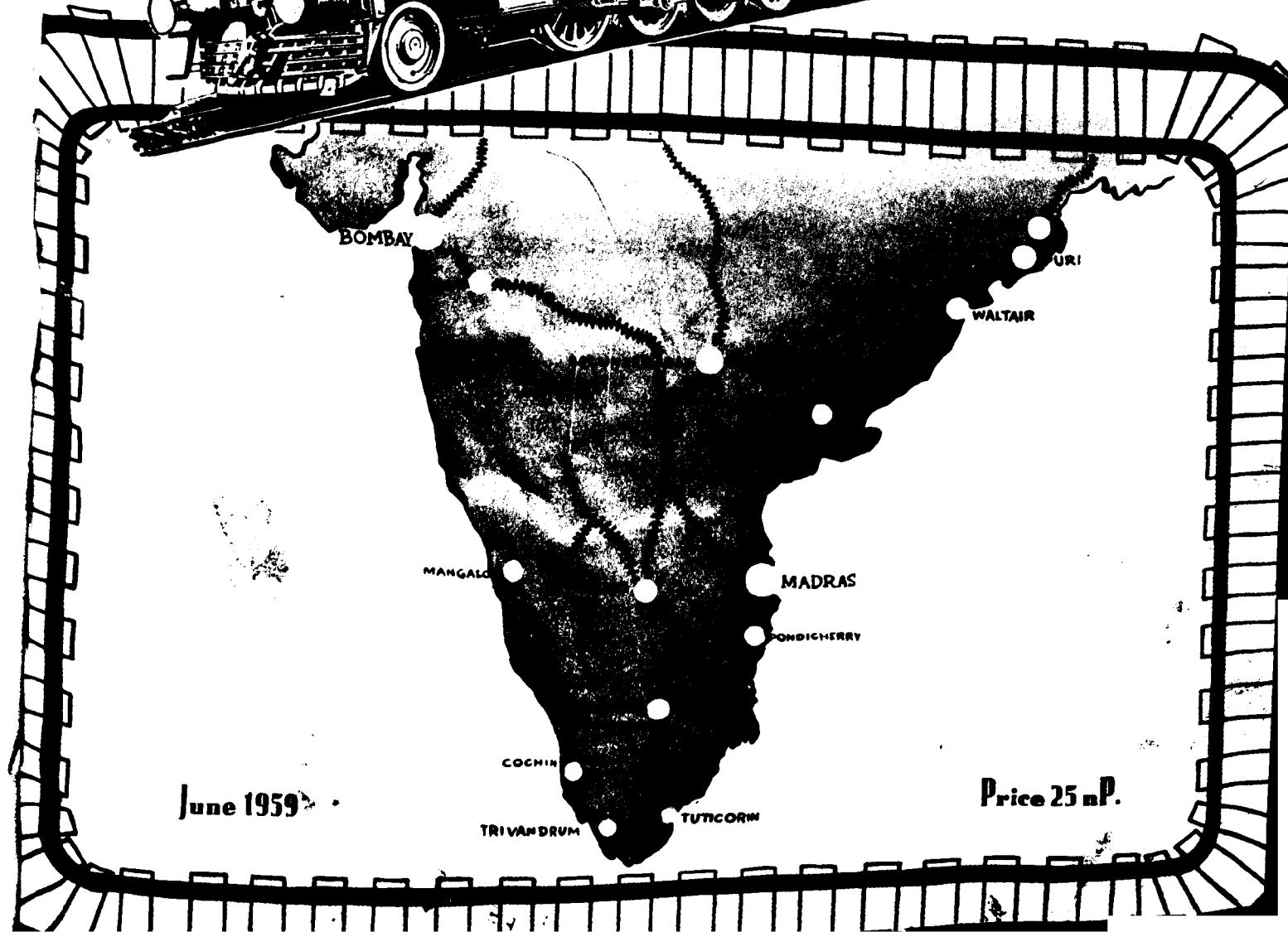
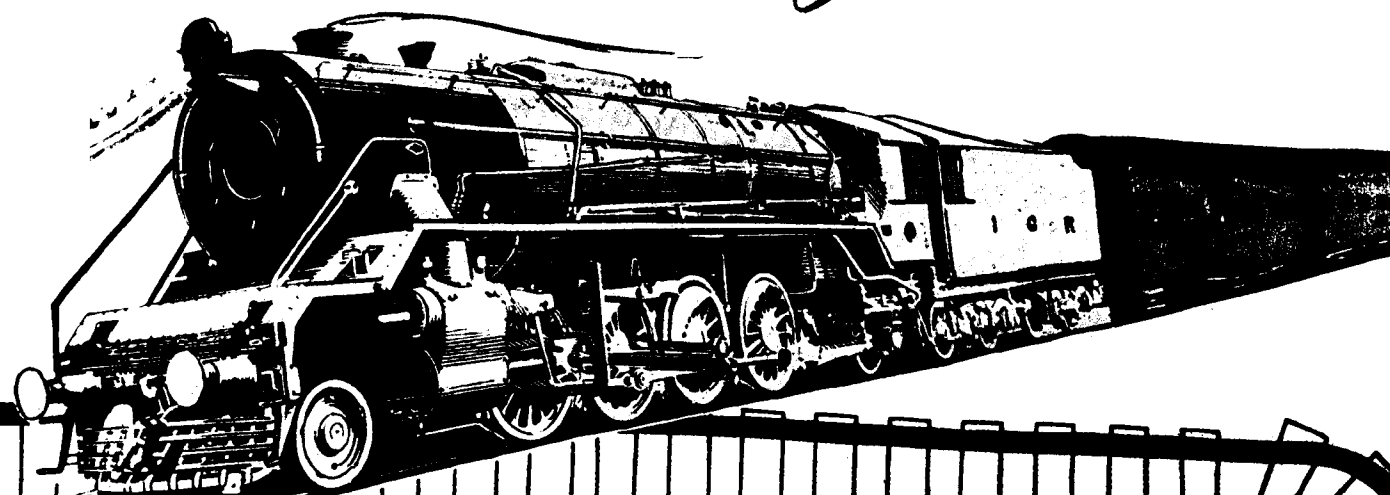


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SOUTHERN RAILWAYS

Magazine



June 1959

Price 25 nP.

IN YOUR OWN INTERESTS

HOW TO PURCHASE TICKETS

Buy your tickets only at the proper place. The authorised offices are (i) the Booking offices at the railway stations, (ii) the Town or City Booking Offices, (iii) the out-Agencies, (iv) Travel Agent. Never buy tickets from any other source as that may lead you to trouble. Please note that tickets are not transferable.

