

**NEWALL PRECISION**

**A MATTER OF FACT**

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*Published to record the inaugural opening of the new Metrology and Standards Room at The Newall Engineering Company Ltd., Peterborough, England.*

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### *In the beginning . . . . .*

*To the majority of people, the mention of the year 1902 conveys very little of significance. This particular year saw the end of the Boer War, Scott's Expedition to the Antarctic and the establishment of the National Physical Laboratory at Teddington. To engineers, however, possibly the most significant happening during the year 1902 was the introduction, by Mr. John Walker Newall, of The Newall Standard Table of Limits.*

*Prior to this time considerable difficulties had been experienced in the supplying of replacement components that could be guaranteed to fit equipment for which they were intended and these difficulties were accentuated when equipment was sold overseas.*

*Mr. Newall was an engineer of considerable ability with a wide range of experience and skill and applied himself to the problems connected with*

*the assembly of components without the necessity of involved operations. After a great deal of theoretical and practical work The Newall Standard Table of Limits was evolved and established a basis for accurate machining that was without equal at that time. This system was quickly adopted by manufacturing concerns both in this country and abroad.*

*As a result of the introduction of The Newall System, The Newall Engineering Company became engaged in the production of precision gauges and measuring machines and it was this type of work which was to become the principal activity of the Company for a considerable period.*

*It is of particular interest to note that a Precision Linear Measuring Machine which was designed and built in 1910 is still in use with the Company and is still capable of measuring to an accuracy of 0.0001 in.*

*The adoption of a Limit System and the practice of working to limit gauges, so defining with absolute certainty the permissible margin of productive error and of variation from nominal size, became universal throughout the engineering industry. As with present day requirements, the standard of accuracy required, not only in interchangeable or repetition work, is so high that the employment of a reliable and efficient means of controlling sizes of components during operations of manufacture is imperative.*

*The advantages of the introduction of The Newall System were quickly appreciated and though*

*the initial expense of installation, in certain cases, may have appeared to be heavy it was proved conclusively that the economies effected by the reduction of production time, lessened supervision and inspection, eliminated judgment and guesswork on necessary size variation of components that had to fit together when completed and the avoidance of scrapped components very quickly compensated for any initial expense incurred.*

### ***Evolution . . . . .***

*During the considerable number of years that The Newall Engineering Company was engaged in the production of precision gauges and measuring machines, based on The Newall Standard Table of Limits, it was a natural evolution that the Company should embody a first-class Gauge Test House. Moreover, the Test House established was one of the very earliest test houses approved by The Aeronautical Inspection Directorate.*

*When The Newall Engineering Company was acquired by the late Mr. Sydney Player, father of the present Company Chairman, it was decided to change the Company's manufacturing programme and to engage in the manufacture of precision machine tools, as he foresaw an expanding market for such equipment, principally on account of the growth of the motor and allied industries in this country and abroad. The correctness of his judgment has been proved without any doubt.*

*This transitional period saw the Company move from London to its present location in*

*Peterborough and Mr. Sydney Player foresaw the necessity of incorporating a Test House and Standards Room which would embody the very latest equipment available in order to ensure complete control of standards, measurements and precision.*

*It was now apparent that the knowledge gained in the manufacture of precision gauges and measuring machines would be invaluable in the new production programme of precision machine tools. As a result, the Test House and Standards Room was to play a greater rôle in the Company's activities due to the more varied, newly adopted programme.*

*Under the joint supervision of the Technical Director and the Newall Group Chief Inspector, a wide variety of inspection equipment was installed and a series of special inspection procedures and techniques laid down in order to ensure that every stage in the manufacture of machine tools complied with a comprehensive series of test sheets.*

### ***The New Metrology and Standards Room . . . .***

*Not unnaturally, with the continued expansion of the Company and the necessity to maintain the already established high standards of precision, it has become necessary to re-house the Metrology and Standards Room, the siting of which has been carefully chosen in order to ensure that its location is as near as possible to the production lines. In this way the control of internal standards of measurement are more easily guaranteed and supervised.*

