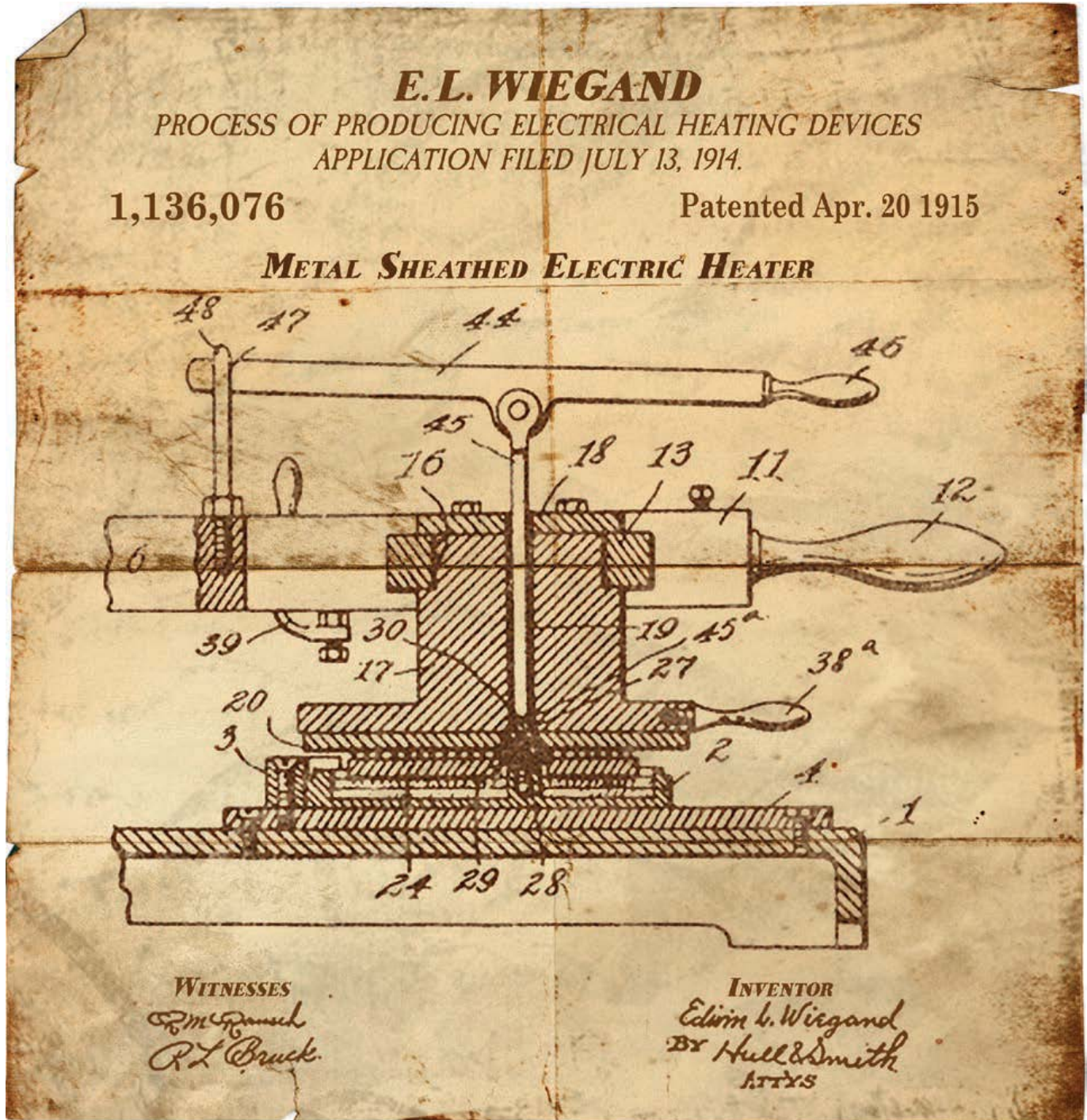
During the 1950s the company supplied pressuriser heaters for nuclear plants and nuclear submarines. The Pittsburgh plant was expanded, and as the business began to concentrate on military and defence markets a new factory opened in California, although this was later closed. During the space age, Chromalox was an important supplier to the manufacturers of support equipment,

and supplied NASA with liquid nitrogen vaporisers for purging the launch pad fuel systems for rocket ignition. When the Apollo 11 lunar module landed on the moon in 1969, it was using a Chromalox strip heater in the control box of a fuel-triggering device. As well as involvement with the space programme, the company launched electric boilers, heat transfer systems and electric vaporisers. By then Chromalox was part of multinational corporation Emerson, which had acquired the business in 1968.

Under Emerson's ownership, Chromalox acquired factories in the UK and France during the 1970s and set up Chromalox Industrial Controls in 1977 after taking over US company Rosemount Temperature Controls. The business continued to grow during the 1970s and 1980s, developing its interest in the oil and gas sectors, and in the 1990s it began to penetrate the Asia Pacific region, setting up a regional office in Hong Kong in 1993. By now Chromalox was regarded as the most technologically advanced electric heating equipment manufacturer in the world.

An office in Shanghai soon followed as the new millennium opened up new opportunities. Ownership changed hands, with J. P. Morgan Partners paying \$165 million for the business in 2003. The company strengthened its position in the USA through the acquisition of the Ogden Manufacturing Company in 2003, extended its Mexican factory and moved many production lines to a new manufacturing facility in La Vergne, Tennessee. Worldwide expansion continued with sales offices opening in India, Thailand, Singapore, Dubai and Germany. The launch of innovative new products remained central to the company's continued success.

The ownership of the company changed hands again in 2011 and 2013 before Chromalox became part of the Spirax Sarco Group in 2017.



Edwin Wiegand's patent for a metal sheathed electric heater, 1915



Spirax Sarco offices, manufacturing facility and customer training centre,
Chennai, India, 2016

At the same time as implementing its corporate acquisitions strategy, the Group continued to apply its traditional strategy for expansion. For several years one of the Group's ambitions had been to acquire control of its Indian joint venture, Spirax-Marshall, until it was finally decided that this was unachievable. Instead, in March 2015, the Group sold its stake to its partner, Forbes Marshall, and set up its own wholly owned company in India, which commenced trading in 2015. The Group invested over £11 million in a new factory, warehouse, offices and training centre in Chennai, which were opened in June 2016. While sales are still small in this huge country, and direct selling will take time to have an impact, it was a move made in anticipation of long-term dividends.

In Latin America the Group set up a Spirax Sarco sales company in Peru in 2015, two years after introducing direct sales to the country. In the same year the Group acquired its Spirax Sarco distributor in Colombia. In 2016 the Brazilian company acquired the assets of control valve maker Hiter, making Spirax Sarco the country's only major manufacturer of control and safety valves.

At the same time, Watson-Marlow was becoming a much more important part of the Group. As well as opening up new markets worldwide, in Africa, Asia Pacific and Latin America, Watson-Marlow was adding suitable acquisitions to strengthen its range, such as Flexicon, MasoSine and BioPure Technology.

Under Nicholas Anderson, the Group has invested nearly £150 million in property, plant and equipment, including new plants in India and Mexico and an extension in China; significant investments in computer software; and the planned site consolidation of Aflex.

The benefits of the strategic review are clearly evident in the business. The Group continues to grow. Sales are increasing – organic growth was 7 per cent in 2018 – and underlying margins are improving, achieved in market conditions that have been worse than expected. The Group's underlying profitability (deriving from the Spirax Sarco steam specialties business and Watson-Marlow, and excluding Gestra and Chromalox) rose from 22.0 per cent in 2013 to 25.2 per cent in 2018. Recently, the Group's total shareholder return has outstripped the average for the industry by a margin of three to one, and market analysts have expressed confidence that Spirax Sarco will continue to give a higher return for shareholders than most of the industry.