Buy your tickets in the proper time. You can avoid unnecessary excitement and trouble if you come to the station in good time, that is at least half an hour before the scheduled departure of your train. The Time Tables of the Railway are on sale at Booking Offices and Bookstalls.

Buy your tickets in the proper manner. Queue up at the Booking Window and you can get your ticket easier and quicker than by crowding at the counter.

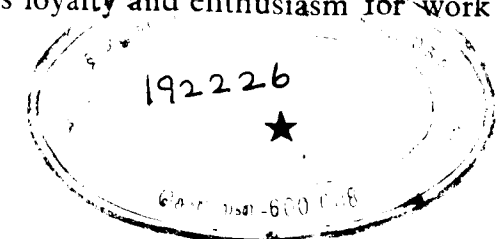
By handing in the exact fare in good coins or currency you get the ticket easier and quicker, and save for yourself and the Booking Clerk time and trouble.

Check up your ticket and money before leaving the counter and draw the attention of the Booking Clerk to any discrepancy you may notice.

(Inserted in the interests of Travelling Public)

GOLDEN RULES OF CONDUCT FOR RAILWAYMEN

1. Maintain proper relations with officers and others in the Department in which you work.
2. Use good human relations in your contact with subordinates. Do not make them feel their position.
3. Maintain good public relations with callers and passengers.
4. Be resourceful and find ways and means of doing a job well.
5. Discard the idea of 'Give me some more men to do the job'.
6. Learn the art of getting along with people.
7. Remember the most important thing is to get a job done—not just to do it anyway and somehow but to do it efficiently, safely, economically and expeditiously.
8. Develop the attitude of 'Give me plenty of rock and plenty of wood and just get out of my way'. This typifies loyalty and enthusiasm for work and responsibility.



1. Get down to the man on the JOB.
2. Move on the line as often as you can as MEMBERS OF THE PUBLIC and not only as officials.
3. Remember pre-arranged and announced expeditions cannot have the same informative value as surprise inspections.
4. Every railwayman has to be convinced that the work that he does is to his own advantage. He should not think and measure his effort merely in terms of wages which is only a motive force.
5. Every railwayman does a specialised job which has no meaning or usefulness by ITSELF unless it is cohered with each other. There is no meaning or value to the work of a permanent way gang unless there are trains to run over the track.

1945

Technical Training School—Integral Coach Factory

By M. Lal

Principal, Technical School

THE Technical Training School of the Integral Coach Factory, which was started sometime before the start of production for training skilled workers for the factory, was inaugurated on the 20th March, 1954 by the then Deputy Minister for Railways, Shri O. V. Alagesan.

At the start, training was given to Trade Apprentices mainly in the three trades, Fitting, Machining and Welding. Recently these trades have been augmented by the Plumber, Carpenter and Electrical Fitter trades. Training courses have also been started for Apprentice Mechanics and Graduate Apprentices. The latest additions to the curriculum of the School are a Promotion Course for Unskilled staff and a Refresher Course for the Supervisors of the factory.

TRAINING OF TRADE APPRENTICES

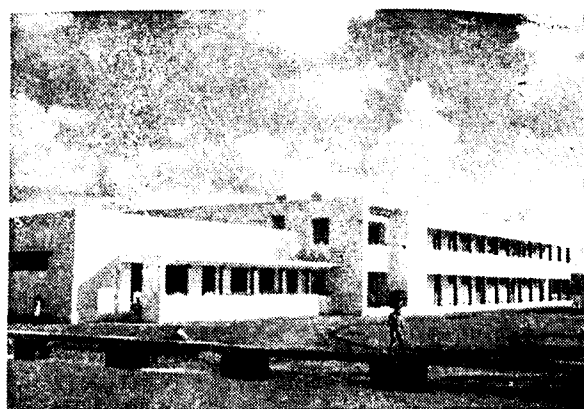
The Integral Coach being of a design different from the conventional coach and the work involved in the manufacture being of a specialised nature, the administration decided at an early stage that at least 80% of the skilled artisans required for the factory should be those who have undergone a regular intensive course of training. The bulk of the skilled artisans required for the manufacture of integral coaches belong to the 3 main trades, viz. Fitting, Machining and Welding. Generally, it takes about 3½ years for a worker to become proficient in a particular trade, but in view of the limited time available before the factory went into production, a special training scheme of 18 months duration was drawn up. The scheme envisages the selection of suitable boys from those who have passed at least IV Form and undergone a minimum of 18 months practical training. The apprentices are given a training for 18 months and those found fit are absorbed as Skilled Artisans in the factory.

This phase of training is styled the intensive phase and will be replaced in due course by the conventional 3½ years course perhaps late in 1959 or in 1960, as from then on recruitment of fresh workers will be made only to meet the annual wastage.

The 18 months training is made up of 6 months of

basic training in the Technical School and 12 months of further training in the Coach Factory.

Origin of the Technical School: The Technical Training School started functioning with a small Basic Training Workshop of 9,792 sq. ft. floor area and with 70 Trade Apprentices on its rolls. The Technical Training School was planned to have capacity to train 260 apprentices at a time, 100 in the fitting trade, 60 in the machinist trade and 100 in the welding trade and with that end in view it was decided that the Basic Training Workshop should be



A view of the Technical Training School.

expanded, a proper building for holding theory classes should be constructed and a hostel to hold 261 apprentices should also be built. The work was taken in hand and the plans drawn up for the School came into fruition during the year 1956-57.

Basic Training: This training is intended to give the trainee a thorough grounding in the trade so that he is sure of the basic principles and he is in a position to derive maximum benefit from the factory training and attain the requisite skill within the 18 months training period. Advantage is taken of the basic training to create in the trainee the desirable habits for him to perform his work in a proper and methodical manner and also to become a worthy citizen of the state.

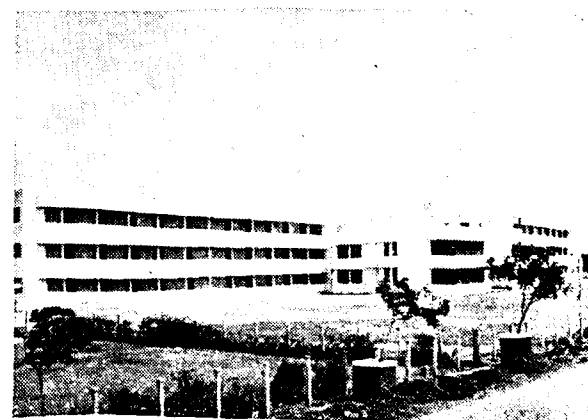
Each trainee puts in 47½ hours of work per week. The boys undergo practical training for 24 hours in a

week and during the remaining 23½ hours they receive theoretical instructions, attend physical training classes and do community work.

