

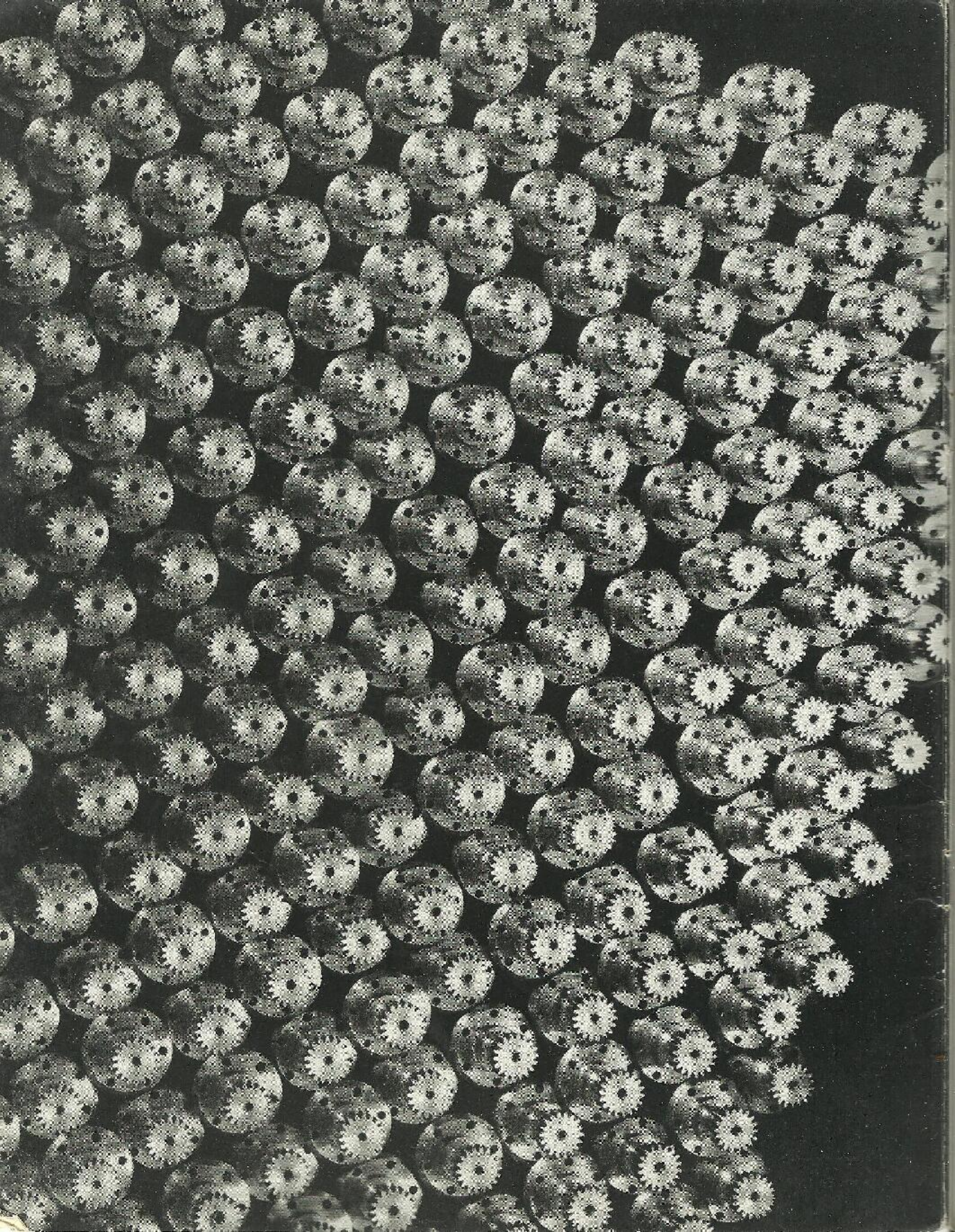
THE MONOTYPE RECORDER

VOL. XL
NO. ONE

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'MONOTYPE' MACHINES IN THE MAKING



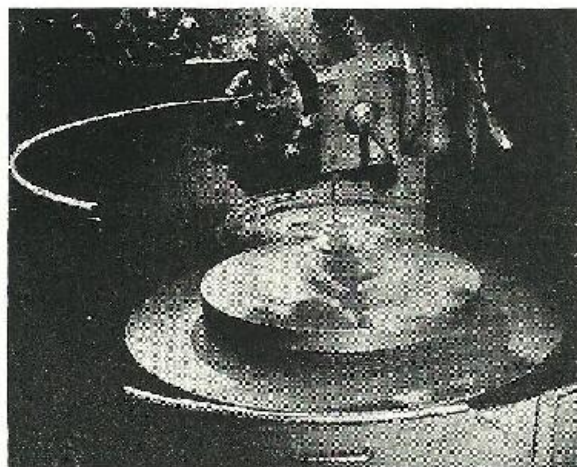
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THE MONOTYPE RECORDER

VOLUME 40 SPRING 1953 NUMBER 1

'MONOTYPE' MACHINES IN THE MAKING

SHOWING A FIRST SELECTION OF PHOTOGRAPHS
RECENTLY TAKEN AT THE MONOTYPE WORKS
AT SALFORDS, SURREY



LONDON

THE MONOTYPE CORPORATION LIMITED

1953



'MONOTYPE' MACHINES IN THE MAKING

The train from Victoria or London Bridge passes under the rampart of the North Downs through the Merstham Tunnel, and the view from the train-window changes: neat suburban gardens give way to the fields and farmlands of the Surrey-Sussex border. Here, in ancient times, the Great Weald sheltered in its forest-glades the Men of Thor—the primeval Back-room Boys who knew the momentous secret of forging iron. At Horley the triple moat of Thunderfield—Thor's field—still encircles the vestiges of a primitive smelting-trough.

But the iron-workers moved to the North, and the forest that had given them fuel and shelter vanished with them. In the first year of this century the hamlet of Salfords, just north of Horley, consisted of a cluster of farms. Very few people realized that it was about to take its place on the industrial map of the world. The Men of Thor were returning to it in a new guise. Brick-makers were gouging out the great pit which is now the tree-fringed lake at the centre of the Monotype Works: and the bricks made of that local clay were rising in solid factory walls. Tolbert Lanston's invention, the first and only successful solution of the problem of setting and justifying single types mechanically, had passed its thirteen-year period of incubation and was ready for the Trade. In 1897, when all had seemed lost—when the American inventors and promoters of the machine had poured out the last of their funds and seen their factory destroyed by fire—British capital had rallied to the rescue. The newly-formed Lanston Monotype Corporation¹ of London had purchased from the Lanston Monotype Machine Company of Philadelphia the entire rights of the new machine for every country in the world outside North and South America. Before the first year of the twentieth century was ended the British company had built that nucleus of its Works in which it was to manufacture, from the start, all its matrices and moulds and to which, as time went on, it was to add more and more manufacturing facilities with the object of producing the entire machine in England.

¹ Its present title, The Monotype Corporation Ltd., was adopted in 1931.