For shareholders, the Group's dividend record has been outstanding. In 2017 the Group marked what it described as half a century of 'dividend progress'. In that time, the Group has delivered 49 years of dividend growth and in one year, 1990, the dividend was maintained. Over the 50 years, compound annual dividend growth averaged 11 per cent, a remarkable record. The company has steadily moved up the ranks of FTSE-listed companies, from 230th in 2008, when its

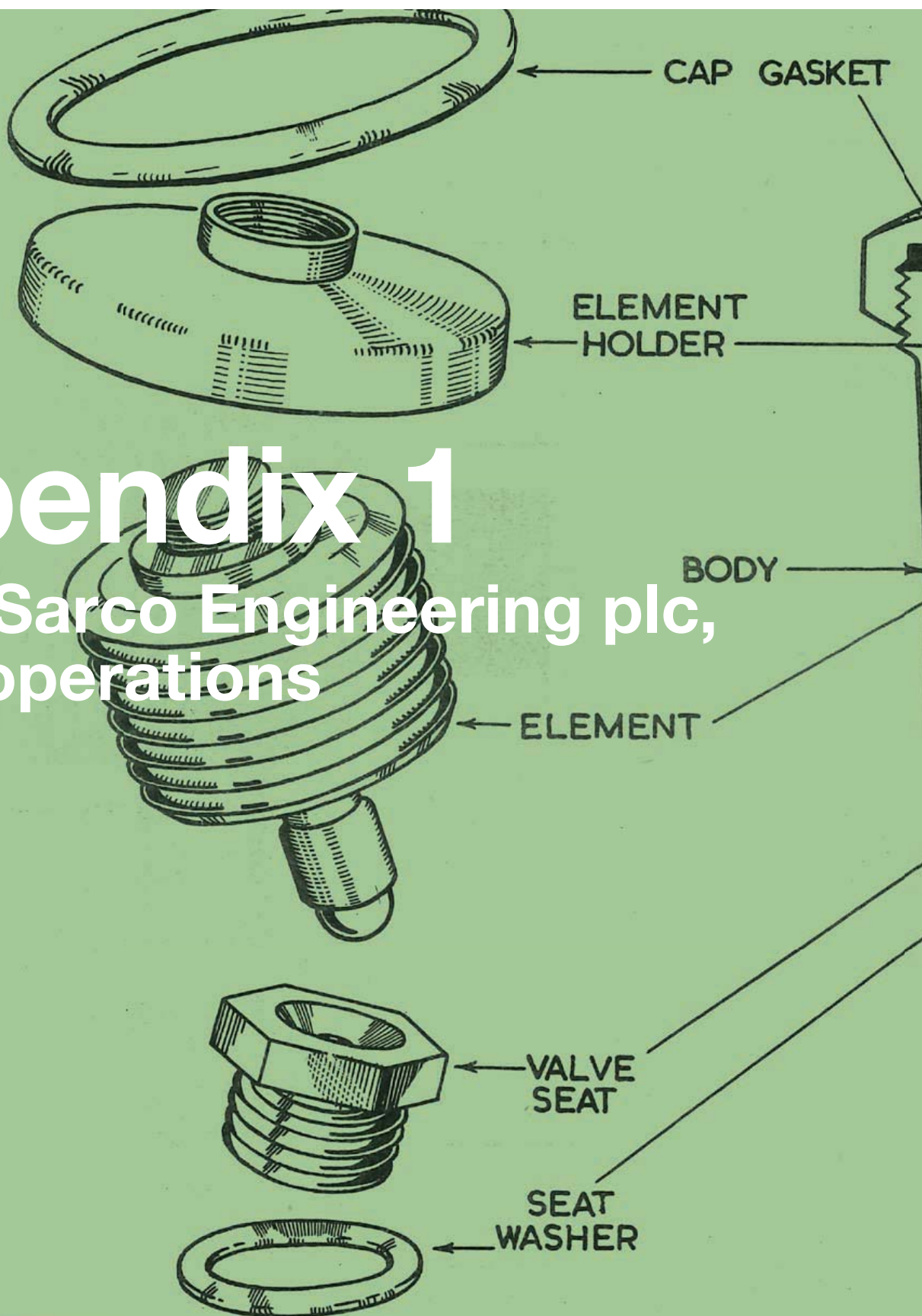
market capitalisation was £730 million, to 92nd in September 2018, when market capitalisation stood at £5.3 billion. On 24 December 2018 the Group reached a new milestone when it was promoted to the FTSE100.

There is still enormous scope for the business to carry on growing. Although it is the world leader in its fields, it still has a relatively small share (14 per cent) of a worldwide market worth £8.5 billion. This, however, masks the fact that the relevant market shares of the steam specialties business and Watson-Marlow are 16 per cent and 19 per cent respectively. There are also still considerable opportunities for growth within specific parts of the steam specialties market, such as controls and thermal energy management, which are bigger in aggregate than the original steam condensate management market.

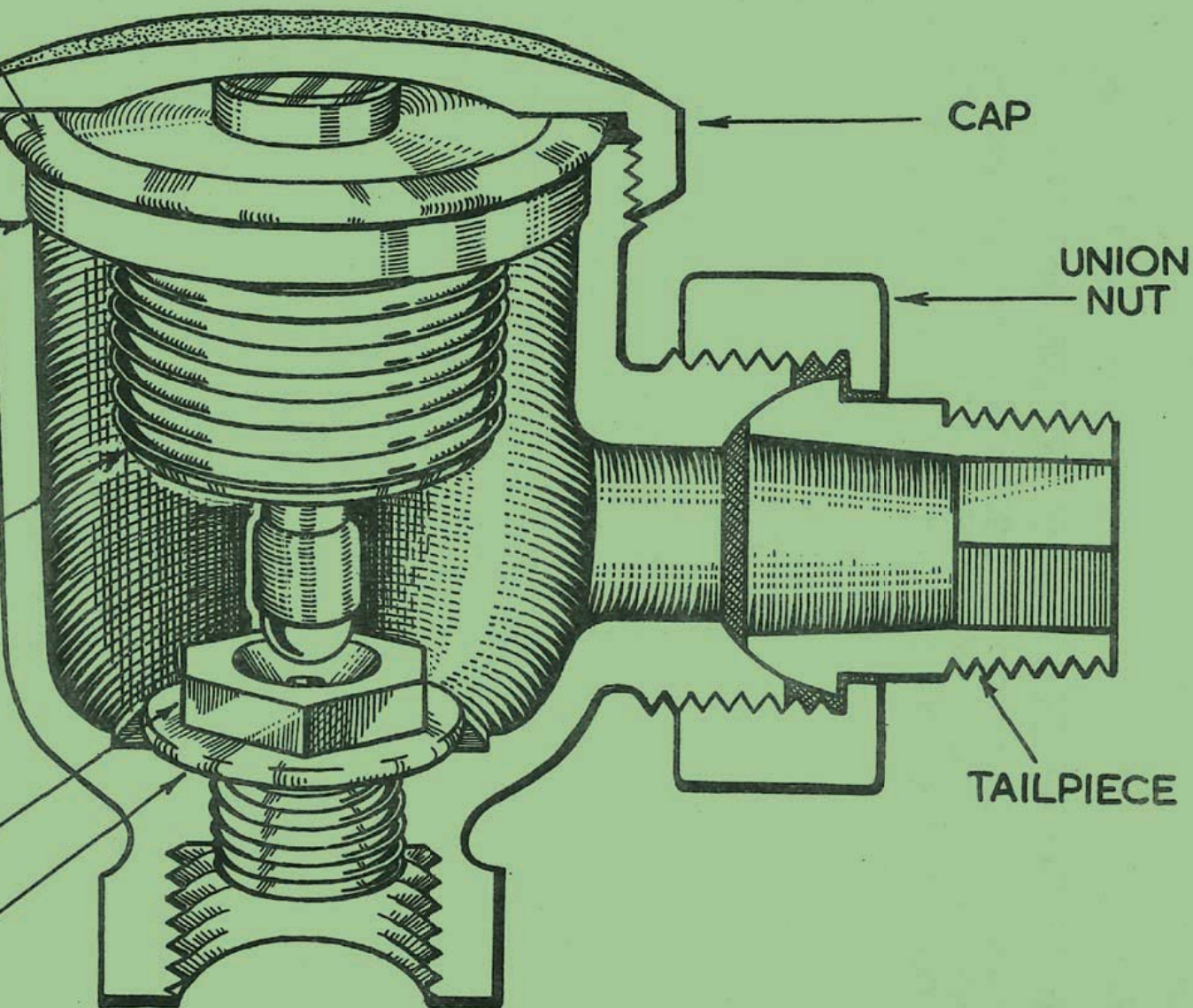
The challenge for the Group is sustaining growth and financial performance into the future, underpinned by sound infrastructure, processes, systems and strong organisation. For Nicholas Anderson, it is all about 'creating a robust and sustainable growth path for the company. In time, I would like my successor to inherit a better company than I did, as each successive CEO has before me.' Based on its core characteristics – direct selling and independent manufacturing, technical advice and strong customer relationships, which have contributed so much to the business over the years – there seems to be every chance this will happen.

Appendix 1

Spirax-Sarco Engineering plc,
global operations



SPARES FOR
SPIRAX TYPE 'R'
BALANCED PRESSURE
THERMOSTATIC STEAM TRAP



THE COMPONENTS SHEWN ON THE LEFT
COMPRISE AN ELEMENT SET. THESE
ARE SUPPLIED COMPLETE AND SHOULD
ALWAYS BE FITTED COMPLETE. A $\frac{3}{8}$ "
WHIT. BOX SPANNER WILL REMOVE THE
SEAT,
REQUISITION AS :— 'R' ELEMENT SET
AND WHETHER LOW OR HIGH PRESSURE
AS STATED ON CAP.