The basic training courses start in May and November each year and during apprenticeship the trade apprentices receive a stipend of Rs. 36/- and a Dearness Allowance of Rs. 45/-, making a total of Rs. 81/-.

Practical Training: Practical training is given in the Basic Training Workshop, which has a floor area of 19,600 sq. ft. and 105 machines installed in it. The B. T. Workshop consists of 3 departments, viz. Fitting, Machining and Welding. During practical training each apprentice has to work with his own hands and for that purpose he is allotted a fully equipped workplace in each department. In the fitter department, each trainee has a vice and set of tools allotted to him. In the machinist department a machine and in the welding department a welding booth with complete welding equipment. Similar arrangements have also been made for the 3 new trades, Carpenter, Plumber and Electrical Fitter. Each exercise is discussed in advance in the class room and when the trainee comes on to the shop floor he is fully aware of what he has to do, the raw materials and tools required, the sequence of operations, etc. To minimise fatigue and to avoid unnecessary waste of time, special tool cabinets with swing-out shelves have been provided for machinist trainees.

During basic training each trainee has to complete number of graded basic exercises starting from the



A view of the Apprentices' Hostel.

simplest. The basic exercises are designed to develop the ability required to do all the skilled jobs

encountered in day to day work. To cut down the cost of training, scrap material is used for basic exercises to the extent possible and in some cases the same workpiece is used for more than 2 to 3 exercises.



A view of the Interior of the Basic Training Workshop.

In the case of fitters, besides giving training in fitting techniques, training is given in smithy and sheet metal working. In the case of the machinists, as the time available is limited, the trainees specialise in any one of the four sub-trades, viz. turning, shaping, milling or drilling and boring. In the case of welders training is given in arc welding, gas welding, gas cutting and spot welding, a technique adopted largely in the manufacture of integral coaches. Similarly, for the Carpenters, Plumbers and Electrical Fitters, the exercises have been so planned that the apprentices will be fit to do the different types of furnishing required on the coach.

Each workpiece done by the apprentices is evaluated and marks are allotted for "Accuracy", "Finish" and special features such as fits, etc. The evaluation is done by specially trained men and the defects in workmanship or the methods employed are systematically shown to the boys.

The progress of the trainees is carefully watched and for this purpose a practical test is held every 6 weeks. This test indicates as to how much of training each apprentice has assimilated, whether he is sure of his ground and whether he is fit to go on to the next set of exercises. Corrective action is taken as indicated by the results. In the case of test jobs, marks are allotted for the working method followed, order on

the work bench, time taken, planning, accuracy and finish.

During practical training, particular attention is paid to the adherence to safety regulations and the use of safety appliances to ensure that the apprentices do not fight shy of using the safety appliances later on.

Theoretical instructions: For imparting theoretical instructions a magnificent building with well lit and well ventilated 11 class rooms, an auditorium capable of accommodating 300 persons, a Library and Laboratory has been built. The total floor area is 21,906 sq. ft. The School building is fitted with modern sanitary fittings and has been adequately furnished.

The lectures are so planned that each trainee understands the theory underlying each operation. Besides lectures on technical subjects, connected with the trade, lectures on Citizenship, Personal Hygiene are also given. Opportunity is taken to teach Hindi to those who do not know that language. Film shows are also arranged on important technical subjects.

Each apprentice has to attend physical training classes for 2 hours a week and has to become a member of the Auxiliary Cadet Corps. Weekly parades are held to instil a sense of discipline in the apprentices. Time has been set apart for community work also to develop *esprit-de-corps*.

Theoretical tests are held once every 2 months.

Prizes: To serve as an incentive for the apprentices to give off their best, attractive prizes have been instituted for the basic training course. Two prizes (a first and a second) for General Proficiency and one prize for the practical training are awarded in all trades. A prize for proficiency in theory is awarded for all trades together.

Factory Training: During the factory training, which lasts for 12 months, the boys are first attached to experienced workers and then work independently as skilled artisans. On completion of the 18 months training they are trade tested and on being found fit absorbed as skilled artizans. The Factory Instructor attached to the Technical School follows up the progress of the boys.

Hostel: A two storeyed building with 87 rooms, 2 dining halls, 2 recreation rooms and fitted with modern sanitary fittings has been built to accommodate 261 boys. Each room is equipped to accommodate 3 boys and each boy is provided with a cot, a table, a chair, a book rack and a coat stand. The rooms are well lit and well ventilated. The hostel has a total floor area of 60,329 sq. ft. A vegetarian and a non-vegetarian mess are run on a co-operative basis, under the supervision of a Mess Committee, elected by the apprentices. The recreation and reading rooms are also managed by the apprentices themselves.

TRAINING OF APPRENTICE MECHANICS

To fill up the vacancies likely to arise in the supervisory cadre, a special Apprentice Mechanics scheme of 2 years duration (as against the conventional 5 years course) has been drawn up and was introduced in February, 1957. For this purpose a selection was made from the trade apprentices, who had completed their training with credit and who had passed S. S. L. C. and were below 25 years of age. The course commenced with 20 trainees comprising of 10 Fitters, 4 Machinists and 6 Welders. At present there are 31 boys under training. These apprentices receive advanced trade training and allied trade training in the Technical Training School and receive factory training on the floor of the shops. Whilst in the School they are given theoretical instructions to bring their knowledge upto the standard prescribed for Apprentice Mechanics in the Technical Training Committee Report. These boys also receive training in Jig and Tool Design, the Drawing and Design Office, and in the production and Planning Office.

Later on, Diploma holders were also recruited from the open market for the post of Apprentice Mechanics. The duration of their training is 2½ years. Under this course 14 Apprentice Mechanics are under training.

TRAINING OF GRADUATE APPRENTICES

A special training scheme of 2 years duration has been drawn up to train Engineering Graduates to fill up vacancies likely to arise in the intermediate stage of the supervisory set up. During training they receive a stipend of Rs. 250/- plus Rs. 70/- as Dearness Allowance per mensem. These apprentices

spend 7 months in the Technical School, the major portion of the time in receiving practical training, theoretical instruction being confined only to factory administration and general subjects. They receive 16 months training in the factory of which 5 months are spent in the Jig and Tool Design Office, Drawing Office and Planning Office. The last month of their training is spent in the Technical School in undergoing a refresher course after which they are tested and absorbed as Chargemen in grade Rs. 260-350. This scheme was introduced on the 2nd April, 1957 and on date 18 apprentices are under different stages of training.