*The policy laid down by Mr. Sydney Player has been endorsed by the present Company Chairman, Mr. Denis S. Player, who has continually stressed the importance of the contribution to be made by the Metrology and Standards Room where the manufacture of high precision machine tools is concerned.*

*Resultantly, the instruments housed in the new Metrology and Standards Room are of a sufficiently wide variety to enable any type of test or measurement to be made to ensure that not only are the Company's machine tools built to the required standards of precision but also to ensure that the wide variety of customers' components that are to be produced by the machine tools will be to the customers' required specification. In some instances, the availability of equipment within the Standards Room facilitates the checking of a customers' components where comprehensive checking by a customer may not be possible due to the lack of similar facilities.*

*Standards of length and angle, calibrated or certified by The National Physical Laboratory or by The National Engineering Research Laboratory and special certified gauges and instruments are employed for ultimate reference.*

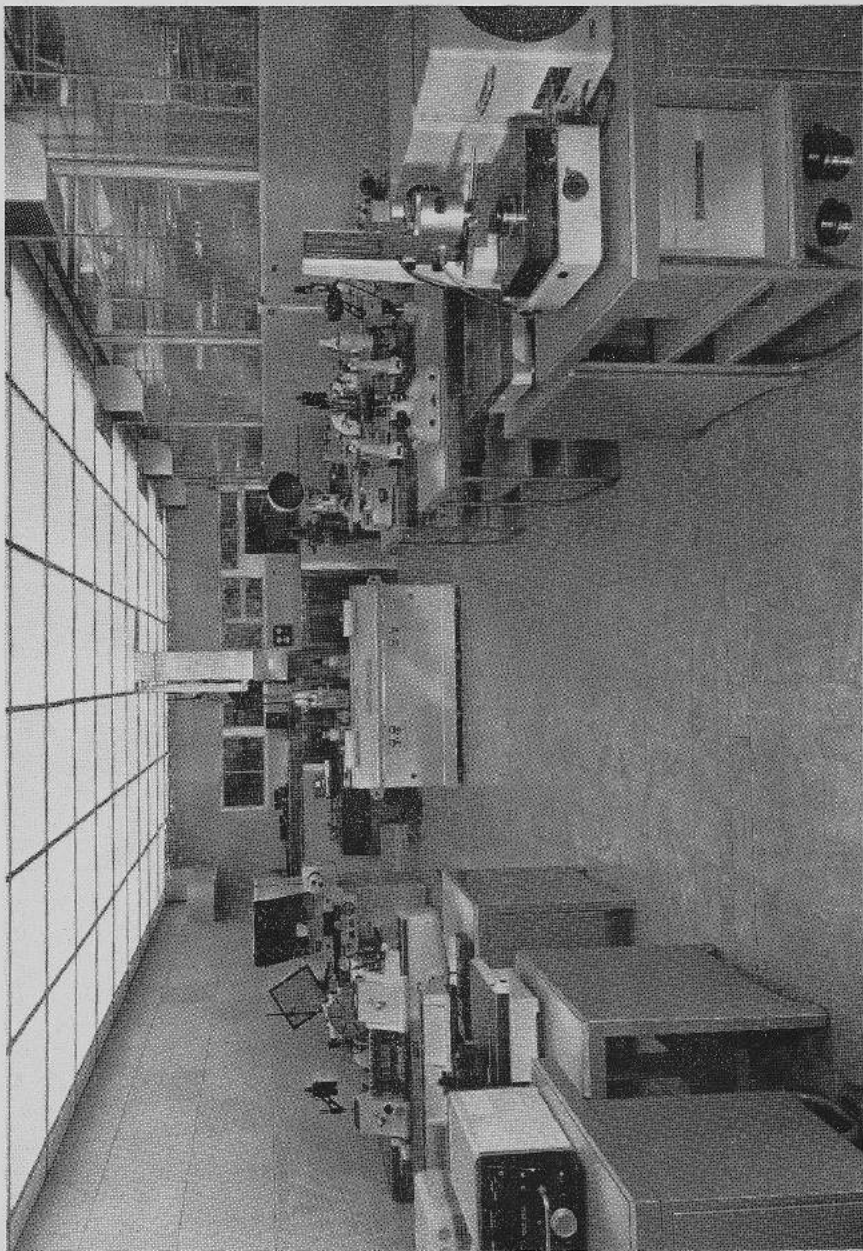
*The newly constructed premises, which covers an area of 1,400 sq. ft., incorporates an air conditioning plant specially designed to control conditions at the International Temperature of Standardisation of 20°C. and 55% Relative Humidity. The plant, which will wash, heat or*