SPIRAX MANUFACTURING CO. LTD.,
CHELTENHAM GLOS.

DRN. P

CHKD. *R.H.*

APPD. *[Signature]*

DATE. 21-12-51

DWG. NO. T 141

STEAM SPECIALTIES: SPIRAX SARCO

Europe, Middle East and Africa

Belgium

Sarco appointed Sainte de Founes, based in Brussels, as agent in 1937. Sarco France later assumed responsibility for sales to Belgium, and a resident sales engineer was appointed in 1950. Sarco Belge SA was formed in 1952, and it soon afterwards became a subsidiary of Sarco France. The company became wholly owned by Spirax-Sarco Engineering in 1971, when the outstanding 23 per cent share capital (owned by Sarco in France) was acquired by the Group. The company subsequently changed its name to Spirax Sarco NV in 1974.

Czech Republic

Spirax Sarco welcomed customers from Czechoslovakia to Cheltenham in 1975. A sales office was set up in the Czech Republic in 1991, followed by a sales company, Spirax Sarco spol sro, based in Prague in 1995. New offices and a warehouse were opened in Prague in 2005.

Denmark

There may have been an agent as early as 1932, but Lionel Northcroft appointed Brodrene Dahl in 1945. Denmark was the UK company's first post-war export market. A central figure in developing sales in Denmark and elsewhere in Scandinavia during this time was Erik Arnberg, who retired in 1982. With premises in Copenhagen, the Danish business became a branch office in 1969, which it remains, offering the same services as a subsidiary company.

Egypt

Spirax Sarco first began exporting to Egypt in the late 1940s. Following direct representation in the 2000s, Spirax Sarco Egypt began trading in 2015.

Finland

During the 1930s Fritz Meyer of Flieberg in Sweden acted as the Sarco agent for Finland. Exports to Finland from Spirax in the UK first began in the late 1940s through the same agent. Spirax OY was formed in Helsinki in 1979.

France (see page 28)

Richardson Frères, based in Marseille, was the Sarco agent in France from 1922 until 1937, when Sarco Appareils Thermostatiques was established in Paris. All the Sarco steam traps sold in France were imported from the USA.

The company began making small numbers of traps during the Second World War, and relied on imports from the UK during the early post-war years. In 1939 Sarco France began making traps in Rue Oberkampf in Paris, moving to works in Rue Rébeval in 1950.

Although Spirax Sarco acquired a stake in the company in 1957, majority control remained with the French management until 1971, when it became wholly owned. A new factory was opened in Châtellerault in 1961, which was doubled in size later in the same decade.

In 1975 the company changed its name to Spirax Sarco SA. In 1977 it moved to offices at Trappes just outside Paris, maintaining the Châtellerault factory. The factory became an important part of Spirax Sarco's global manufacturing capacity. It was upgraded in the 1990s and later became Spirax Sarco's centre of excellence for controls and ancillary equipment.

Germany

Sarco Germany was established in 1954. The company was relocated to Konstanz after Spirax Sarco acquired a controlling interest in 1957. A small factory was completed in 1962 for making traps and strainers. The company became a wholly owned subsidiary of the Group in 1968, changing its name to Spirax Sarco GmbH in 1975. A second production unit was set up in the Black Forest in 1973. Both factories were closed in 1984 after the decision to concentrate European production in the UK and France. The business made steady progress, with extended offices (1986) and a new warehouse (1990). The company's major domestic competitor, Gestra, became part of the Group in 2017.

Hungary

Direct sales started in March 1995. A sales office was established in Budapest. The operating company, Spirax Sarco Kft, began trading in January 2018.

Italy

Jucker, based in Milan, became a manufacturing licensee of Sarco in 1937, and the arrangement continued after the Second World War. The Group tried and failed to acquire Jucker in the 1980s, and set up its own sales company in competition in 1984 after Jucker began exporting Sarco products. This venture was not particularly successful, and in 1993 the Group negotiated the acquisition of Jucker's steam process manufacturing business. The integration of the two businesses proved challenging, but Spirax Sarco Srl soon moved back into profit, becoming a strongly performing operation.

Kenya

In the 1960s A. Baumann & Co. were agents. By 1980 a resident sales engineer, Shaukat Sangrar, was in place. Spirax Sarco East Africa Ltd, based in Nairobi, began trading in 2017.

Morocco

In 2017, engineer Hacène Boukherroub relocated from Spirax Sarco France to establish direct sales in Morocco and set up Spirax Sarco Maghreb, which began trading in 2018.

Middle East

A regional engineer was appointed for the Middle East in 1990. A regional office was later opened in the United Arab Emirates to support activity there and in other countries in the region, including Saudi Arabia, Qatar, Kuwait, Bahrain, Oman and Yemen. Larger premises were taken in 2006 to incorporate a training centre. All business until that date had been handled through distributors. Spirax-Sarco Engineering Middle East (FZC) was established in 2013 to strengthen direct relationships with customers and improve technical support and site services. A local warehouse was set up at the same time. Countries in the region other than those covered by Spirax Sarco Middle East or Spirax Sarco Egypt are managed by the Export Developing Markets unit in the UK.

Netherlands

Econosto became the Sarco agent in 1927. A joint venture, Spirax Sarco BV, was formed in 1976, specialising in the oil and petrochemical market, but proved short-lived. A new sales company, Spirax Sarco Netherlands BV, was formed in 2014, but there are still strong links between the Group and Econosto.

Norway

Sigurd Sorum became the Sarco agent in 1930 and continued to act for Spirax Sarco until a separate sales company, Spirax Sarco AS, was formed in 1993.

Poland

An agent was handling sales for Sarco Thermostats and Spirax in Poland in the late 1930s. In the 1960s several attempts were made to re-enter the market, with little success. In 1991 a resident sales engineer was appointed, and a sales office was opened in Warsaw. Spirax Sarco Sp zoo was formed in 1995.

Portugal

There was a Sarco agent in Portugal before the Second World War. In 1948 a new agent, The Engineering Co. of Portugal, Lisbon, was appointed, succeeded in 1955 by Bell's Asbestos and Engineering. In 1984 Spirax Sarco acquired the then distributor, Tecnoeco Equipamentos Industrias Lda, and Spirax Sarco Equipamentos Industrias Lda was formed in 1985.

Romania

Direct sales began in January 2007, with a sales office in Cluj. Spirax Sarco SRL began trading in 2018.

Russia

The first Spirax Sarco export to Russia took place indirectly in 1958. For some years sales in Russia were dealt with through Spirax Sarco's Finnish company. In 1995 a sales office was opened in St Petersburg. In 2005 a new trading company, Spirax-Sarco Engineering LLC, was set up, with a head office in St Petersburg, a branch office in Moscow and engineers in eight other major cities.

South Africa

Bell's Asbestos and Engineering became the Sarco agent in 1934. In 1973 Spirax Sarco (Pty) Ltd (now Spirax Sarco South Africa (Pty) Ltd) was formed.

Spain

Industrial Mas Nieto became the Sarco agent around 1932. The civil war disrupted progress until after the Second World War, when Industrial Mas Nieto began assembling traps from parts exported from Spirax in the UK. By the late 1980s the company was still manufacturing under licence, and employed 13 sales engineers around the country. The Group took a stake in Industrial Mas Nieto in 1993, increasing it to 95 per cent in 1997, and acquiring complete ownership soon afterwards. Production was wound down, and the small factory was closed in 2003, but a sales company remained.

Sweden

Fliesberg became the Sarco agent in 1932, and this relationship continued until the formation of Spirax Sarco AB in 1977. Manufacturing had begun in a small way sometime previously, although this was short-lived.

Switzerland

The original Sarco agent in Switzerland was A.G. für Warmemessung, based in Zurich, from 1946 onwards. The Group acquired the business in December 1973, forming Spirax Sarco AG in 1974.

Turkey

Spirax Sarco was exporting to Turkey from at least the 1960s. In 2009, following the acquisition of its existing distributor, the Group established Spirax Inter Valf Sanayi (now Spirax Sarco Valf Sanayi ve Ticaret AŞ), based in Istanbul.

United Kingdom

The origins of the Group began with Sanders, Rehders & Co. in London in 1888. The UK business had mixed fortunes until the formation of Spirax Manufacturing Co. Ltd in 1932 to make Sarco steam traps under the Spirax name. It was during the 1930s that Lionel Northcroft developed his theory of direct technical selling, which is still essential to the Group's business model today. In 1937 the company relocated from London to Cheltenham.

During the Second World War, Spirax worked closely with the British government on energy conservation, vital when energy supplies were scarce.