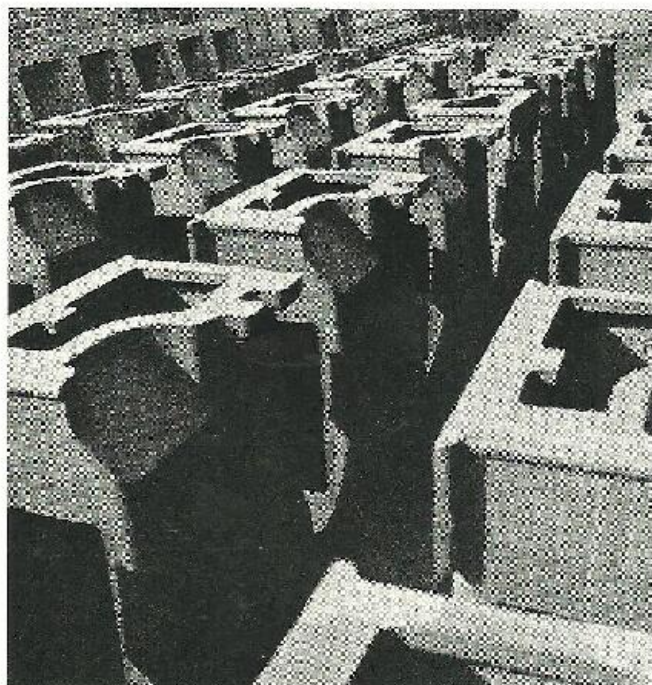


Fig. 1: Large iron castings "ageing" in store for long periods

That latter object was achieved just thirty years ago. The First World War had put heavy and sudden demands upon a Works that was even then noted for the speed and efficiency of its precision-work, and the ending of that War found those Works so greatly expanded and so well equipped with machine-tools that the original Works Manager, the late Frank H. Pierpont, could entrust to the present General Manager of the Corporation, Mr. E. Silcock, the responsibility for organizing the new programme of "all-British manufacture" of 'Monotype' machines, as well as the development of the display-size potentialities of the invention for which the advertising side of the Trade had begun to clamour.

To anyone who alighted thirty years ago at the then new railway station of Salfords, the view from the platform would be familiar today, save for the large sign "Monotype Works" (designed by the late Eric Gill, A.R.A.) which is now so well known to travellers



Fig. 2: Part of the new Power House

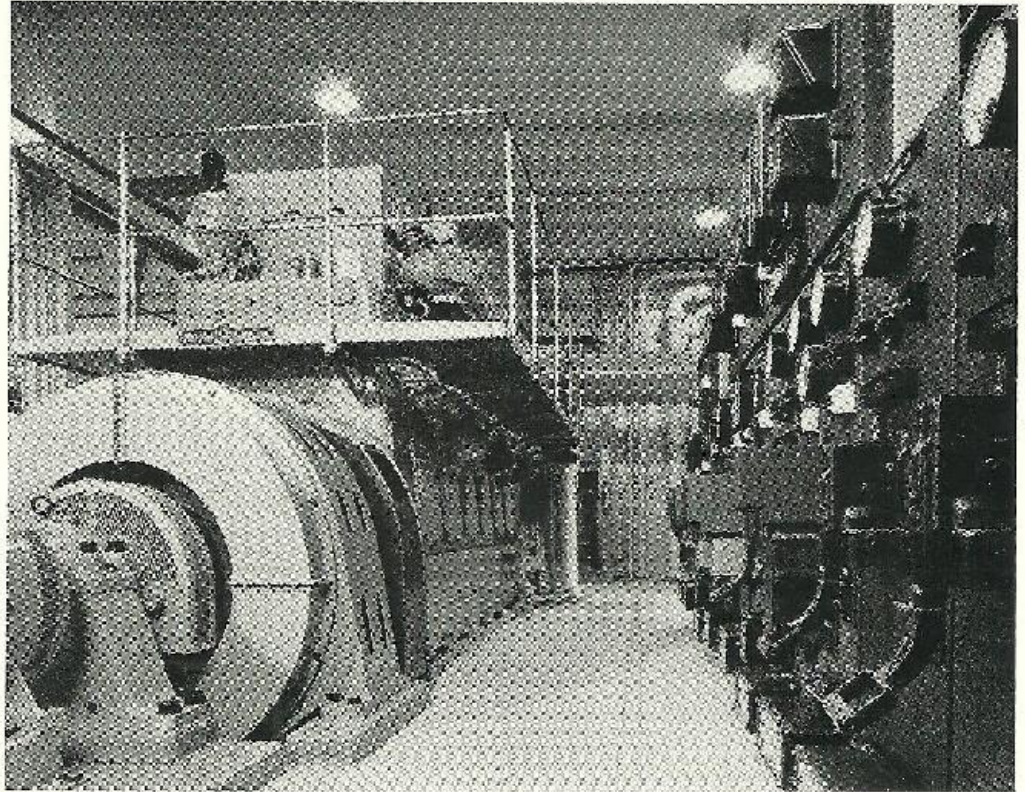
Fig. 3: Waste Heat Recovery Plant and Central Heating Boilers in the Power House

on the Brighton line. Behind it stretches the same foot-path through broad acres of playing fields and tennis courts. The path skirts a pleasant Club-house and Sports Pavilion (built in 1929), crosses the wooded track that was the Old Post-road to Brighton, and enters the Works proper by its West Gate—to reveal at once what immense expansion has taken place in three decades. At the left one can see the large new buildings in which the Matrix-cutting Department is about to step-up its output; behind that the new Technical Building

looms high, and scarcely older than that is the 35,000-square-foot span of the New Machine Shop. At the end of the vista from the West Gate, where the road divides, stands the new Power House (figs. 2 and 3) which has made the Works practically independent of the national grid and where the "waste heat" engendered in the making of electrical energy is recovered for the hot-water supply of the washrooms and canteen.¹

Lining this roadway lie the cast-iron caster and keyboard bases laid out to "rust", which means to rest and toughen after casting, under the influence of the sun and rain. Thor's Men know that cold iron cannot be hurried: but each day certain of these bases, coming to the head of their outdoor queue, are lifted by steel fingers and plunged into the cleansing acid-bath. One such familiar shape you see emerging, in our frontispiece, stripped of its thick orange crust and ready to make its gradual way to the Assembly Section, toward which hundreds of other manufacturing-routes are simultaneously converging. Nearby is the shed where that caster-base, and many other parts, will receive their successive coats of gleaming battleship-grey enamel finish—the livelier livery that distinguishes them at first glance from "pre-war" machines. It is a significant distinction to the printer, for the post-war machines,

¹ For an illustrated description see the August, 1952, issue of *Gas and Oil Power*.



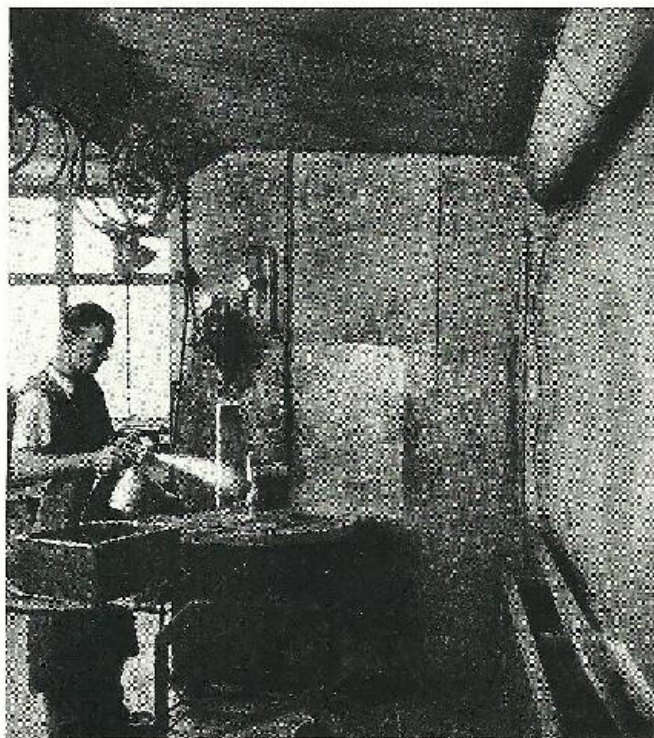


Fig. 4: Spraying 'Monotype' parts with paint, using the latest type of water curtain spray booth

with their 14-row keyboards and 251-character matrix-cases, represent an important increase in versatility and productivity.