*cool the air, will be steam operated during the winter and electrically operated during the summer months.*

*Shadow-free, defused lighting is installed to ensure ideal working conditions. The walls and the ceilings are insulated for temperature and acoustic control and all glass panelling is of a double glazed nature. The floor is of a hard wearing, anti-slip nature and, moreover, is of a type enabling the reduction of vibration to an absolute minimum. Power points are situated at floor level and all-in-all the fabrication of the building, its construction and the relevant services are of the finest available.*

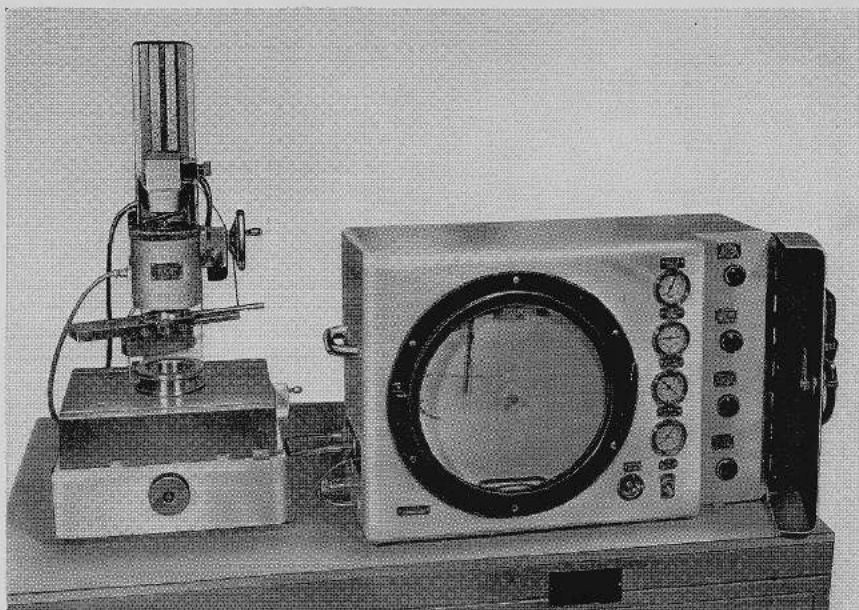
*In addition to the foregoing, it is the considered opinion that the new premises are as good as any in the world for a Company not actively engaged in the actual manufacture of gauges.*

*The various items of equipment housed in the Metrology and Standards Room are illustrated in the following pages and depict the nature of the type of work carried out in each instance.*