PROMOTION AND REFRESHER COURSES

After the work came into full swing in the factory, the need was felt for providing instructional courses for the Unskilled staff and for providing Refresher courses for the supervisors in the factory. These courses were started recently. For the Unskilled staff

the training given is similar to the training given to the Trade Apprentices during the first 6 months of their training and consists of basic exercises in the B. T. Workshop and a series of lectures in the School. The exercises, however, are simpler and the lectures also are of a more elementary nature and are delivered in regional language. The duration of the training is 3 months.

The Refresher Course consists of lectures by Officers of the Factory on various subjects such as Production and Planning Control, Time and Motion Study, Principles of Supervision, Machine Tools, Stores Procedure, etc. These lectures are so planned that the supervisors learn what they miss in the daily rush of work and thus are helped to understand how the factory is administered. They also acquire a basic fund of knowledge on important topics, which it is hoped will be an asset in the execution of their duties.

—(Courtesy: The Indian Railway Engineer, Bombay)

BOBBINS FOR SEWING MACHINES

The Indian Standards Institution has issued a Specification for Bobbins for Sewing Machines (IS: 1294—1958), which covers the requirements for two popular sizes of bobbins, namely size 1 and size 2, for sewing machines of the so-called household pattern.

This standard is intended to assist the industry in regulating the quality of indigenous bobbins. It is one of a series of Indian Standards for sewing machines and their components, being prepared on the recommendation of the Tariff Commission and at the instance of the Development Commissioner for Small Scale Industries, Ministry of Commerce & Industry. The series at present comprises the following Indian Standard Specifications:

- IS: 1294—1958 Bobbins for Sewing Machines
- IS: 1295—1958 Needle Bars for Sewing Machines
- IS: 1296—1958 Pressure feet for Sewing Machines
- IS: 1297—1958 Pressure Bars for Sewing Machines.

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SPECIFICATIONS FOR ENGINEER'S FILES

The Indian Standards Institution has drafted a specification for Engineer's Files (Doc: EDC 12(299), which covers:

- (a) General Requirements and Methods of Tests, and
- (b) Specific Dimensional and Test Requirements for

- i) files commonly used by engineering and similar industries, and
- ii) saw files

The instrument files, generally used by instrument makers, jewellers, etc. file blocks, die sinker's files and the high alloy content steel files, normally called 'high speed steel files' have not been included. Separate additional parts or separate standards, covering such files, are expected to be issued by the Institution later on.

Copies of the draft standard are being circulated widely with a view to eliciting comments from the interested parties. The last date for receipt of comments is 6th July 1959.

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THE VICE PRESIDENT ARRIVES IN BOMBAY

The Vice President of India arrived in Bombay from Jalgaon on the morning of Sunday 22nd March, 1959 in special carriage attached to the Pathankot Express. He was received at the Victoria Terminus station by the Managing Committee of the Indian and Eastern Engineer over whose Centenary celebrations Dr. Radhakrishnan presided. Shri D. P. Mathur, Senior Deputy General Manager, Shri P. B. Aibara, Divisional Superintendent, Bombay and Shri B. Natarajan, Public Relations Officer were among those who received the Vice President.

Automatic Spray Gun

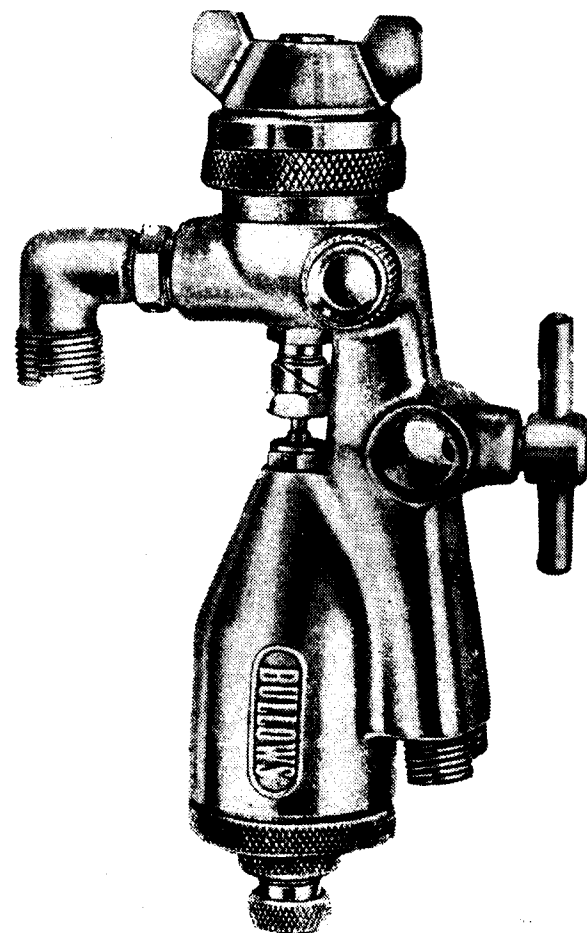
ALFRID Bullows & Sons Ltd., Long Street, Walsall, announce the introduction of a new automatic spray gun, the L540, which supercedes their well-known L500 automatic spray gun.

Years of experience in the use of automatic spray guns in all branches of industry have influenced the design of the L540, which represents an interesting advance in this field.

By using a forged aluminium alloy body, Bullows have reduced the weight of the L540 to less than half that of the L500—19½ ounces as opposed to 41 ounces—without reducing efficiency or hard wearing characteristics. At the same time, they have retained interchangeability of internal component parts.

For added ease of operation, all hoses come away in the line of the gun. This feature, combined with the startling reduction in weight, will allow the new Bullows gun to be used in positions and at speeds previously considered impossible.

Nozzle set-ups are interchangeable with those used on the Bullows-Binks L1900 spray gun, which is standard equipment both in this country and the U. S. A. to almost every major mass production manufacturer of motor cars, refrigerators and similar products which call for a finish of the highest possible class to be produced at a high speed. The result is that the L540 becomes probably the lightest and certainly the fastest high performance automatic spray gun available.



The price of this gun is £10/15/0 plus 20% and delivery is seven days.