Where the roadway divides at the Power House the path to the left leads the visitor toward those parts of the Works in which the operations of punch-cutting and matrix- and mould-making reveal to designers and laymen what complexities lie behind the creation of a type face. Those will be described in a later issue: here we are to take the right-hand road, past the Canteen building where some 1,200 employees are served with hot meals and past the Carpenter's Shop, of which there is a glimpse in the last-but-one illustration (fig. 27)—and on to the New Machine Shop, for our object is to see something of processes that go to the making, complete to the last nut and bolt, of all-British 'Monotype' keyboards and casters.

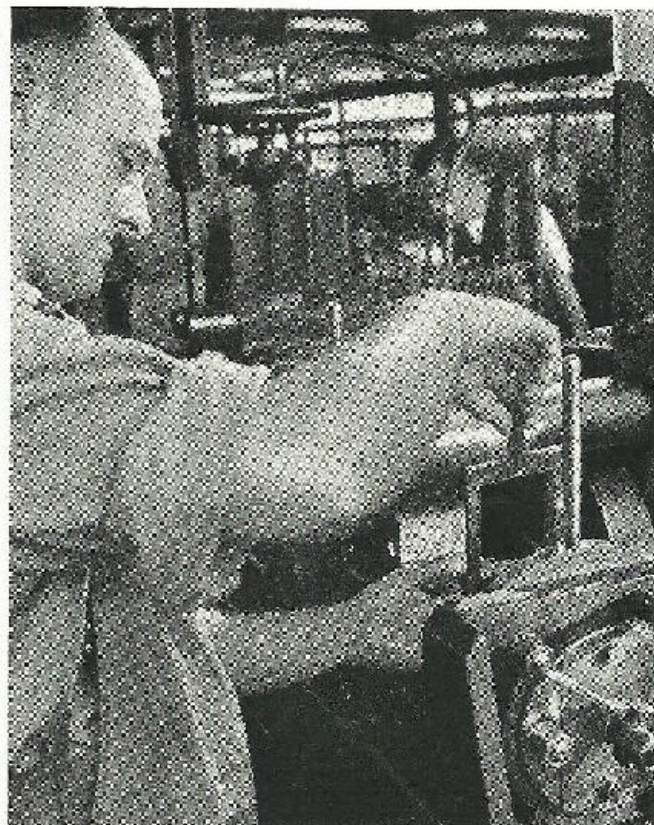
Famous engineers have visited these Works, and their descriptions of the special machines and methods which they came to see would, if reprinted here, more than fill these pages with details and diagrams.¹ But

¹ *Machinery*, the well-known journal of metal-working practice and machine tools, last year devoted no fewer than five full-length illustrated articles to various important mechanical developments and new methods used at the Corporation's Works (issues of Nov. 22, 1951, and March 20, April 10, April 24 and May 8, 1952).

most of the hundreds of visitors who come here in the course of a year (many from distant lands) have no such eagle eyes for technical detail. It is enough for them to know that the processes which they are witnessing do represent quite extraordinary engineering achievements in the way of precision production by mechanical means. That is a vastly more complex and difficult undertaking than any known to the hand-craftsman, for a machine—even of the most intricate and delicate design—cannot think.

That means that the manufacturer is entrusting to automatic machines operations which in handcraftsmanship would have been controlled and directed by a critical human brain—the brain which signals "stop" to its skilled hand at the instant of recognizing that there has been some almost imperceptible falling-away from the standard of precision. Machine manufacture to watchmakers' standards of accuracy begins with the design of machine-tools to make the sort of tools—jigs, cutters, grinders and the rest—that will perform their work for a fairly predictable length of time within an accuracy-tolerance of a fraction of a thousandth of an inch. But because that length of time cannot be absolutely predicted, the whole success and economic validity of this kind of manufacture depends upon scientific

Fig. 5: Production milling matrix-cases to precise limits



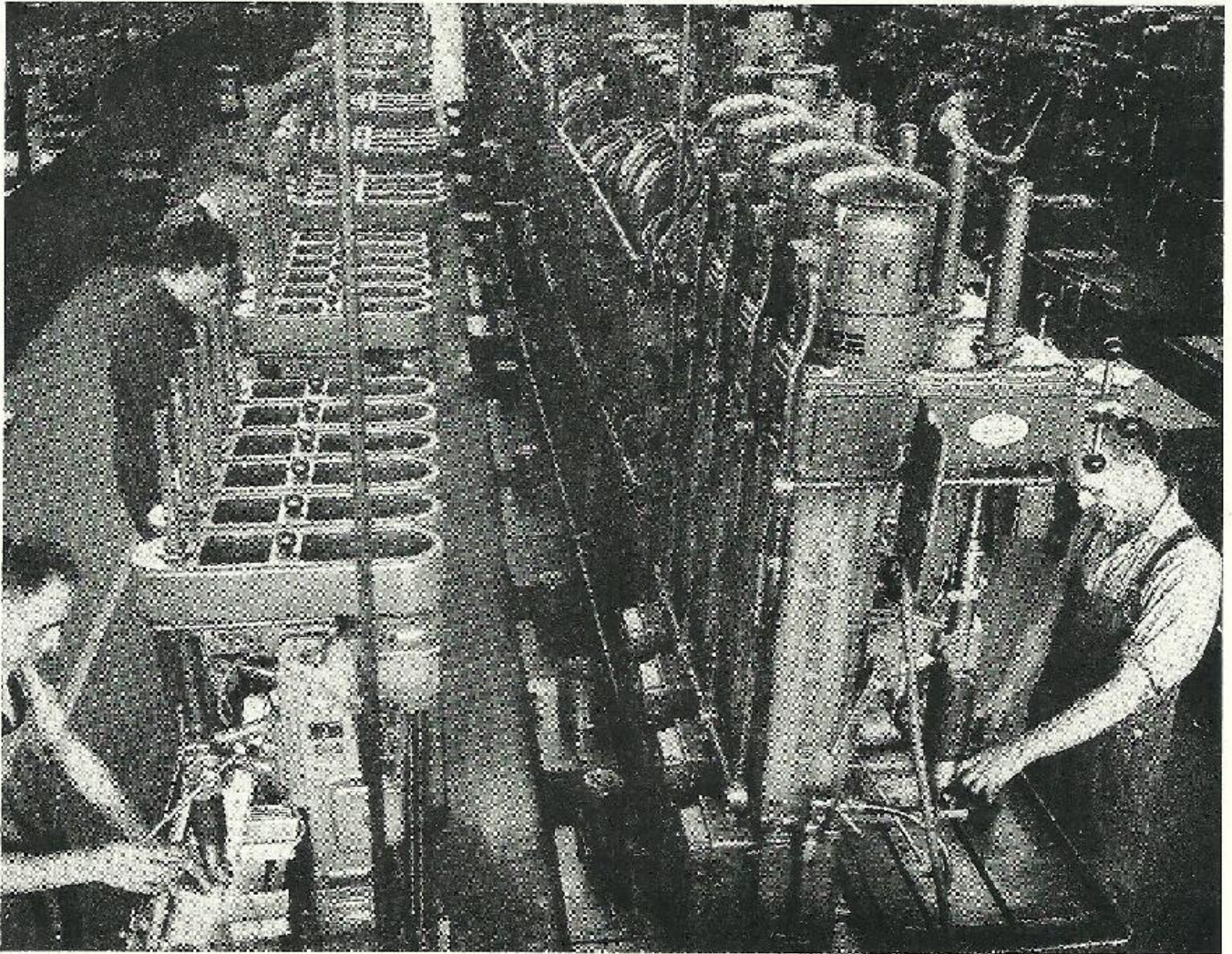


Fig. 6: A view showing part of the large drilling section engaged in the manufacture of 'Monotype' parts