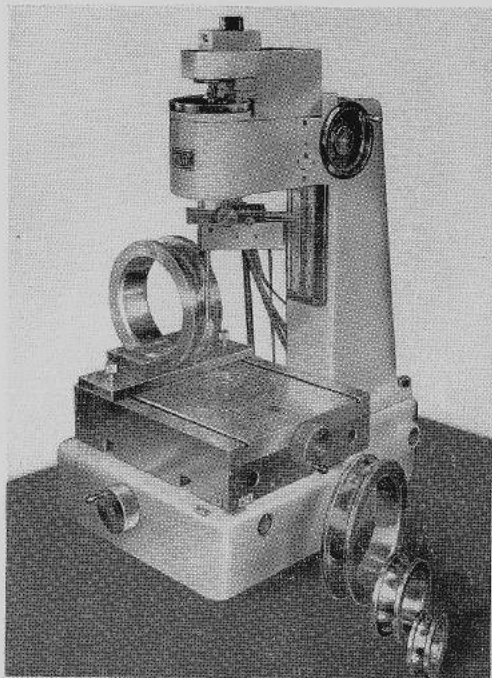


*A general view of the new Metrology and Standards Room.*

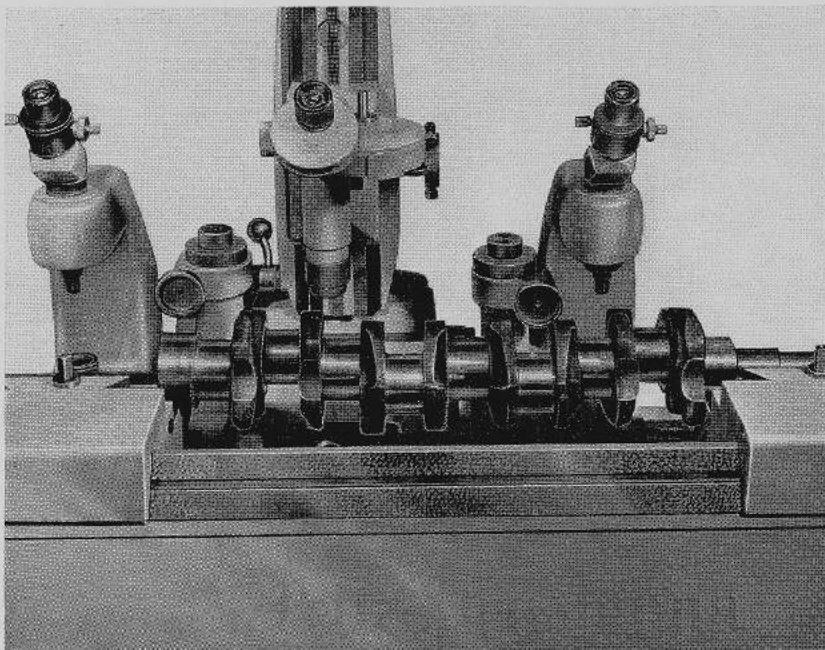




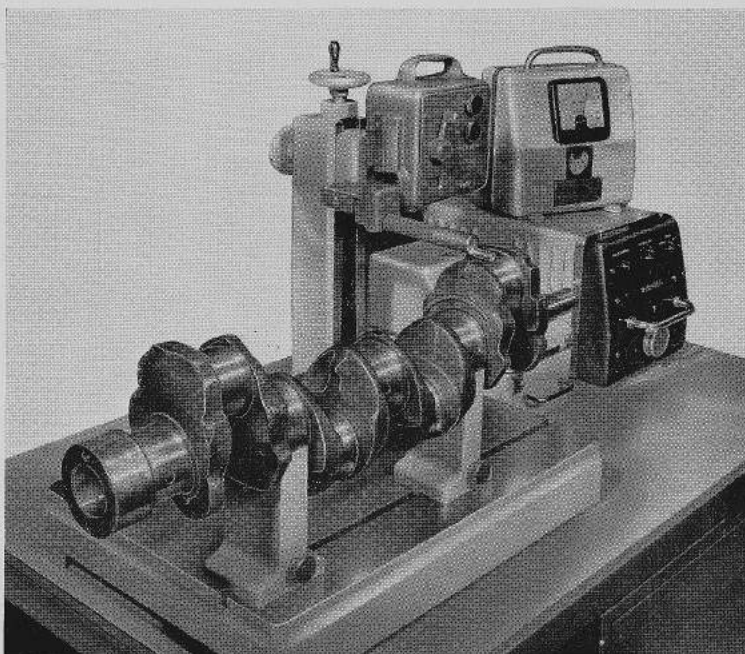
*An O.M.T. Roundness Measuring Machine records, in documentary form, the track roundness of a ball race inner ring ground on a Newall B.G. Precision Chucking Grinding Machine.*