Spirax Sarco was formed in 1952 after the Spirax Manufacturing Company and Sarco Thermostats were acquired by Lionel Northcroft and Herbert Smith. In 1957 the company acquired Sarco International and interests, either wholly or in part, in all its associated businesses. By then the company was also exporting widely across the world, and had formed its first joint venture in India in 1958. The Group holding company, Spirax-Sarco Engineering Ltd (now Spirax-Sarco Engineering plc), was formed in 1959.

The UK company led the international expansion of the business after the Second World War. Today the Group's and Spirax Sarco's headquarters remain in Cheltenham, as do the latter's important UK manufacturing facilities and research and development function.

Asia Pacific

Australia

A sales agency was established around 1937. Spirax-Sarco Engineering Pty Ltd, based in Blacktown, Sydney, was formed in 1973. A Melbourne sales office was opened and was followed by offices in Brisbane, Adelaide and Perth.

China (see page 124)

Spirax Sarco senior managers first visited China in 1977. The company began exporting into the Chinese market in 1985. A Shanghai sales office opened in 1992. Spirax-Sarco Engineering (China) Ltd was formed in 1995 as one of the first wholly owned foreign enterprises in the country. The first regional office opened in Beijing in 1996. A factory and offices were opened by British Prime Minister Tony Blair in Shanghai in 1998. A new factory opened in 2010 and the plant was expanded in 2017. By 2013 the company had more than 40 regional offices and the largest direct sales team in the Group.

Hong Kong

Spirax Sarco was selling into Hong Kong in the early 1960s. For many years China Engineers acted as agent and also sold into China. New premises were opened in 1991. Spirax Sarco Hong Kong Co. Ltd was formed in 2013.

India

Bell's Asbestos and Engineering became the Sarco agent in India in 1933. Spirax appointed several new agents in 1946, including J. N. Marshall. India made up 80 per cent of exports from Spirax by 1950. Spirax-Marshall was formed with J. N. Marshall in 1958 as Spirax Sarco's first joint venture. The factory in Poona (now Pune) was built in 1958 and began production in 1959. Spirax Sarco's first overseas training centre was opened by Spirax-Marshall in 1960.

The arrangement lasted until March 2015, when the Group sold its stake in the joint venture company to Forbes Marshall and formed the wholly owned Spirax Sarco India Private Ltd. The company began trading in mid-2015, and a new factory, warehouse, offices and training centre were opened in Chennai in June 2016.

Indonesia

A distributor was first appointed in 1983. Direct representation began in 1986, and in 1990 a sales office was opened in Jakarta. Following acquisition of the local distributor PT Petrolog MUM in 2013, PT Spirax Sarco Indonesia was established in Jakarta, with sales representatives throughout the country.

Japan

A branch office was established in Japan in Tokyo in 1973. A purpose-built office and warehouse were opened in Tokyo in May 2000. The business revived significantly under the leadership of Simon O'Brien in the late 2000s through the strengthening of direct selling.

Malaysia

Bell's Asbestos and Engineering became the Sarco agent in Malaya in 1952. A sales company,

Spirax Sarco Sdn Bhd, was formed in Kuala Lumpur in 1981.

Myanmar

Direct selling commenced in 2012. Spirax Sarco Ltd was incorporated in the country in June 2017.

New Zealand

John Chambers acted as the Sarco agent in New Zealand from at least 1939 until 1965 when Andrews & Beavan took over. In 1964 Spirax Sarco (New Zealand) Ltd was formed as a small-scale manufacturing and assembly unit run jointly with Spirax Sarco's local agent. In 1972 the first resident sales engineer was appointed. The joint venture appears to have continued until a new sales company, Spirax Sarco Ltd, was formed in 1991.

Philippines

Spirax Sarco was selling into the Philippines in the 1970s. This led to the formation of an exclusive distributor in the 1980s under former Spirax Sarco manager Charles Moody. A direct presence was established in the late 1990s under Merryn Selwyn as Country Manager. For some years Spirax Sarco worked alongside the local distributor, until the distributor was acquired by the Group in 2007. Spirax Sarco Philippines Inc was formed in 2012 and began trading in 2013.

Singapore

Bell's Asbestos and Engineering handled the agency for Singapore from the 1930s until the 1970s. A sales office was then opened in the 1970s, with a sales company (Spirax Sarco (Private) Limited) established in 1978, along with a warehouse to service other Spirax Sarco territories in the region. During 2017,

a new distribution centre was established, and Singapore became a regional distribution hub for the steam business in Asia Pacific.

South Korea (see page 84)

Exports were made to South Korea in the 1960s, and a first visit by Spirax Sarco was made in 1974. In Soon Park became resident sales engineer in 1976 and a joint venture company, Spirax Sarco Korea Ltd, was formed in 1978. In 1979 the company moved to offices, factory and a warehouse in Bupyeong. The first regional offices were opened in Taegu, Kwangju and Busan in the same year. The joint venture company became a wholly owned subsidiary in 1980. In 1992 the company moved into purpose-built premises just outside Seoul. New premises were opened in 2009. By then Spirax Sarco Korea Ltd was second only to China in the Asia Pacific region. Employees still hold a 2.5 per cent stake in the business.

Taiwan

In 1976 Hoffman & Co. was appointed as distributor. Its successor, Longbridge, built up sales during the 1980s. A branch office was opened in 1981. Spirax Sarco acquired Longbridge in 1989, and Spirax Longbridge Limited was established. The company's name was changed to Spirax Sarco Co. Ltd in 1997.

Thailand

From the mid-1970s Boonyium & Associates acted as agent in Thailand. Following its acquisition in 1990, a sales company, Spirax Boonyium Ltd (now Spirax Sarco (Thailand) Ltd), was formed.

Vietnam

A distributor was appointed in 1996. Direct sales began in 2011 under Mike Hubbard, which

demonstrated that there was a clear market for Spirax Sarco, and a sales company, Spirax Sarco Vietnam Co. Ltd, began trading in 2016.

Americas

Argentina (see page 76)

A sales agency was established in 1940. Sarco Argentina was formed as a joint venture with Alfonso Aguilar in 1963. A factory was opened in Buenos Aires in 1964. A new factory was opened in 1981. The company became a wholly owned Group subsidiary in 1983 as Spirax Sarco SA. The latest plant expansion was completed in 2016.

Brazil (see page 62)

A sales agency was established in 1944. Sarco Brazil Ltda was formed as a joint venture with Robert Hall and the Macedo brothers in 1959. Manufacturing began in 1960, and a new factory was built in 1964, which was replaced by another new factory in Cotia, outside São Paulo, in 1978. The company became a wholly owned Group subsidiary in 1991 as Spirax Sarco Ind e Com Ltda. Spirax-Sarco Engineering acquired the control valve manufacturer Hiter in 2016.

Canada

Sarco Canada was formed in 1926 as a subsidiary of Sarco Co. Inc. In 1934 it began importing parts for the assembly of radiator traps by an external contractor. The Claremont factory was opened in 1941. Clement Wells disposed of the company to its management in 1948. After the management buyout of Sarco Co. Inc. in the 1950s, it set up a Canadian subsidiary, Escodyne, to compete with Sarco Canada, which led the latter to set up a competing US subsidiary, Erwel. Escodyne became part of Spirax-Sarco Engineering after

the acquisition of Sarco Co. Inc. in 1983. In 1989 the Group also acquired Sarco Canada and Erwel, and the two Canadian businesses became one, as Spirax Sarco Canada Ltd.

Chile

Fett & Oebauer, Santiago, became Sarco agents in Chile in 1937. The first post-war export was despatched from UK in 1949. From the 1960s the country was supplied by the Brazilian factory. Based in Santiago, Spirax Sarco Chile Ltda was formed in 2012, following the acquisition of the steam business of Spirax Sarco's previous distributor, Termodinámica Limitada.

Colombia

Distributors were active in the 1970s, and a sales office with a resident sales engineer was opened in 1973. Direct sales were resumed in 2012. Spirax Sarco Colombia SAS was formed in 2015, following the acquisition of Spirax Sarco's local distributor, Casaval SA.

Mexico

Based in Monterrey, Especialidades Industriales was manufacturing under licence for Spirax Sarco in 1959. Especialidades para Vapor (EPV) was founded in 1966 to sell Sarco products in Mexico, supplied from the USA. Spirax Sarco acquired a 49 per cent share of EPV in 1980 and a joint venture company, Spirax Sarco Mexicana, was formed. The factory was extended in 1986. The joint venture company became a wholly owned Group subsidiary in 2010, and a new factory was opened in 2014.

Peru

Products were sold into Peru initially through the Brazilian company before a local distributor, Ingeniaria Termodinamica SA, was formed

in 1961, selling products supplied from Brazil from 1962. This arrangement was modified in 2001 when distribution and service was shared between a new company called Termodinamica SA and another company, La Llave. Direct sales began in 2013, and a sales company, Spirax Sarco Peru SAC, began operating in 2015.