inspection at frequent and regular intervals. At the Monotype Works today, operations can "go wrong" as they can wherever metal cuts metal; microscopes (and machines more searching than microscopes) can show up errors that mean rejections: errors which, until the mechanism is halted, are bound to be repeated automatically. The human craftsman can have his off-moments, see his flaw, toss aside his failure and feel spurred to better work: the machine can only go on doing what it is doing. What matters is that at these Works no mechanical operation can continue to turn out a product that is doomed to rejection for more than a few minutes—thanks to a system of inspection that has been as carefully plotted as any of the creative operations. The important saving of cost and gain in productivity thus ensured have been "passed on to the customer" during these recent years when all the raw

materials used in the machine, and all costs of skilled labour, have steeply risen.

The metals used in each one of the many different parts of 'Monotype' machines and their attachments are chosen and scientifically tested to ensure long-term performance to the highest possible degree of accuracy. Many thousands of separate precision operations go to the machining, finishing and assembling of these parts, which range from heavy castings down to minute but exquisitely-tooled screws and bolts. In the New Machine Shop, the first great area that the visitor sees of the total of well over 100,000 square feet¹ devoted to the "machine" side of the Works activities, one looks across a glass-ceilinged vista of activity. Here, producing the lighter parts, are about half of the

¹ The Matrix-making side, together with the Mould-making Department, now occupy over 43,000 square feet of floor-space.

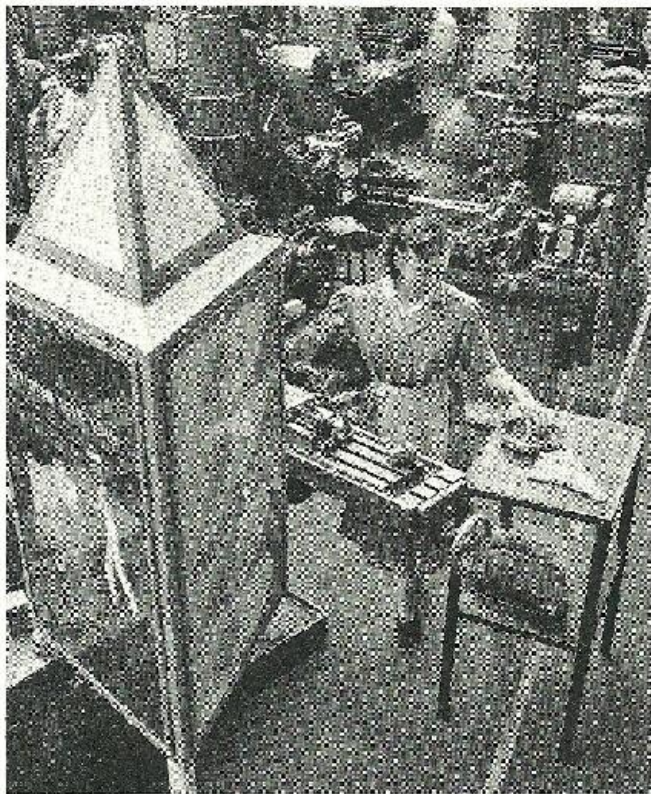


Fig. 7: Safety and cleanliness publicised by means of posters in one of the machine departments at the Monotype Works

50,000 fixtures, jigs, cutters and gauges, many of which were specially designed and built for their microscopically precise tasks.

Here are machines planing strips of steel to predetermined lengths and thicknesses; semi-automatic capstan lathes; gear-generating machines, and others which rough and broach matrix-cases with mathematical precision (fig. 5). At the right distance from every group of operations is its inspection bay: scores of trained inspectors stand on instant guard between the possibly-imperfect part and the printer, to whom the breakage of that part might spell a costly delay. Further on are milling machines; drills; lathes cutting small parts out of steel bars as swiftly as a knife cuts through butter; milling and grinding machines. Steel fingers snatch and twirl a bar of metal under a torrent of cutting-oil, presenting and withdrawing it in turn from this and that tool-edge.

By this time the visitor will be consciously noting the one thing which is most likely to remain in his mind as a general impression after his tour and the one matter on which he is most likely to comment, whether or not he happens to be familiar with the problems of modern factory production. It is the "almost incredible tidiness and neatness" of every section of

these enormous shops that first of all evokes exclamations from those who are passing through them for the first time.

To the practical printer, no less than to the specialist engineer, this speaks of efficiency and good planning, with strong "corporate pride" behind it. The visible presence of dust and dirt, or the neglected accumulation of metal-filings, waste or oil-splashes, must of course jeopardize accurate manufacture and expose skilled men to needless risks. So tidiness and cleanliness always "pay". But there is more to them than that. When they shine out so clearly as to call forth praise from men who have visited famous factories in four continents, then they represent something more than mere negative precautionary measures. They begin to reveal a corporate frame of mind, shared and understood by every man and woman and young trainee in the organization: a frame of mind in which the mere sight of any evidence of negligence or apathy is psychologically revolting. The brooms that keep so active on these floors are not only preventing possible physical disasters or losses: they are also helping to maintain in skilled men's minds, and to foster in impressionable young brains, that healthy contempt for any sort of "mess",

Fig. 8: A young apprentice serves a period inspecting parts produced in the Production Shops

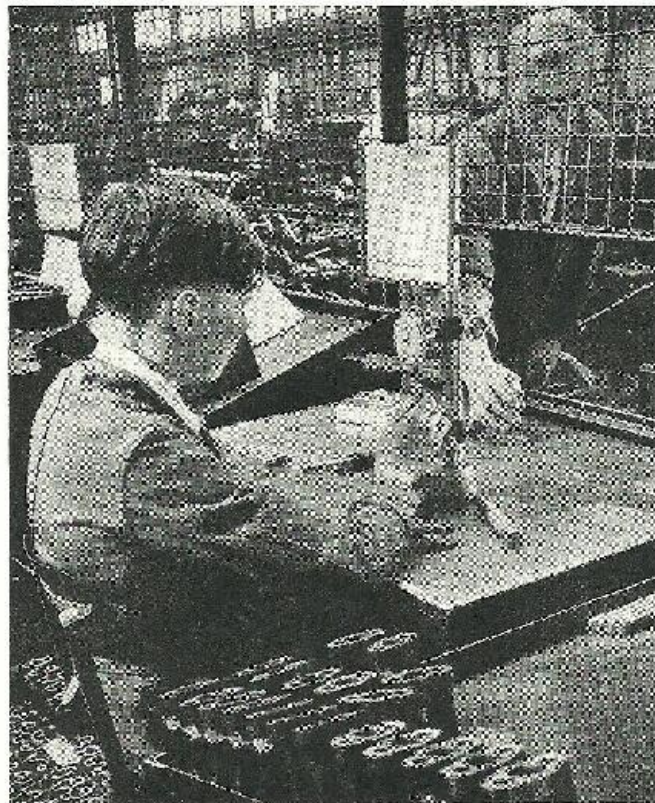






Fig. 10: Machine parts going to inspection

and for any tell-tale sign of easygoing neglect of little details, which is characteristic of the first-rate mechanic or engineer. Safety and Cleanliness, the two handmaids of Precision, are therefore exalted to an enthusiastic cult by workers and management alike; and the posters that preach these virtues appear, in this case, more like boasts of achievement than like warnings or rebukes (fig. 7).