D. R. U. C. C. MEETS IN BOMBAY

The sixth meeting of the Divisional Railway Users' Consultative Committee of the Bombay Division of the Western Railway for the years 1958-59 was held in the office of the Divisional Superintendent, Western Railway, Bombay Central, at 11-00 hours on Tuesday, the 7th April, 1959, under the chairmanship of Sri R. N. Chaudharia, Divisional Superintendent, Western Railway, Bombay Central. Members, representing the various Chambers of Commerce & Industries in Bombay, Surat, Amalner and also representatives of Passen-

ger & Traffic Relief Association were present

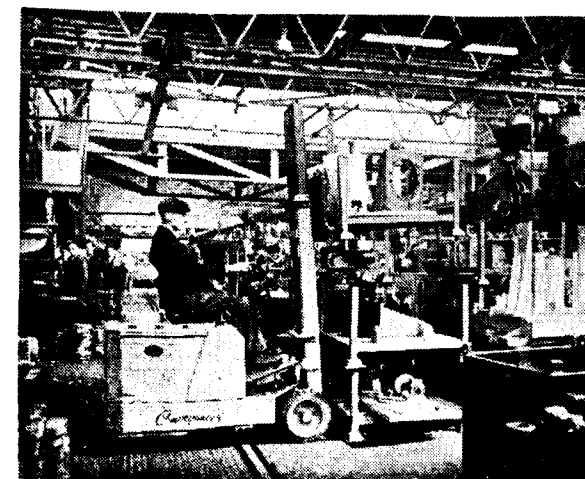
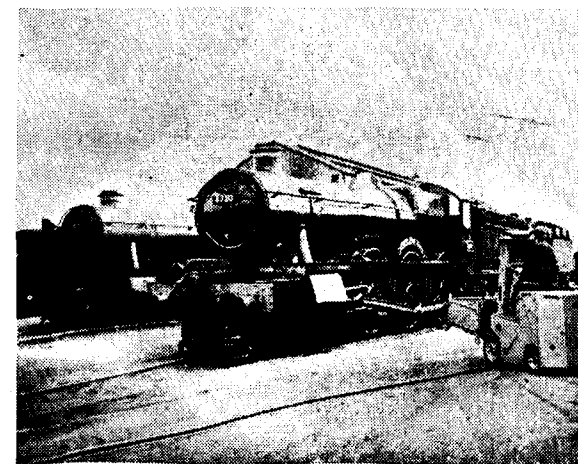
Various matters connected with catering arrangements, difficulties experienced by public at booking windows at certain stations, proposals to attract more traffic to the Railway, were discussed and action proposed to be taken was explained to the members. Statements in respect of provision of passenger amenities, punctuality of passenger trains and inspection of food-stuffs for sale for the quarter ending 31-3-59 were also taken up for discussion.

British Railways, Swindon

SWINDON—the town on the hill—dates back at least eight centuries and is mentioned in the Domesday Book. It was an ancient market town of some note when the Great Western Railway came into being.

Parliament had sanctioned the construction of the railway between Bristol and London in August, 1835, and, thanks largely to the energies of its indomitable engineer, Isambard Kingdom Brunel, construction was commenced three months later and the first completed section of his famous broad (7 ft.) gauge railway—Paddington to Maidenhead Riverside Station (now Taplow)—was opened in June, 1838.

By December, 1840, the line had been extended through Swindon, and June of the following year saw the whole line between London and Bristol, including the Box Tunnel, in use.

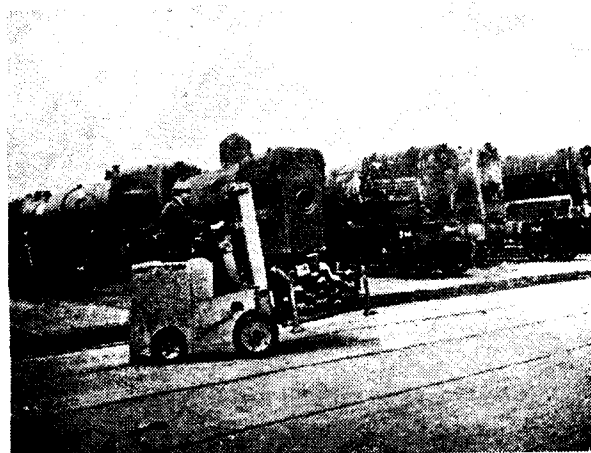


Brunel, who had been appointed engineer to the undertaking when but 27 years of age, selected as his Locomotive Superintendent a young man then scarcely in his majority, one Daniel Gooch, who had been trained with Messrs. Robert Stephenson and Company.

With the rapid growth of the railway arose the necessity for the provision of a central repair depot for the maintenance of the locomotive stock and Mr. Gooch was asked to investigate and report on the most desirable location for such a depot.

In this connection an extract from Mr. Gooch's diary is interesting:

"1840. During this year further portions of the Great Western were opened and agreements



were made for leasing the Bristol and Exeter and the Swindon and Cheltenham Railways, and it became necessary to furnish large works for the repair, etc., of our stock. I was called upon to report on the best situation to build these works, and on full consideration I reported in favour of Swindon, it being the junction with the Cheltenham branch and also a convenient division of the Great Western line for the engine working. Mr. Brunel and I went to look at the ground, then only green fields and he agreed with me as to its being the best place."

This recommendation of the locomotive Superintendent was endorsed by the Directors, who on February 25th, 1841, authorised the construction of such a depot at Swindon in the following words:

"Decide to provide an engine establishment at Swindon commensurate with the wants of the Company, where a change of engines may be advantageously made and the trains stopped

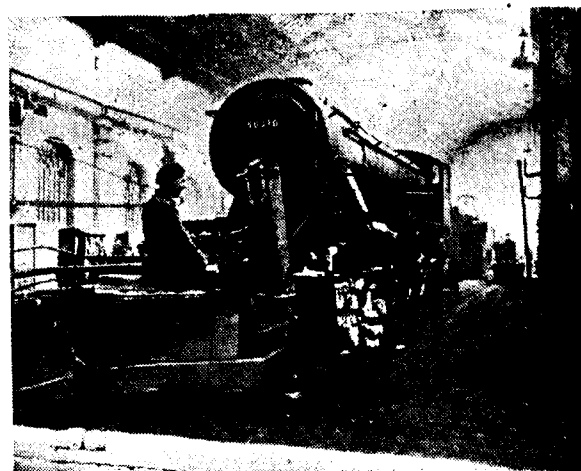
for the purpose of passengers taking refreshment.... The establishment there would also comprehend the large repairing shops for the Locomotive Department."