United States of America (see page 18)

The Sarco Fuel Saving and Engineering Company, New York, was formed in 1907 and replaced by Sarco Co. Inc. in 1915. Roller Smith made recording instruments for the company from 1911, adding steam traps during the First World War. The first branch office was opened in Chicago in 1912. The driving force for many years was Clement Wells, whose influence percolated through the business worldwide.

Sarco Co. Inc. set up its own factory in Bethlehem, Pennsylvania, in 1935. By 1939 the company had 60 representatives across the USA.

The company supplied traps and controls to US shipyards and military bases during the Second World War. An industrial division was formed after the war. A management buyout took place in 1956, and a new factory in Allentown, Pennsylvania, was opened in 1962.

The company was acquired by White Consolidated Industries in 1964. It was sold to Spirax-Sarco Engineering in 1983, when it became Spirax Sarco Inc.

The factory was relocated to Blythewood, South Carolina, in 1998. The plant was expanded to include the fabrication of engineered systems, opened in 2011–12.

STEAM SPECIALTIES: GESTRA

Gestra was founded by Gustav Gerdt in Bremen, Germany, in 1902. The name Gestra came from the abbreviation of the names of Gerdt and his partner Strauch. Under the leadership of Gerdt's sons in the late 1950s the business began to expand outside Germany. Subsidiaries were established in France (1956), Spain (1957) Italy and Brazil (1961), the UK (1967) and the USA (1976). Gestra became known for innovation in valve technology and industrial electronics.

In 1988 Gestra became a subsidiary of Siebe (later Invensys). The company's business in its core domestic market was restructured and manufacturing consolidated into one unit. Ownership changed hands again in 2002 when Flowserve Corporation acquired Invensys's Flow Control business, of which Gestra was a part. Spirax Sarco acquired Gestra in 2017, and at that time over 80 per cent of its €92 million sales came from Europe. Gestra's brand was revived and the two steam businesses, Gestra and Spirax Sarco, now operate independently in the market, ensuring customer choice, under a dual brand strategy.

See also page 149.

CHROMALOX

Chromalox was founded in Pittsburgh, Pennsylvania, USA, in 1917, and soon began specialising in electric integrated heat and control products. The company flourished as more homes and factories were supplied with electricity. It adopted the name Chromalox when it moved to a new factory in Homewood, a Pittsburgh suburb, in the 1920s.

The company strengthened its reputation in industrial and commercial heating applications during the 1930s, licensing the brand and its technology worldwide. Chromalox supplied portable heating solutions to the US military in the Second World War and component heaters to NASA during the 1960s and 1970s.

The company continued to expand under the ownership of Emerson Electric from the late 1960s onwards. Factories were opened in the UK and France in the 1970s. In 1993 an office was set up in Hong Kong to serve the Asia Pacific region. A decade later, an office was also opened in Shanghai. The company developed new markets in the oil and gas industries.

Worldwide expansion continued under a number of different owners during the 2000s, earning Chromalox a reputation for innovative products and as the world's most technologically advanced electric heating equipment maker. Chromalox became part of Spirax-Sarco Engineering plc in 2017, and in the year when it joined the Group, it had full-year revenues of £146 million.

See also page 152.

WATSON-MARLOW FLUID TECHNOLOGY GROUP

The business was founded in the UK as Watson-Marlow Air Pumps by Bernard Refson in 1958, when he produced his first peristaltic pump for sale. By the early 1960s the company's pumps were already being used in a wide variety of applications, including medical research and pharmaceuticals, cosmetics, food processing, brewing, sugar refining, tyre manufacturing and printing. Peristaltic pumps were also used for renal dialysis machines, and for a short time in the late 1960s the company began developing its own machines.

As the company grew, it relocated in 1969 from Marlow in Buckinghamshire to Falmouth in Cornwall, where it remains to this day with a state-of-the-art production facility.

By the early 1970s the company, both entrepreneurial and innovative, was producing most of the peristaltic pumps sold in the UK. Half of its sales came from exports, mainly into Europe, and its range ran from micro-metering pumps to industrial models.

The need to raise more capital for expansion led to the company's sale to Smith & Nephew in 1977. During the 1980s, under Chris Gadsden as Marketing Director, Watson-Marlow increased the applications and markets for peristaltic pumps and expanded its export sales. Total sales grew from around £1 million in 1980 to £6 million in 1991, Watson-Marlow's first full year in the Group.

Under the ownership of Spirax Sarco from 1990 onwards, Watson-Marlow began to grow in leaps

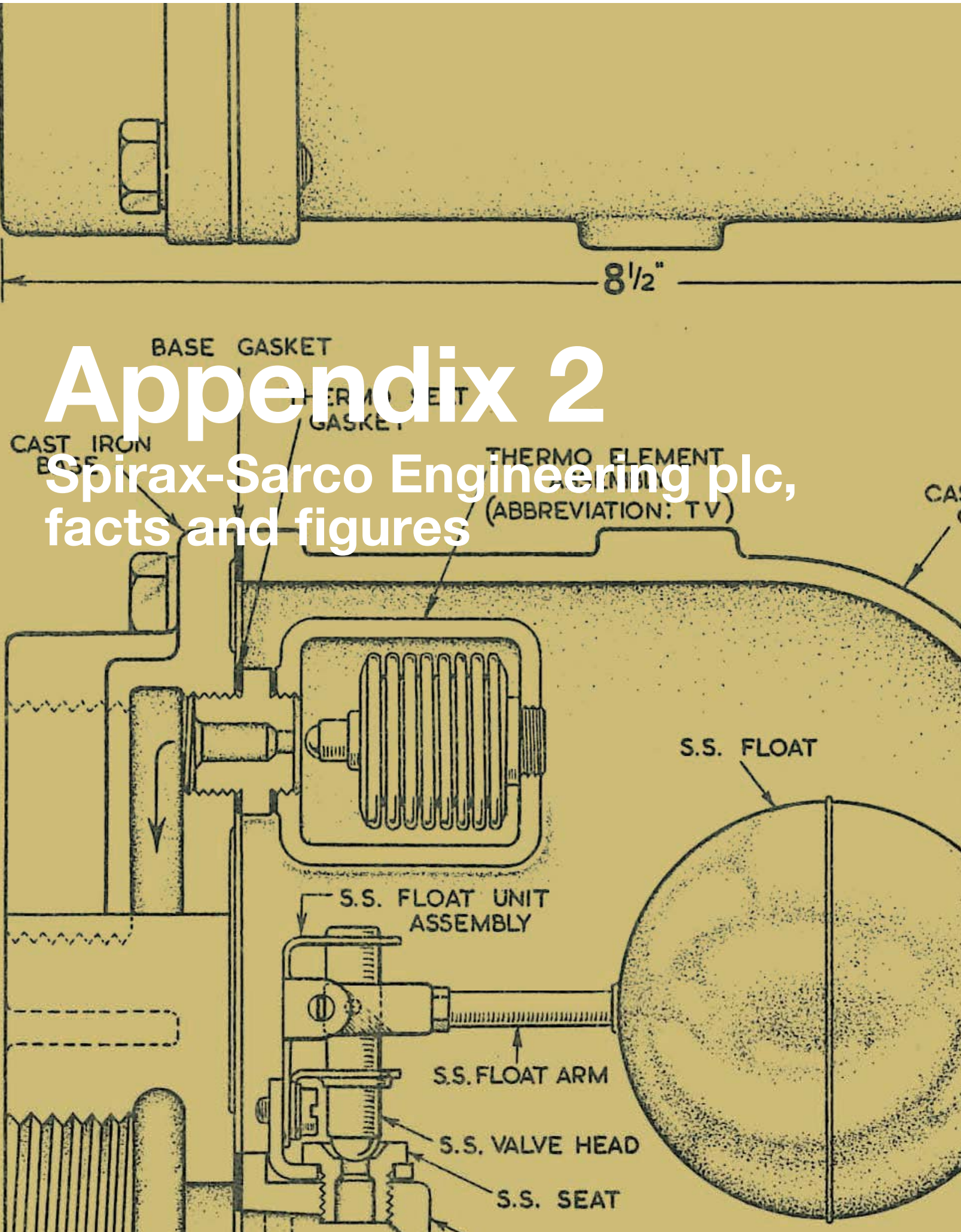
and bounds. With Richard Woods as Managing Director, sales reached £20 million by the end of the 1990s. Watson-Marlow Inc. was formed in 1991, and under Jay Whalen as Sales and Marketing Director grew rapidly by applying the Spirax Sarco direct sales model to the business. This became the template for Watson-Marlow's growing worldwide operations, which benefited from the support of Spirax Sarco's many overseas branches. In 1996 Watson-Marlow made its first major acquisition when it took over Bredel, the Dutch maker of heavy industrial peristaltic pumps.