A sloping ramp leads to the Main Machine Shop; near its end one may see the Running-in Shed where some ten casters at a time are undergoing their 100-hour final test and step-up to full production speed. After that they will be stripped down again for a final, searching inspection against any flaw that could have become perceptible only after actual (and gruelling) performance by the machine as a whole system of interacting parts.

There is another side-view along this passage from the New to the Main Machine Shops—one which can be counted upon to refresh and delight any lay visitor whose appetite for the sight of "steel fingers" at work may have been sated by what he has already seen. The double door at the top of the ramp, with its safety push-bar, gives no hint of what lies behind it. The visitor would not be startled to find himself looking into the Laboratories where steels are x-rayed, or one of the Drawing Offices, or the huge Casting Stores, or any other one of the outbuildings and special departments that surround a great modern factory. What he actually sees and hears if that door is swung open is a large neat henyard, part of the Farm which keeps every part of the Corporation's 90-acre site productive.

Fig. 9 (opposite): One of the many Inspection Bays

The denizens of that yard stare back at the visitors with what seems like mutual amazement: then the door swings to again and old Mother Nature hands back the party to the new Men of Thor.

The Tool Department through which the visitor enters upon the main Machine Shop is in a sense the inner shrine of the goddess Precision whose presence dominates the Monotype Works. Here are manufactured the jigs, fixtures, cutters and gauges that will be used in the manufacture of various components. These tools assist in maintaining the needed accuracy—often to a limit of less than .001"—required to ensure a perfect fit in the complete machine and to make replacement parts absolutely interchangeable. Fig. 11 shows one of the main machine tools on which tungsten-tipped steel cutters machine components with consistent accuracy.

In the Main Machine Shop are massive presses and other machines stamping-out and finishing keybars and other parts—again with inspection bays strategically disposed. In one corner are stored the gaily-coloured keybuttons for all the different alphabets of Latin and non-Latin (e.g. Arabic, Greek, Hebrew, Indian Vernacular) scripts of the literate world (figs. 19 and 20). Nearby are the stores where 10,000 or more parts must be ready for special replacement demands or for the

Fig. 11: A milling cutter being carefully reground in the Tool Room



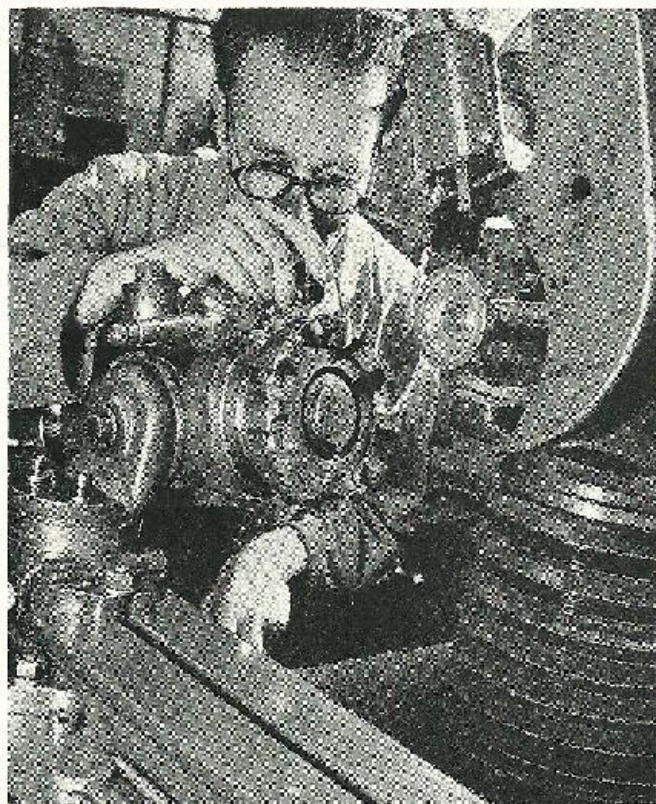


Fig. 12: The precision diamond lapping of one of the latest hard metal milling cutters



Fig. 13: Experienced operator using measuring comparator to detect errors down to a quarter of one ten-thousandth part of an inch during blade manufacture

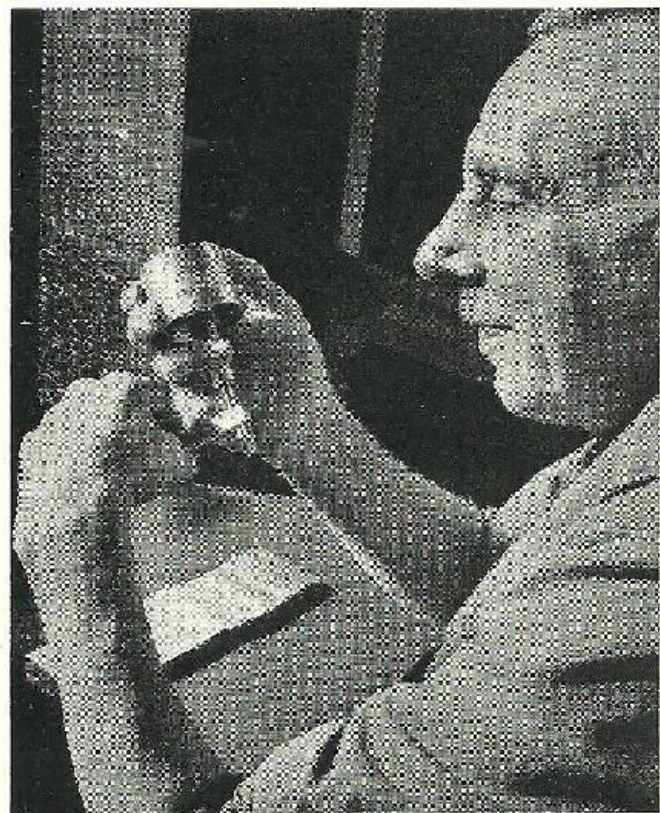


Fig. 14: Sensitive fingers read a Braille micrometer

normal demands of "Assembly", further down the room. There, all production-roads converge: there part is fitted to part, section to section—never without vigilant inspection—until the whole keyboard or caster is ready to "come to life" as a working machine, ready to satisfy the most scrupulous professional "critics" that it will give many years of dependable performance.