The erection of workshops for the repair of locomotives was commenced without delay. The machinery was started in November, 1842, but the Works were not in regular operation until January 2nd, 1843.

Ultimately, Swindon was chosen for the Carriage and Wagon Works, and these were authorised by the Directors in October, 1867. The Works were commenced in June 1868, and completed the following year.

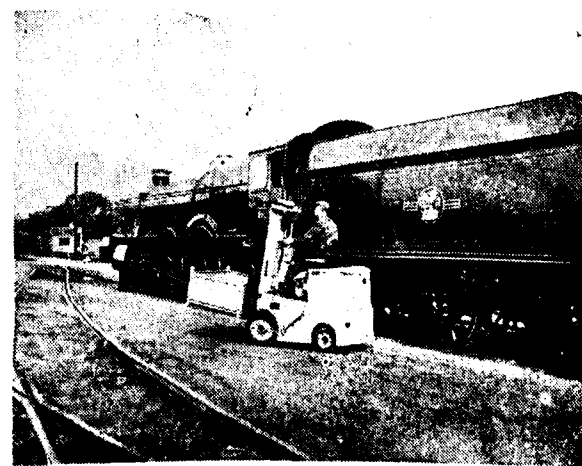
The effect of the Company's selection of the town of Swindon is disclosed by reference to the census returns, which in 1841 gave a total population for the town of 2,459. To-day the population is about 70,000 whilst the number of employees in the Works has increased from 4,500 in 1876 to 10,000.

From those early days in the history of the Great Western Railway, the Company has maintained a proud position in the van of British railway development and operation. To-day the name is different but British Railways (Western Division) has lost none of the magic of its earlier name, and its great record continues to be upheld in every field of railway endeavour.



The Locomotive and Carriage and Wagon Works at Swindon are second to none. Their great tradition is the basis for continuous reassessment and improvement to maintain their lead in changing modern conditions.

It is not surprising that the Engineers at Swindon have given a great deal of attention to the handling of



materials throughout the vast works, since few industrial changes have taken place in recent years so rapidly as those of materials handling techniques and facilities.

THE TASK

Unlike many establishments where standardisation of product simplifies the problem, the construction of locomotives and rolling stock involves the handling and storage of an enormous variety of shapes and sizes, weights and types of material. It was apparent that large-scale improvements in handling methods were necessary and the task was recognised as being one of considerable magnitude. The degree of necessity for improvement and an accurate assessment of the extent of the problem were not known.

The approach to the problem was typical of the efficiency that one expects of the Swindon Works, and the first stage was to determine the necessity and the extent. An analysis of overhead costs revealed that the movement of materials throughout the works accounted for a good proportion of the total costs. This figure was substantiated by further analysis of the overhead costs of one large Shop. The cost of crane facilities was not included.

Having thus proved the financial necessity for improvements there remained the extent of the problems yet to be ascertained. A complete survey of all handling throughout the Swindon Works was then undertaken, in order to provide answers to a number of questions. How much material is moved? How is it moved? In what quantities is it handled? Over what distance is it moved?

A census was made of all movements of material throughout the works for a period of two full weeks



(excluding Sundays), and the following information was obtained for every movement:

- (i) Despatch Point. } Any one of 269 possible
- (ii) Destination. } situations.
- (iii) Nature of material (solid or liquid, wood or metal, glass, etc.).
- (iv) Process stage of material (whether raw, part finished, finished or scrap).
- (v) Size of unit of material.
- (vi) Weight of unit of material.
- (vii) Shape of unit of material
- (viii) Characteristics of material (whether fragile, robust or intermediate).
- (ix) Type of transport (by hand or vehicle, hand-operated or power driven).
- (x) Method of loading vehicles for transport.
- (xi) Weight of load and whether complete or part-load.

A five-figure code was devised to give all necessary information concerning size, nature, etc., of the material. Other necessary information was similarly coded.

The mass of information thus obtained was recorded on punch-cards and tabulated by machine. The master-set of cards could now be used to give a complete and detailed analysis of the problem. Any particular item of information relating to the material or movement could be readily extracted, summed and related to any other factor. For instance, it now became possible to determine how many fragile parts of a certain size and shape are conveyed by any particular means of transport between any two points

in the works, and by what means they were loaded and unloaded.

It was found that over 44% of all material was moved by hand; that overhead cranes handled 13%; that 10% was handled by mobile crane and 2% by chain blocks.

Of the various types of transport in use, 60% of all material was moved by rail vehicle, and 25% by road trailer. It was also found that, on a basis of vehicle usage, road trailers had a "usage" figure of 42% compared with 9% for rail vehicles.

It was thus observed that handling by hand was largely accounted for by the loading and unloading of trailers.

The average weight of a load was found to be 0.85 tons and the average daily tonnage moved was almost 2,000 tons.

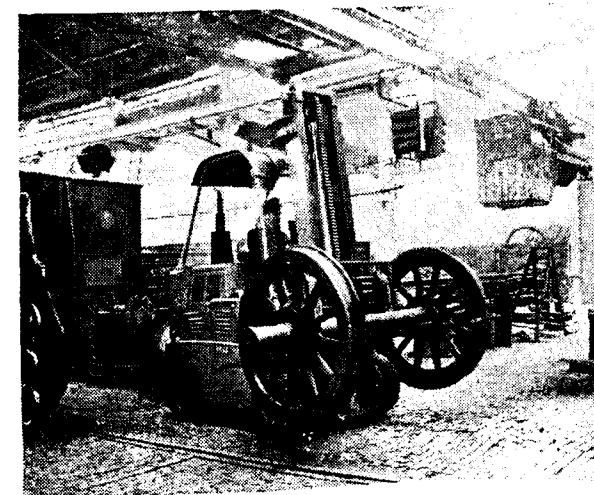
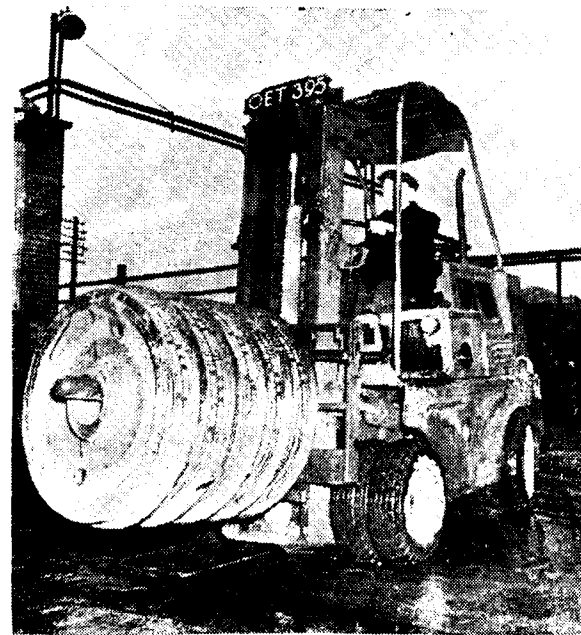
These facts alone substantiated the evidence of the overheads analysis that there was a necessity for improvement. Furthermore, they clearly indicated the extent of the problem and the scope for improvement. They were also to form the basis on which to develop an overall scheme for a revised mechanical handling development programme.