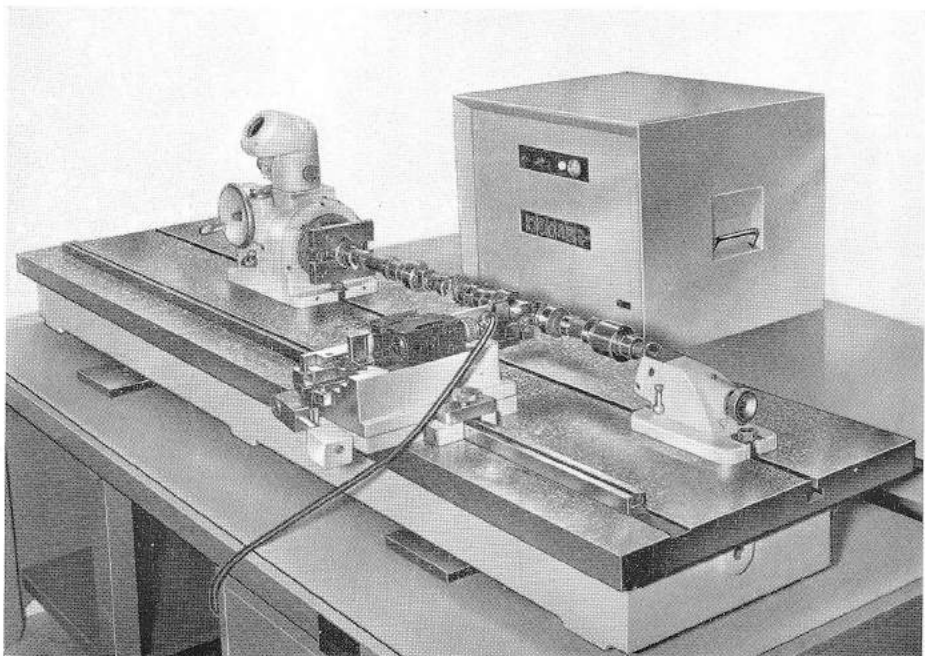
*Again, an O.M.T. Roundness Measuring Machine is used to record the accuracy of production of the track radius of a ball race inner ring.*



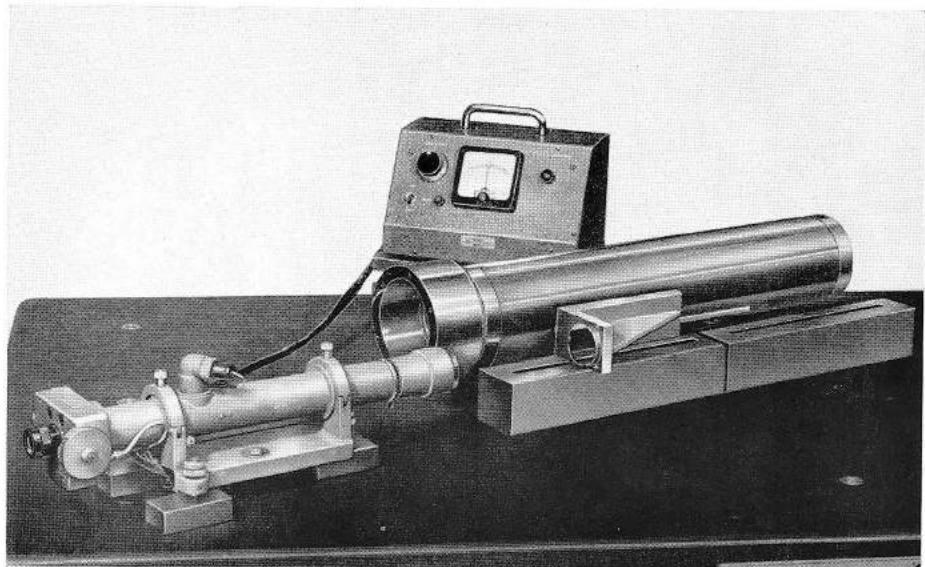
*Close inspection of fillet radii ground on a Newall H.A.C. Crankshaft Grinding Machine.*