Every 'Monotype' keyboard must prove to its makers that it cannot be speed-jammed by even the most phenomenally nimble fingers. Every 'Monotype' caster must prove that its maximum recommended casting-speed (which may be as fast as three characters a second) is not in fact a speed that would risk the danger of an imperfect product. The reputation of the Monotype Corporation has been built up, during the past fifty years, by performing specific promises. The machine is in effect, to every new or potential customer, a *promise*—of wider composing and casting versatility, more intensive hourly output round the clock, greater accuracy (thanks to the unit system) and also longer trouble-free performance under difficult conditions, than he would have thought possible without hearing the

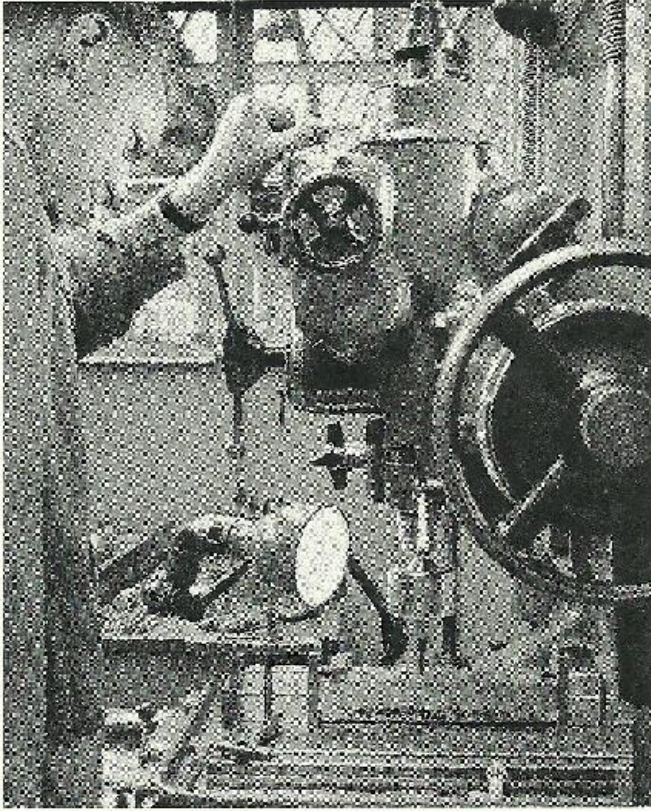


Fig. 15: A fine boring operation in the Tool Room

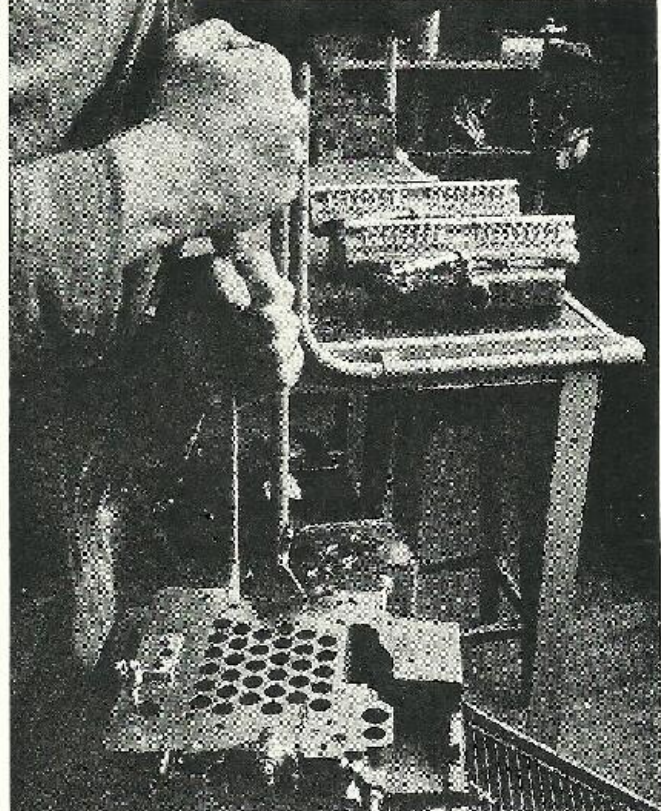
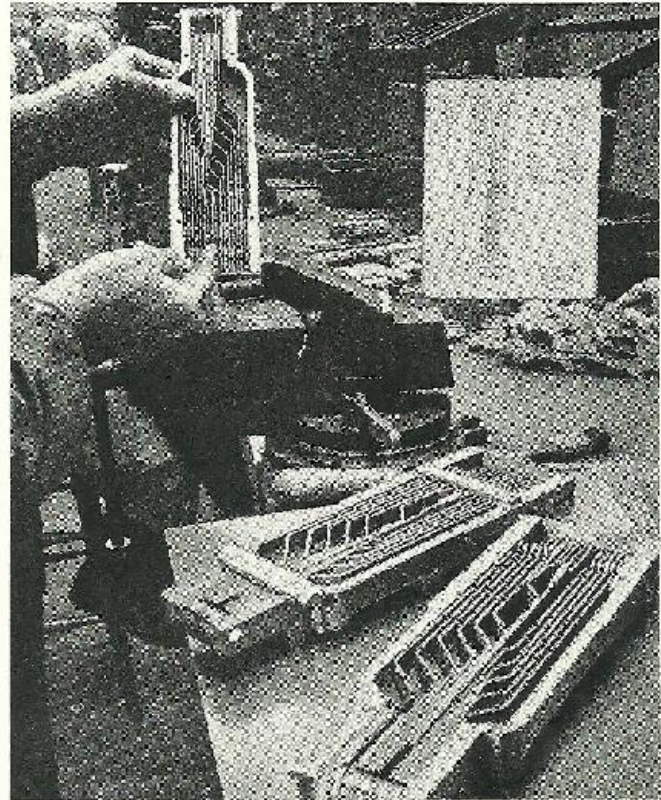


Fig. 16: Fitting keyboard piston blocks during final assembly
Fig. 17: Stopbar cases being assembled

testimony of other users. Here at the Monotype Works a staff of some 1,600 men and women are concentrating on the one complex task of making certain that the astounding promises first made to the Trade by Tolbert Lanston and his colleagues nearly seventy years ago, and constantly enhanced in the interval, shall stand true in every printing office that has taken the great twentieth-century leap into mechanized single type composition.

The keyboards and casters, having passed their final tests, are then prepared for what may be long journeys across storm-tossed seas or through tropical jungles. The new method of wrapping them in air-tight sheaths of plastic material (fig. 26 and back cover) was pioneered by the Corporation: it has carried, along with the machines, a little of "the very air of England" to many a remote land. The distant journeys of some of the machines will take them beyond the frontiers of the roman alphabet. Facing page 10 you can see part of the Stores and Assembly section where keybuttons of many non-latin alphabets including Greek, Hebrew, Cyrillic, Devanagari, Tamil, Bengali, Arabic and others are ready for immediate fitment. Delicate parts are now dipped for protection in a plastic solution. Insecure casing might "break the promise" *en route*: in the nearby Carpenter's Shop skilled joiners are at



work on the stout, well-designed boxes into which certain parts—and those jewels of precision which are the Moulds—can travel across the world in safety. Here, after our pictorial tour of so many machines, we leave the reader amongst the products of an older and timeless world—that of human craftsmanship. When the tour is resumed, in a later issue, we shall see another aspect of that older world as it is linked to modern precision-tooling, for the intricacies of punch-cutting and matrix-making would be meaningless without the eye of the artist and creative designer.

The full-page photograph on page 14 portrays one of the oldest active employees at the Monotype Works. "Teddy", as he is affectionately known to his colleagues, is a master craftsman whose skill at joinery will be exhibited for many years to come, in the handsome paneling, shelving and fitments of the Technical Library which is an admired feature of the new Technical Building in which many of the executive offices are housed.