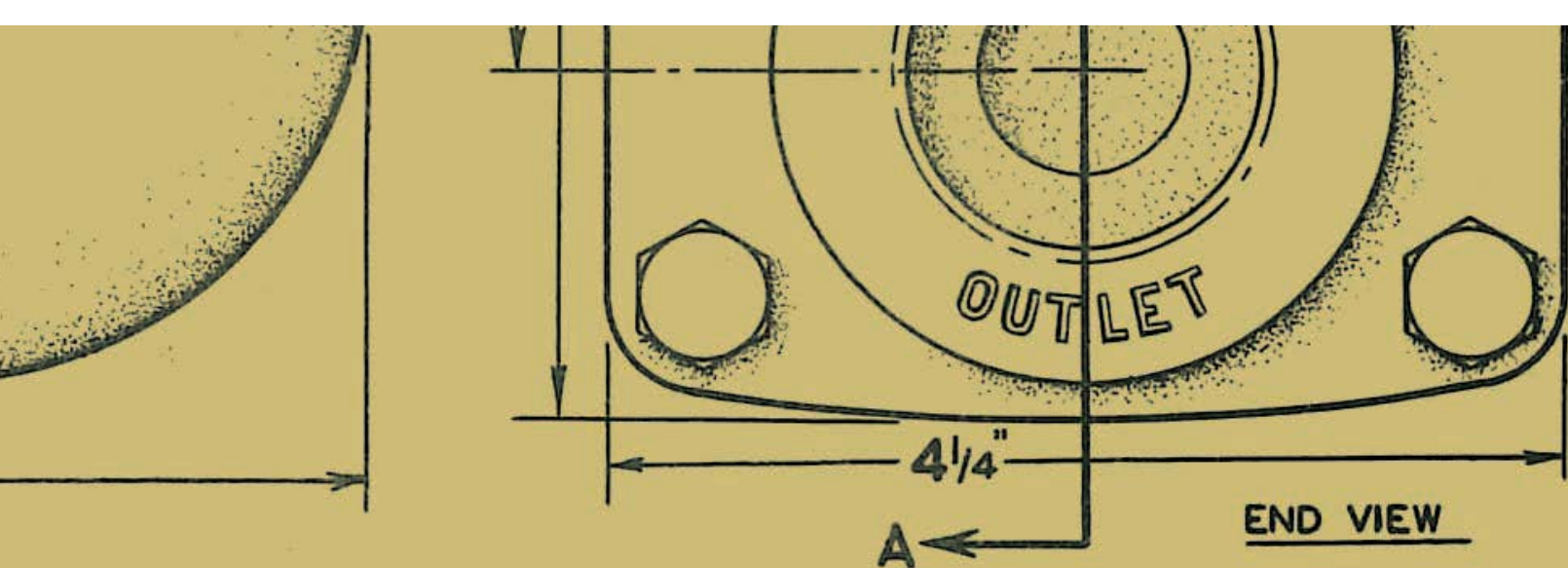
Watson-Marlow's growth continued to accelerate in the new millennium under Chris Gadsden, who succeeded Richard Woods in 2002, and Jay Whalen, who took over as President in 2010. As well as expanding into emerging economies, the company also broadened its scope through several acquisitions. These included Alitea, Sweden (2000), Flexicon, Denmark (2008), MasoSine, Germany (2009), Bio-Pure, UK (2014), Asepco, USA (2015), Flow Smart, USA (2015) and Aflex Hose, UK (2016). Further investment was made in the Falmouth factory, including a new tubing plant in 2009, which now exports 90 per cent of everything it makes. The changing scope of the business led the company to change its name in 2014, becoming the Watson-Marlow Fluid Technology Group. By 2018, Watson-Marlow had over 40 operating units worldwide and a direct sales presence in 34 countries.

See also Chapter 8 (pages 94–119).

Appendix 2

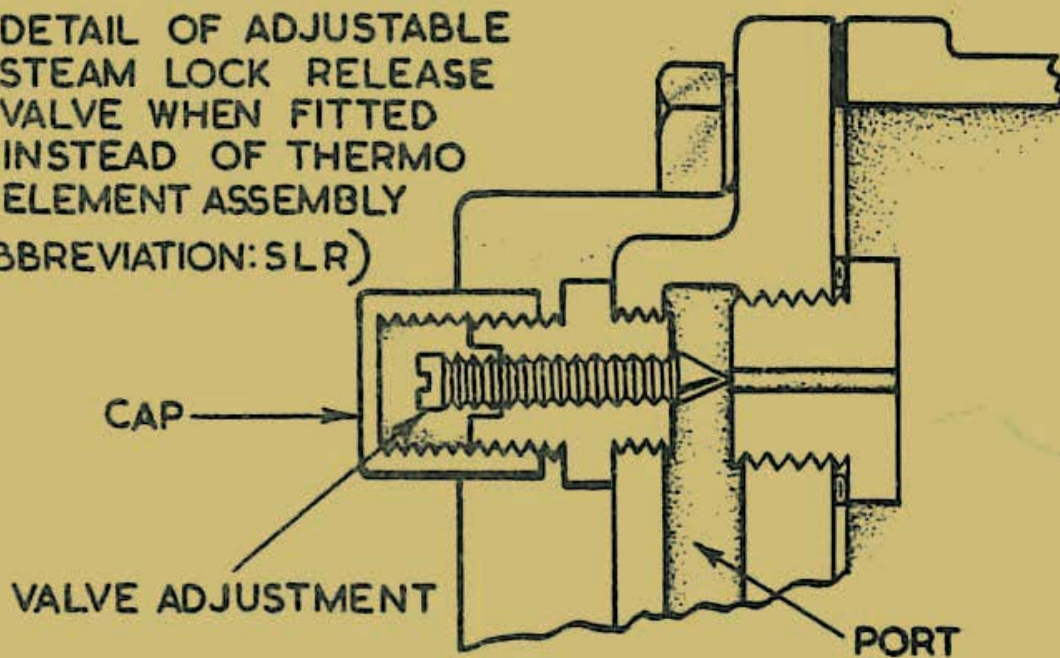
Spirax-Sarco Engineering plc,
facts and figures