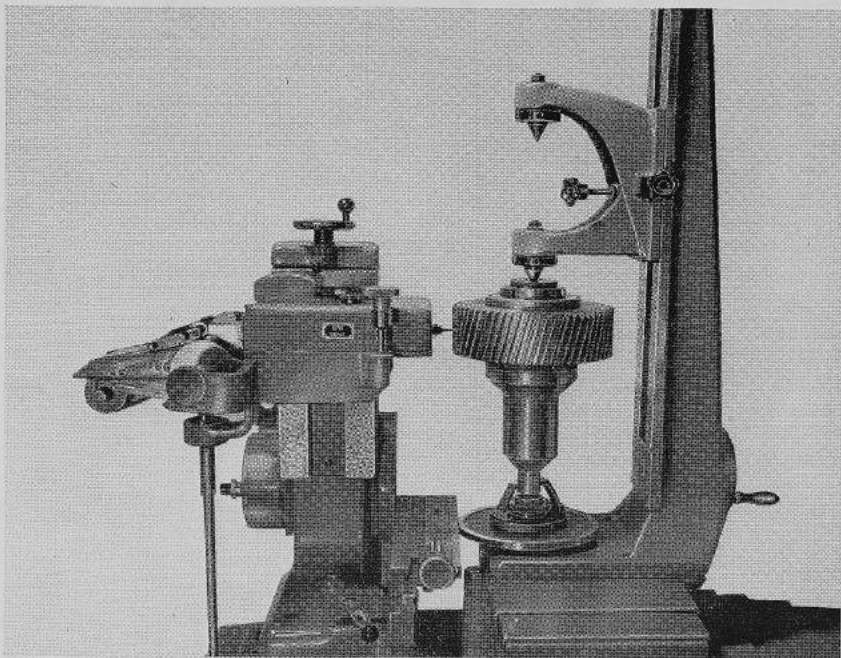
*Checking the surface finish of a crankpin ground on a Newall H.A.C. Crankshaft Grinding Machine.*



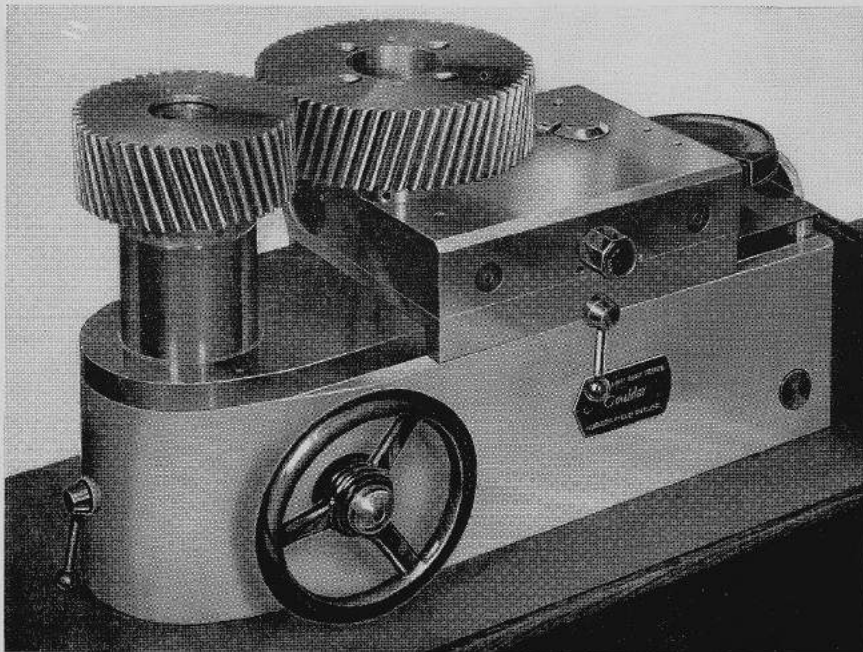
*Checking the shape of a camshaft cam-form, ground on a Newall Camshaft Grinding Machine, utilising a digital read-out system employing a diffraction grating mounted on a specially designed slide.*