Even at the first brief assessment of the census certain undesirable features became apparent. Internal movement of material by railway rolling stock is slower, and less flexible than by tractor and trailer. It is also more costly, even in a railway works. There are a large number of cases, of course, where the nature and size of the material necessitates the use of rail vehicles, but it has been estimated that, at Swindon, the introduction of additional trailers and reduction in internal rail traffic would present considerable economies.

However, the census also revealed that the use of trailers involves greater use of manual labour for loading and unloading. The reduction of manual labour was, therefore, indicated as a major source of savings.

THE MEANS

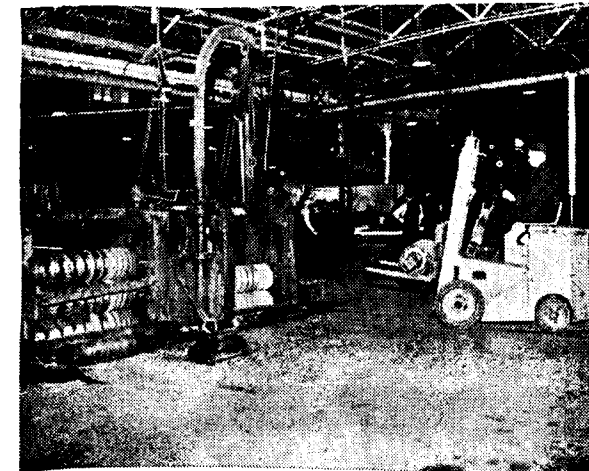
The next stage was to decide upon the type of equipment whereby to effect optimum savings, and to consider any re-organisation of form or size of load which the introduction of such equipment would require.



Three main basic handling techniques were extensively examined :

- (i) Overhead equipment.
- (ii) Conveyors.
- (iii) Mobile vehicles.

There are a number of instances where either technique is the sole answer to a particular problem, or where none has any great advantage over the others. Generally, however, the latter is more flexible. The census showed very clearly that flexibility and universality must be major factors in any decision with regard to equipment in the Swindon Works. On the other hand, maximum standardisation is very desirable in any organisation. Flexibility with



standardisation were considered to be the basic requirements of the new handling system. The fork lift truck was recognised as the type of equipment best suited to these requirements. Most of the general handling applications could be dealt with by an orthodox machine, and a standard machine could be fitted with standard attachments to accommodate particular requirements.

Also in the category of mobile vehicles are special types such as straddle-carriers, side-loaders and reach-trucks.

It was decided that the fork lift truck and pallets would be the basis of the new handling system at Swindon.

The next stage was the operation of one or more pilot test schemes.

Two "Conveyancer" fork lift trucks, an E2/20 and an E3/20 and a number of pallets were introduced into "AM" Shop. A large number of items are handled in unit pallet-loads in this shop, and whenever

possible, material is delivered to the shop and despatched from the shop in this form. Swarf is also handled in pallets.

A "Conveyancer" E3/20 was installed in the Rolling Mill for handling heavy billets.

Two E2/20 trucks have subsequently been introduced into "R" Machine Shop. Here, on account of space-restrictions and narrow gangways, a highly manoeuvrable truck and small-size pallets were necessary.

The results have been readily apparent and are of considerable gratification even to those, who, by such careful planning, ensured the success of the scheme from the start.

Savings of about 15% on original materials handling overheads costs have already been attained in both Locomotive and Carriage & Wagon Departments.

The system is proving itself to be the answer to the problem. Large-scale expansion of the system is now envisaged, and it is planned that, eventually, all departments in the Works will be linked by an integrated pallet-trailer and tractor transport service. The trailers will be loaded and off-loaded by fork lift truck, and the bulk of internal shop handling will also be performed by fork lift truck. Manual handling will be largely eliminated and movement by railway wagon will be restricted to very large and bulky material for which it is best suited.

A great deal yet remains to be done. It might even be true to say that a mechanical handling system is never so perfect that it cannot be further improved. But the foundations of a sound system have been well and truly laid in the Swindon Works, and we of Conveyancer are proud to have had Swindon engineers place such faith in our products.

ELECTRIC & DIESEL LOCOMOTIVE MANUFACTURE IN INDIA

Proposals for the progressive manufacture in the country of the mechanical components of electric locomotives starting with the assembly of knocked-down locomotives have been sought from the manufacturers who supply electric locomotives on the Eastern and South Eastern Railways. This was stated by the Railway Minister, Shri Jagjivan Ram in the Lok Sabha.

He said that the electric components for the indigenously manufactured electric locomotives may have to be imported in the initial stages, until these can be supplied by the Heavy Electricals Plant, Bhopal.

The development of indigenous capacity for the manufacture of diesel locomotives has also been taken up, he said.

Dealing with the progress made towards the objective of self-sufficiency in the manufacture of steam locomotives, carriages, underframes and wagons, the Minister disclosed that during the budget year, out of a total provision of about Rs. 80 crores for rolling stock, about Rs. 68 crores would be spent in the country and only about Rs. 12 crores (including sea freight) on imports.

HOW TO RESERVE ACCOMMODATION

Unless you reserve your berth (I Class) or Seats (II and 3rd Class long distance) in advance, you may not be sure of getting accommodation on the train you wish to travel by.

Application should be made to the Station Master of your starting station at least 3 days in advance specifying the date and train by which you intend travelling and the tickets must be bought in advance. The reservation fee leviable is 8 Annas per seat or berth.

Reservation by I and II Class from intermediate stations by Express trains can also be made similarly, but reservation ticket can be issued only after getting an advice from the Reservation Centre that the reservation has been made.

Tickets will be issued only if accommodation is available.

If the reserved seats or berths are not occupied at least 5 minutes before the booked departure of the train the reservation will be cancelled and the seat or berth given away to another.

Reservation fee is not refundable.