But as Mr. Guy Gravett's camera has already revealed it is not only the Workers of Wood whose faces and hands are moulded and dignified by years of dedication to high craftsmanship. The pictures on these pages represent a photographer's spontaneous comment

Fig. 18: Some of the thousands of carefully preserved parts kept in store being withdrawn for use

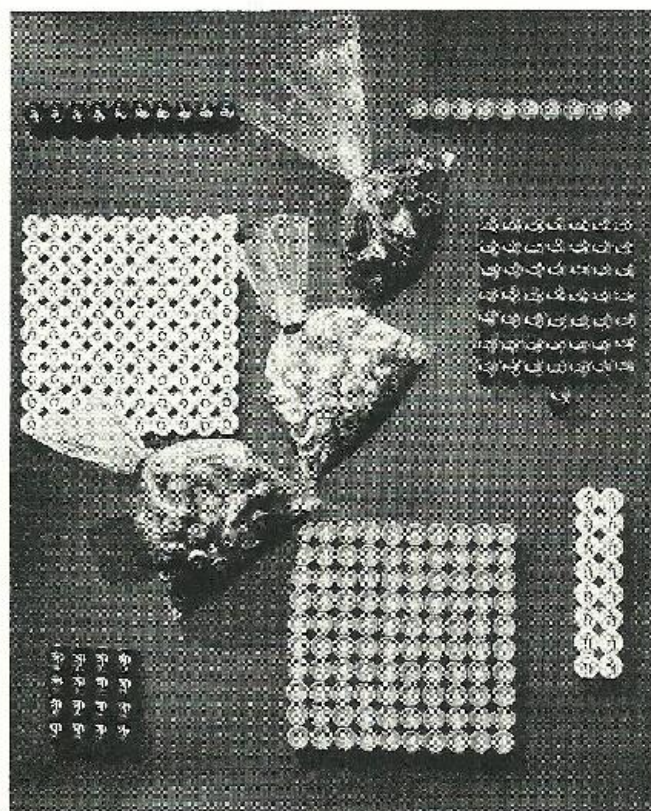
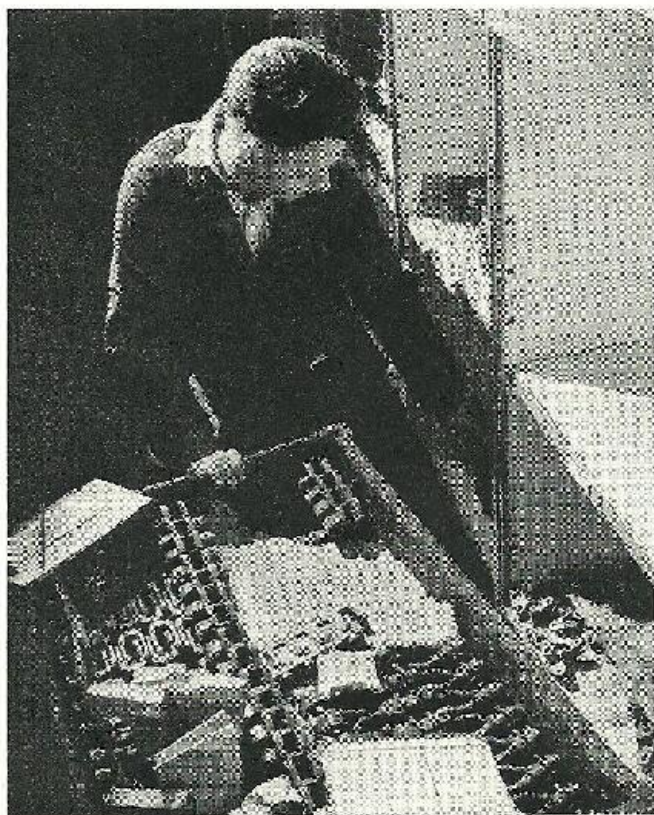


Fig. 19: A few of the thousands of keybuttons, representing many languages, kept in stock

on what happened to appeal to his eye as he passed through those parts of the Monotype Works with no prompting or direction from his hosts, and with none of those anxious preparations and posings which so often take the life out of industrial photographs. They are views, not simply of machines, and certainly not of employees singled out as individuals, but of activities involving human minds and mechanical force in combination—activities only momentarily interrupted for the camera's sake. Hence they show, incidentally, how far one can look beyond the recognized fields of hand-craftsmanship to find the same unmistakable cast of countenance—the look of vigilance and pride-in-craft—that distinguishes the skilled worker at any trade.

In one department, however, a factual record on the film turned out, in the print, as that rarest of events in professional photography: the picture which by sheer coincidence lifts real life into the artist's realm of imagination. The illustration on our front cover shows an operator manipulating a machine that presses display matrix blanks accurately to size. But on the Perspex window of the safety-guard of the mechanism, the

Fig. 20: Part of the keybank button store





Fig. 21: Progressive final assembly of keyboards

watchful reflection takes on the quality of Allegory. A "component" is being manufactured—but not for any common or worthless object. It is being made for a machine which will itself be a "component" of that vast pattern of activities which is the Printing Trade—the indispensable servant of the arts and sciences,

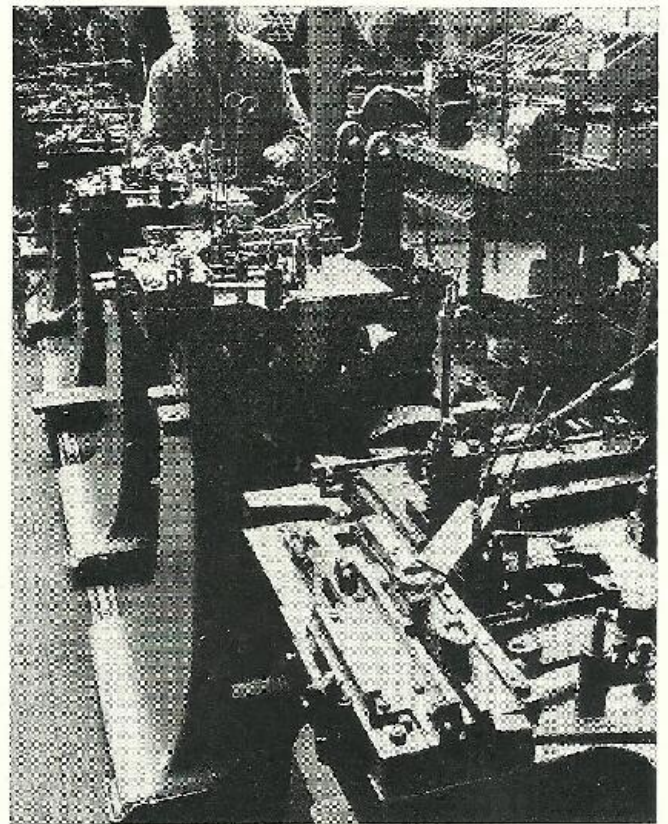
Fig. 22: Keyboard piston block bases being "piped-up"



and of every other human activity in our free Western Civilization. That Civilization stems from the invention of the Alphabet, which, by making it easy to learn to read and write, made possible the ancient Athenian—and the modern—concept of Democracy. Athena of the Parthenon still looks with grave vigilance upon all responsible workers who contribute to the enormous tasks of the Alphabet, and keeps them aware of the dignity and ultimate significance of what they do.