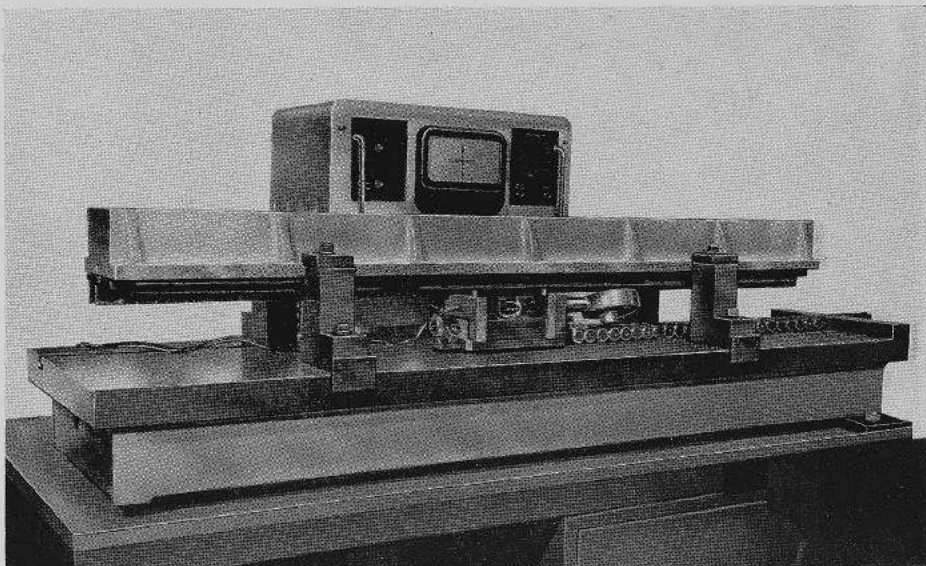
*A Newall jig borer quill being checked for straightness with the aid of a photo-electric, auto-collimator.*



*Accurate checking lead and involute form of a spherical gear.*



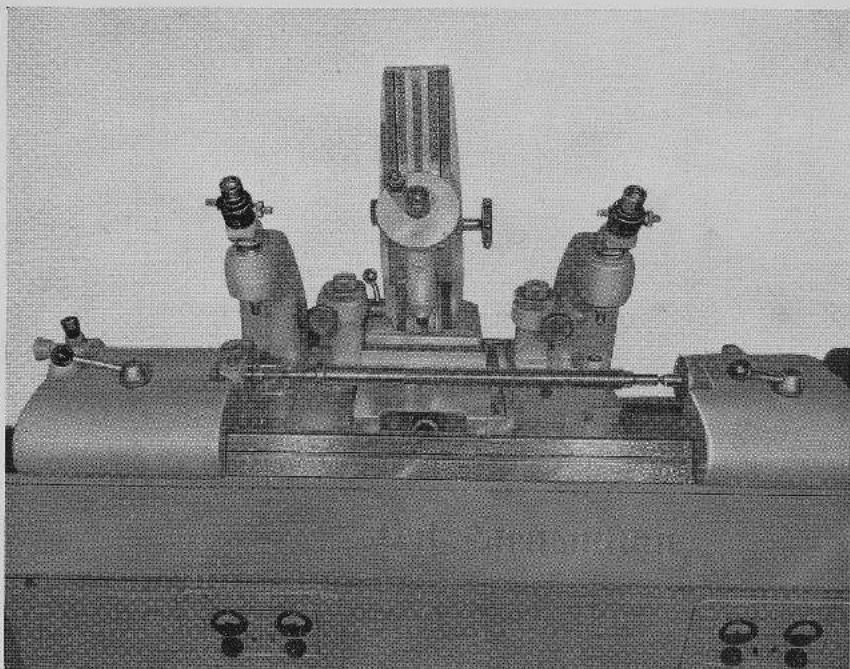
*Inspecting for composite errors, if any, on helical gears employed in the manufacture of Newall H.A.C. Crankshaft Grinding Machines.*