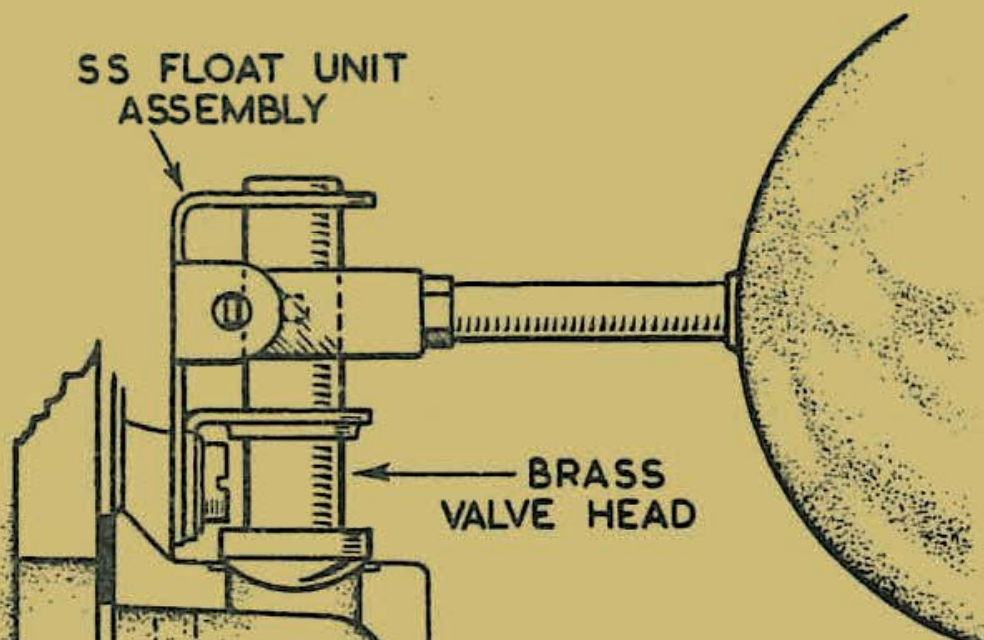


ST IRON
CASE

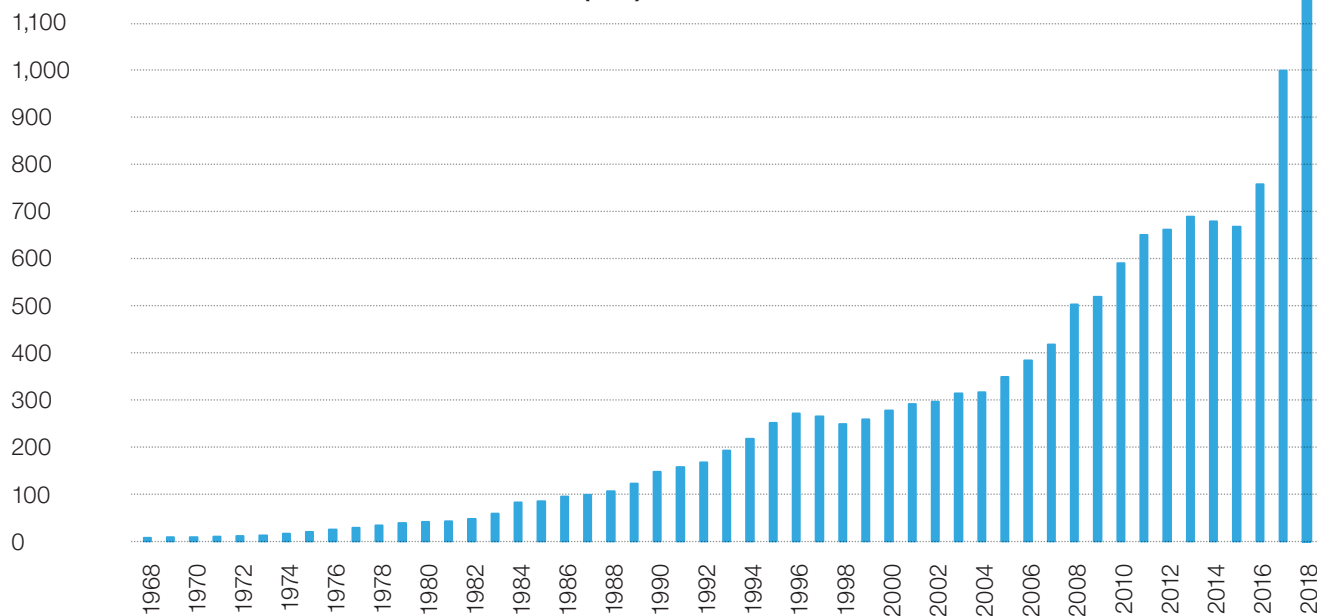
DETAIL OF ADJUSTABLE
STEAM LOCK RELEASE
VALVE WHEN FITTED
INSTEAD OF THERMO
ELEMENT ASSEMBLY
(ABBREVIATION: SLR)