Machines and human beings supplement and complement each other because they are true opposites. A machine starts its "career" at the top of its form and thereafter can but deteriorate and depreciate; an apprentice-craftsman starts at the bottom and gradually appreciates in value. A machine is "written off", a lad is "brought on". The mechanized devices of our ancestors look, to modern eyes, faintly ridiculous: not so the portraits of the men who invented or worked them. Skill, and responsibility for the repute of a great invention, shape the hands and faces of those who have worked long at Salfords, no less now than in the day of the prehistoric Discovery that underlies all engineering technique: the day when the Great Weald first echoed to the ring of Cold Iron.

Fig. 23: Progressive final assembly of composition casters with careful checking at each stage



'MONOTYPE' MACHINES IN THE MAKING

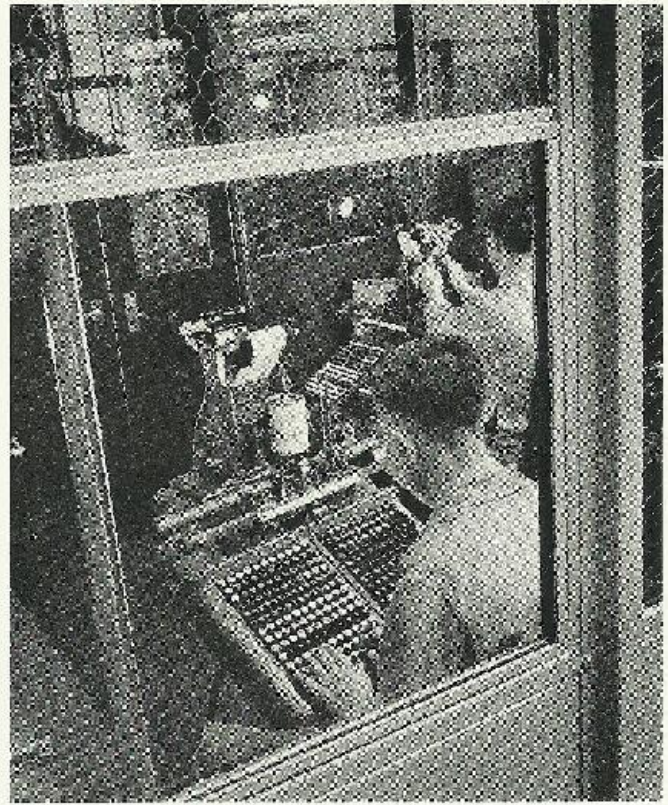
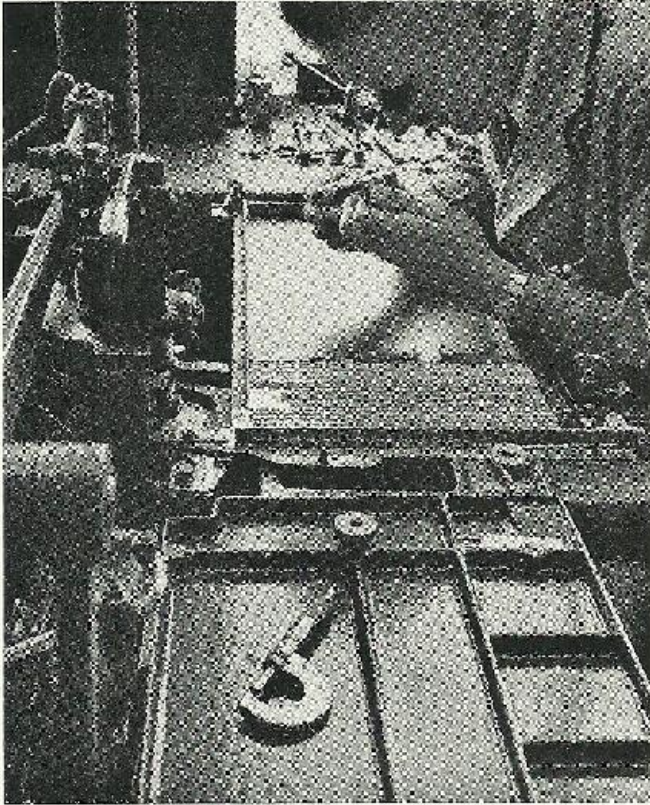


Fig. 24: Final test of completed castor under production conditions

Fig. 25: Final test of keyboard

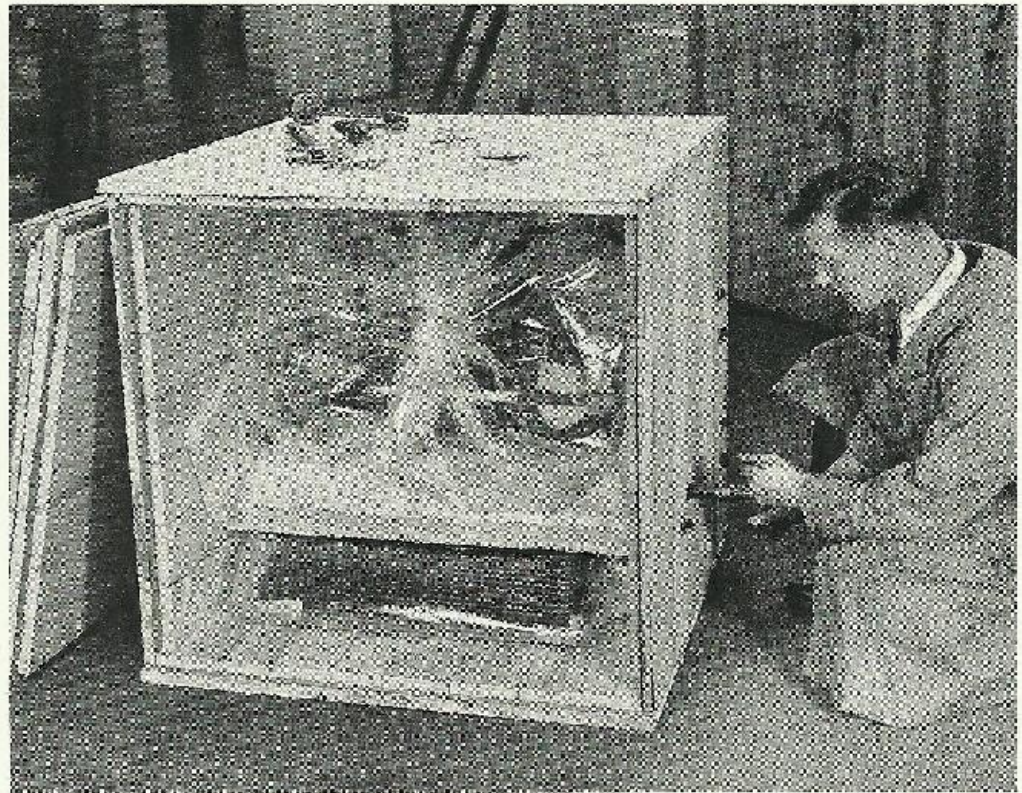


Fig. 26: A keyboard in its silica gel sheath



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Above: 'Monotype' Casters in their protective airtight sheaths of silica gel ready for crating and shipping to distant lands.

This number of THE MONOTYPE RECORDER shows you glimpses, recorded by the camera of Mr. Guy Gravett, of 'MONOTYPE' MACHINES IN THE MAKING. The text is set in 12 and 10 point 'Monotype' Goudy Modern, Series 249. Printed by Balding & Mansell Ltd, Wisbech, for The Monotype Corporation Ltd, London and Salfords, Surrey.