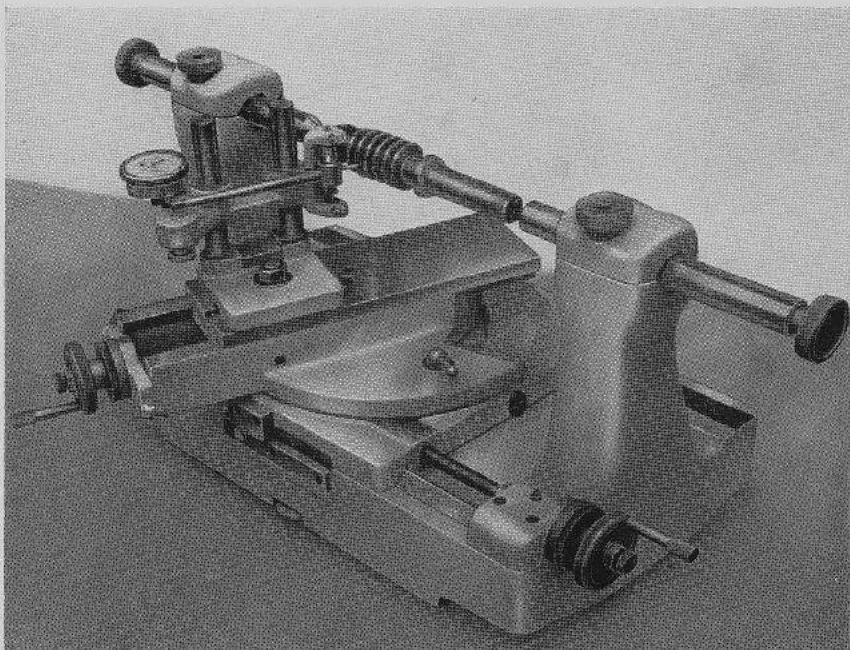
*A set-up for determining the positions of magnetic blocks in the measuring bar of a Newall 'Spacematic' Jig Boring and Milling Machine when equipped with the A.E.I. measuring and control system. A point of interest is the use of Newall patented rollers to determine precise, one inch increments.*



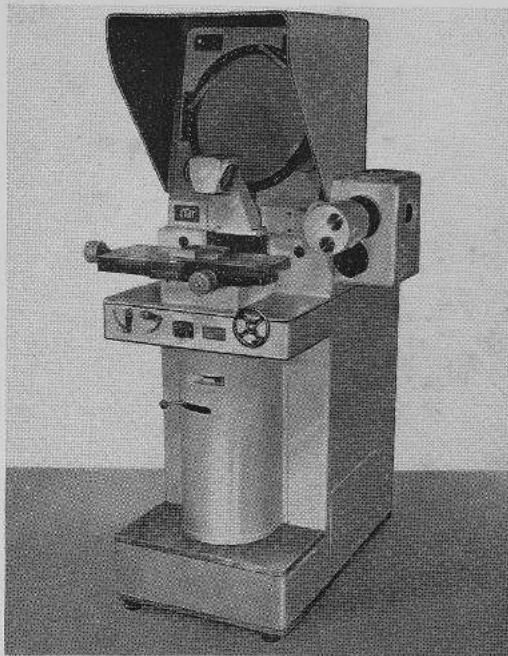
*A Newall Linear Measuring Machine employed in checking 10 rollers, of the Newall patented measuring system, against 10 master rollers calibrated by the National Physical Laboratory.*



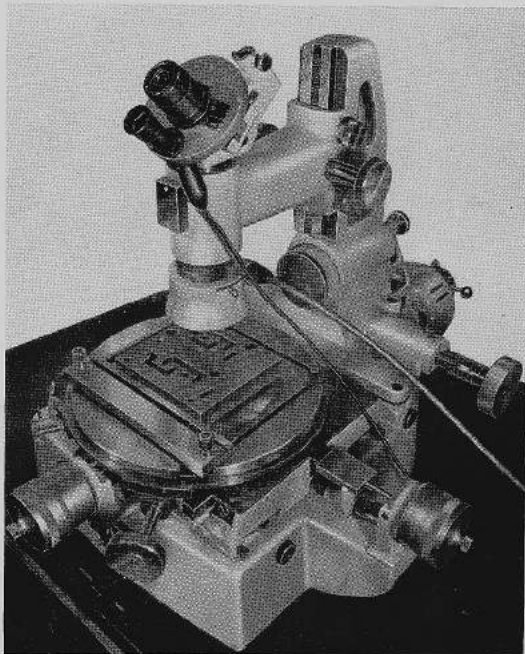
*Checking the thread-shape and pitch of a lead screw destined for use in a Newall machine tool.*



*Accurate inspection of the flank angle of a worm thread.*



*The contour accuracy of a thread former plate being checked on an O.M.T. 15-inch Universal Projector.*



*The sizes and positions of ports in a hydraulic block are checked, by reflected light, on an O.M.T. Tool-makers' Microscope.*