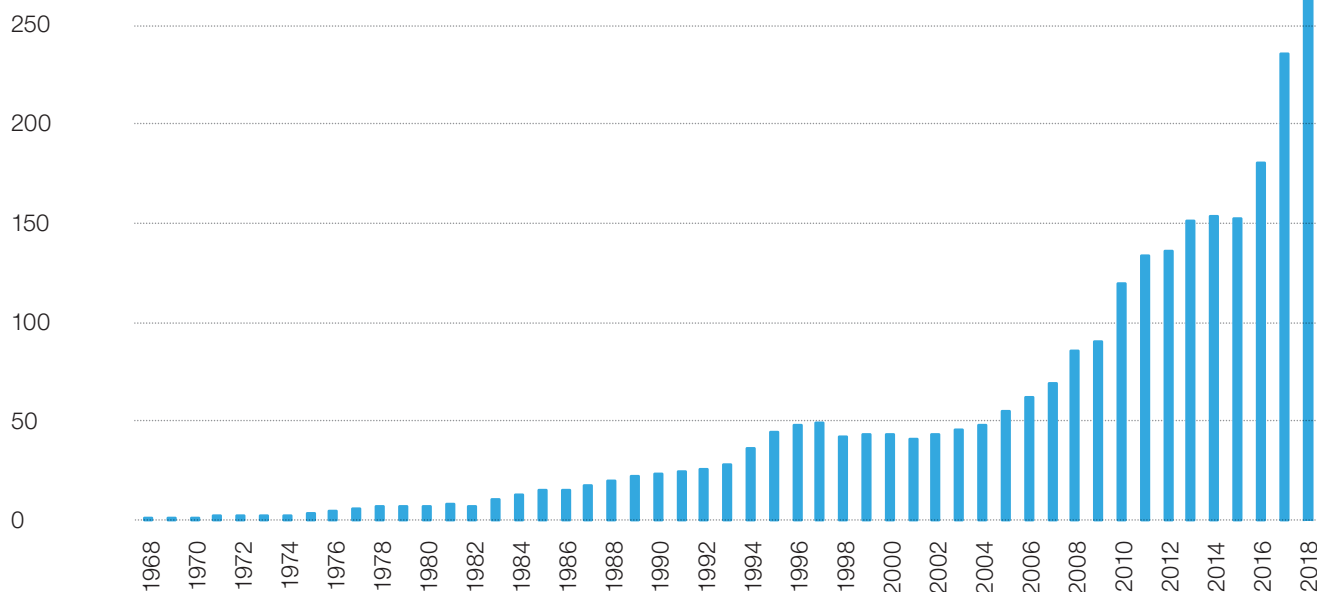
SS FLOAT UNIT
ASSEMBLY



Revenue (£m): 1968–2018

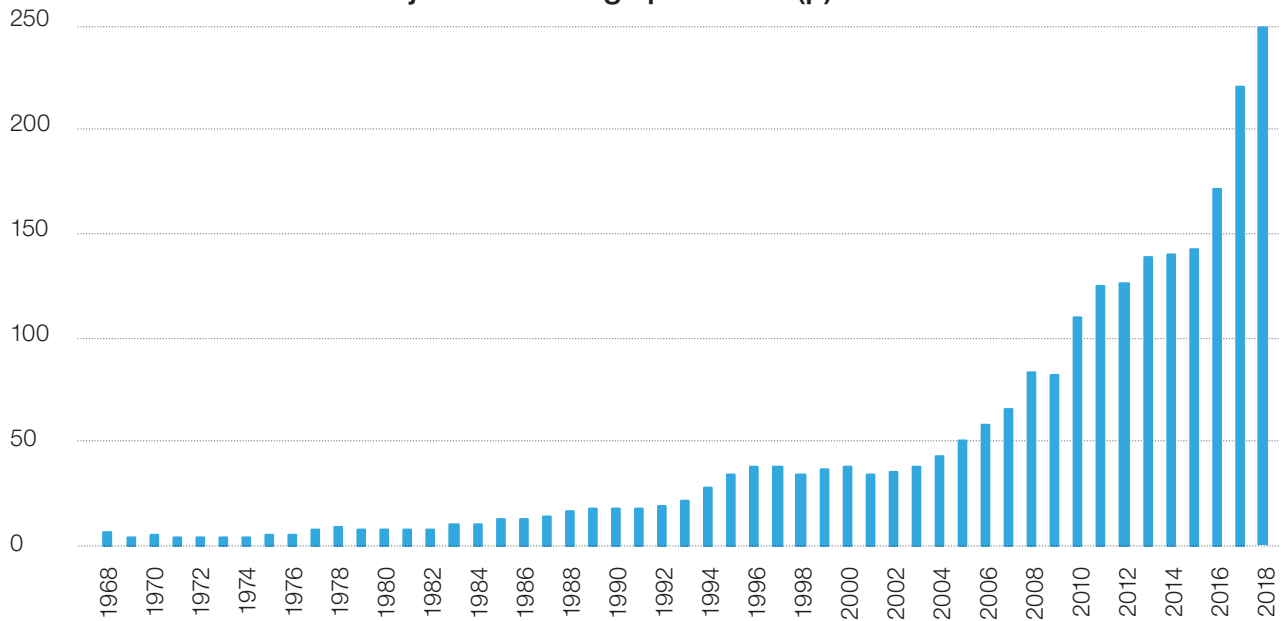


Adjusted operating profit (£m): 1968–2018



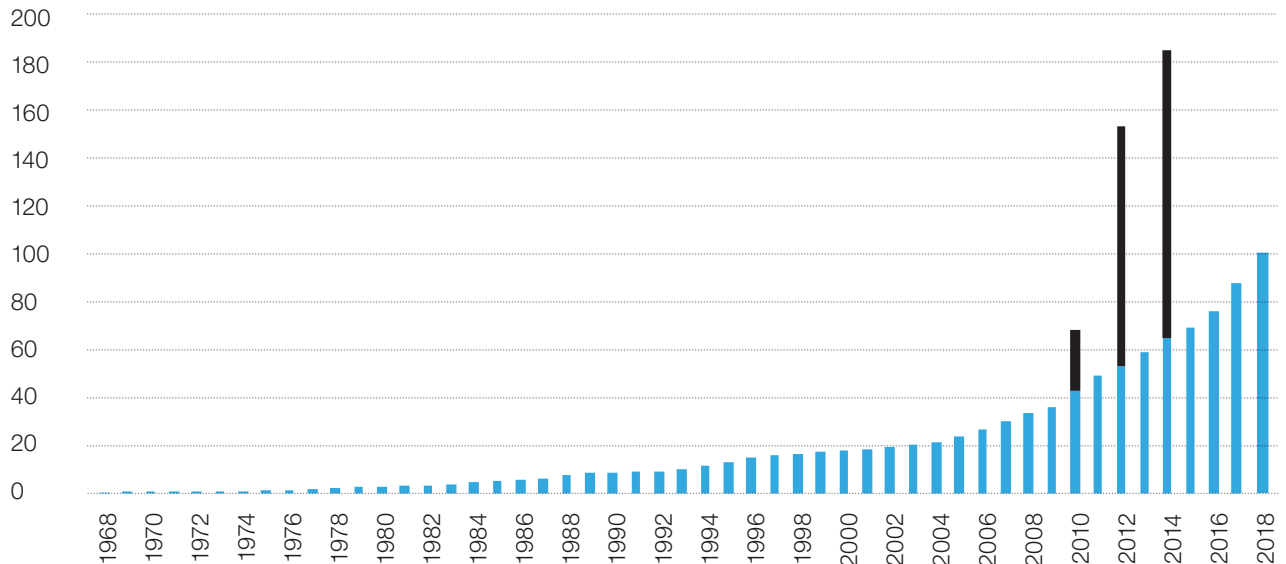
Note: 1968–1981 profit restated to reflect the latest basis for calculating adjusted operating profit; 1982–1990 profit as restated in 1991, to reflect the changes in accounting policy for subsidiary undertakings in South America that experienced a high level of inflation and currency devaluation; 1992–2003 as reported, operating profit excluding exceptional items; 2004 onwards, as reported adjusted operating profit.

Adjusted earnings per share (p): 1968–2018



Note: Adjusted earnings per share restated to take account of rights and scrip issues and share consolidations.

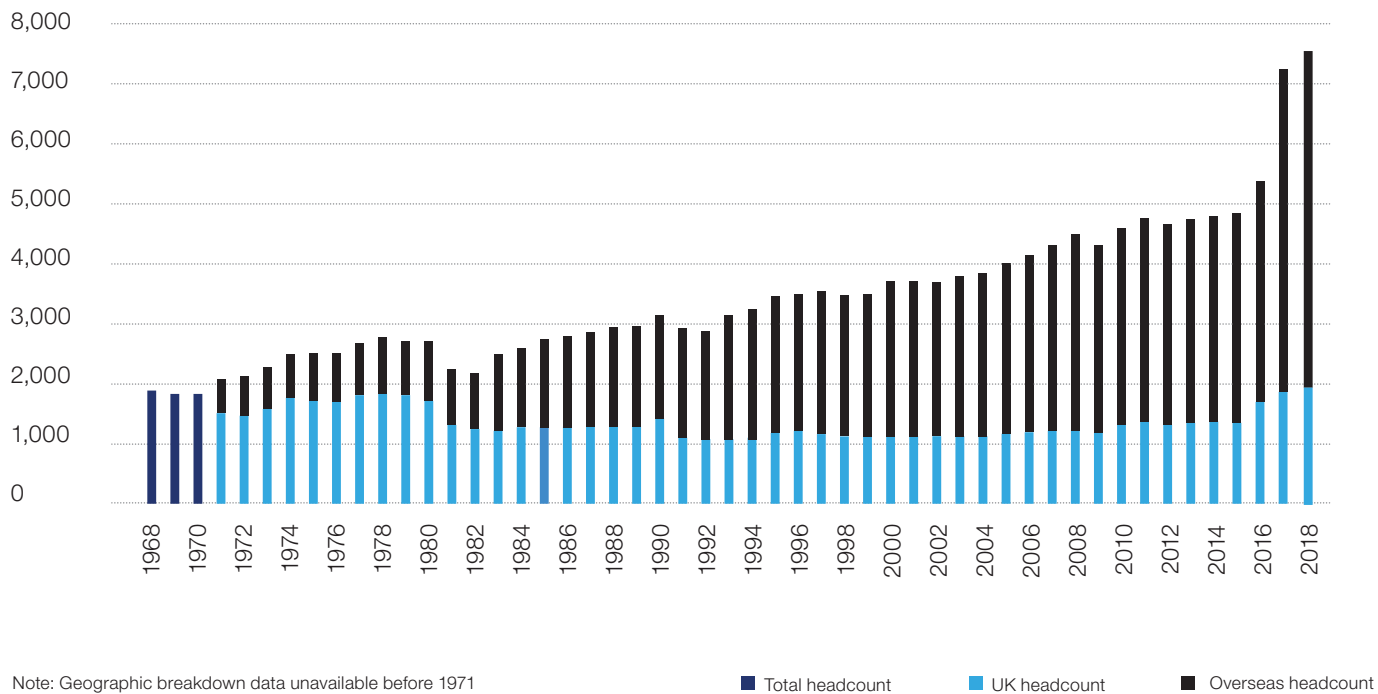
Dividends per share (p): 1968–2018



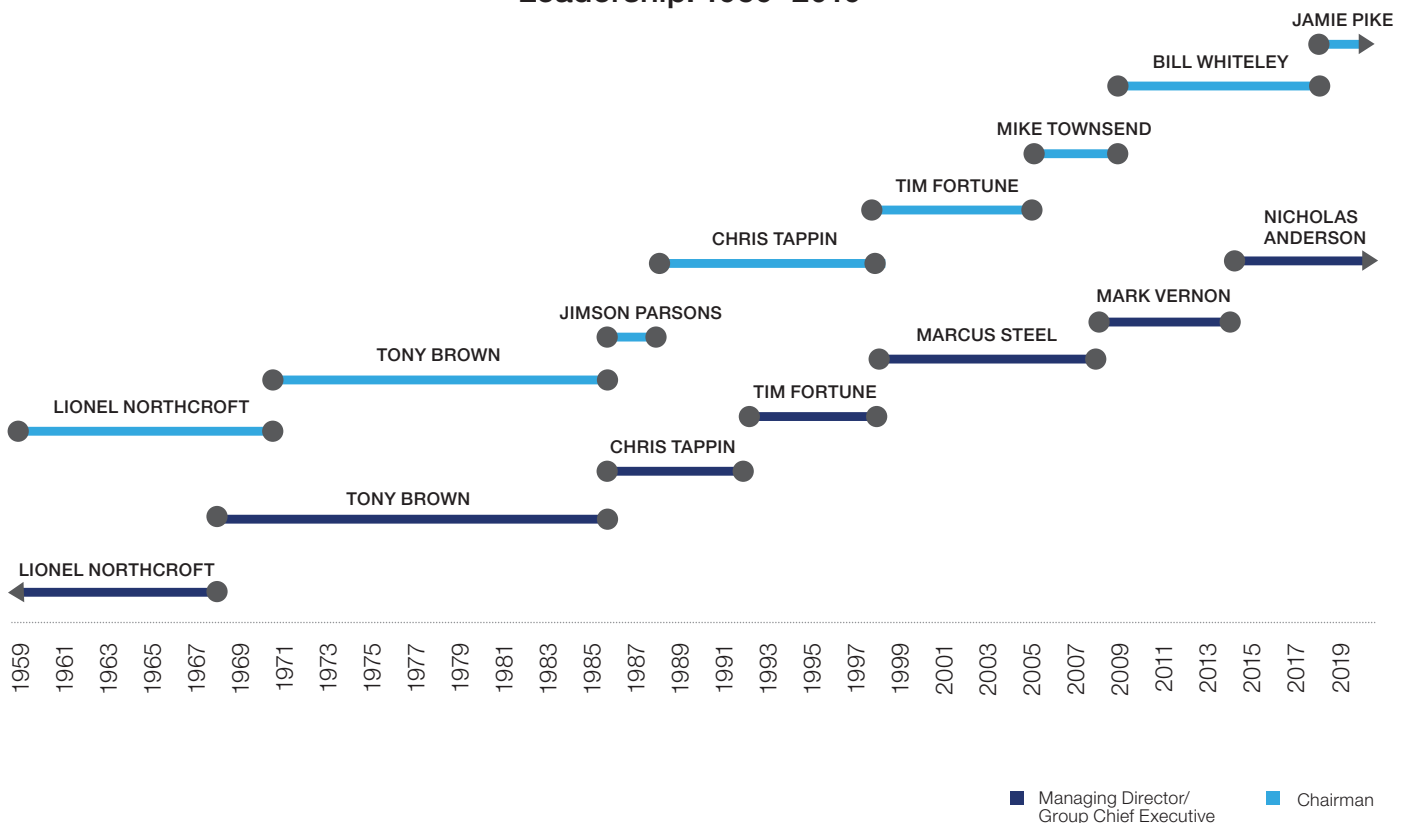
Note: Dividends per share adjusted to take account of rights and bonus issues.

■ Dividend per share ■ Special dividend

Employee headcount: 1968–2018



Leadership: 1959–2019



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