III Class seats are also reservable on Express and certain other important trains for long distance passengers from the train-starting stations on payment of a reservation fee of 4 Annas per seat.

Do not occupy a berth or seat reserved for another, as you are liable to be displaced at the last moment.

If you find another person occupying the berth or seat reserved for you and if he will not vacate it on demand, report it to the Guard or Station Master. They will help you.

(Inserted in the interests of Travelling Public)

Brief resume of "WRIGHT" Vertical Spindle—Horizontal Table-Surface Grinders

ONE of the main activities of Wright Electric Motors (Halifax) Limited over the past 15 years has been the manufacture of Vertical Spindle—Horizontal Table—Surface Grinders (British Patent No. 531, 584). Originally made in two sizes only, fitted with 8" diameter or 12" diameter cup-type grinding wheels, these machines have been generally adopted by a wide range of industries for roughing and finishing operations requiring a reasonable degree of accuracy and speed. We have actually supplied with our Table Surface Grinders, the following industries which have been selected at random from our records :—

Internal Combustion Engine Manufacturers and Repairers.

Agricultural Machinery Manufacturers and Repairers.

Engineering Works of all kinds.

Light Foundries, Ferrous and Non-Ferrous.

Aircraft Manufacturers and Repairers.

Dockyards and Shipbuilders.

Armament Manufacturers.

Navy, Army and Air Force Workshops.

Sheet Metal Works, Cabinet Makers, Welders.

Die Stamping and Metal Moulding Works.

Tool Makers.

Plastic Moulding Works.

Tile Works.

Electric Motor Manufacturers.

Switchgear Manufacturers.

Car and Cycle Manufacturers.

Makers of Electric and Gas Stoves.

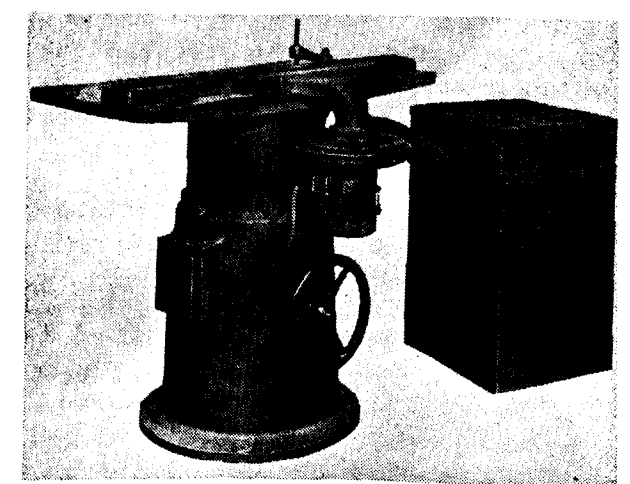
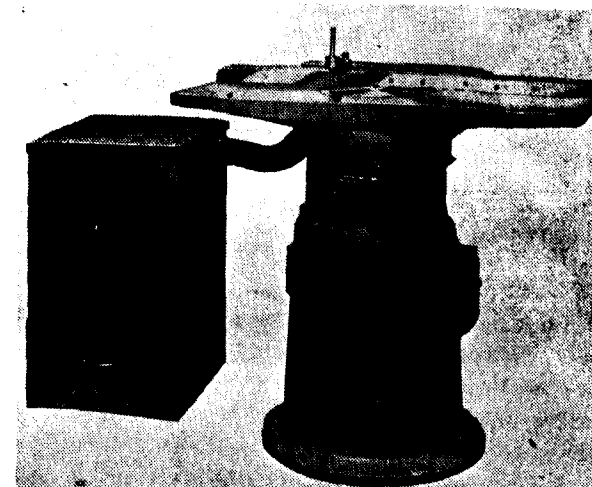
Railway Repair Works.

Car, Tractor and Lorry Repair Shops.

To meet a steadily increasing demand for machines which can easily be operated, also by female labour, and where adjustment of depth of cut and/or compensation for wheel wear can be obtained with the least effort, we have recently designed and developed new types of machines for which Provisional Patents have been registered under numbers 11957/54 and 31507/54.

Grinders are now made in six different sizes having grinding wheels of 8", 10", 12", 14", 16" and 20" diameter, all of which are available in pillar construction, whilst the 8" and 10" machines are also available as bench types.

"WRIGHT" Vertical Spindle—Horizontal Table—Surface Grinders, Models 54/8" and 54/10" have a



"WRIGHT" Model 54/Ex.12 Patent Table Surface Grinder fitted with dust extractor motor fan unit. Process dust discharge pipe leading into our No. 1 Dust Collector Unit.



"WRIGHT" Model 54/Ex. 12 Patent Table Surface Grinder fitted with Dust Extractor Motor Fan Unit. Process dust discharge pipe leading into our No. 1 dust collector unit. Illustration shows surface grinding of turbine components undertaken by girl labour.

cast iron rectangular working table, each provided with an insert plate and a wheel centre disc made of high tensile, wear resisting, hardened steel. The whole surface of the table is accurately machined and ground over. A guide fence is fitted, faced with a hardened steel strip, the body of the fence being of cast iron and arranged so that it acts as an exhaust hood, having cast-in ducts. A fan mounted on the motor shaft creates a vacuum below the grinding wheel and draws the process dust for discharge via a cooling baffle into the dust bag.

For grinding operations involving large quantities of process dust, we recommend the use of our No. 2 Self-contained motorised Dust Collector Unit having an 0.5 B. H. P. fan motor running at 2800 r. p. m.

The grinder body is of heavy cast iron construction, giving extreme rigidity. A swivelling truing block, to take a diamond-tipped wheel dresser is fitted. A cup-type grinding wheel is carried on a cast iron wheel hub, clamped with a steel plate screwed to hub. The wheel hub is keyed on to the tapered shaft extension of the driving motor and secured through a lock nut. Compensation for wheel wear and/or adjustment of depth of cut is obtained by vertical adjustment of the motor rotor by means of a handwheel through a pair of bevel gears, the rotor always remaining within the magnetic field of the stator. The whole rotating

mechanism is dynamically balanced ensuring smooth and vibrationless operation.

The driving motor, forming an integral part of the grinder, is of the Totally Enclosed, dust proof type, of special design having high torque and low starting current features. The rotor shaft, made of high tensile steel, is fitted with deep groove single row ball-bearing at the top, and double purpose ball-bearing at the bottom end, both being stauffer lubricated. Continuously rated to B. S. S. 168/1936 developing 1 B. H. P. at 3000 r. p. m. synchronous in connection with the 8" machines, whilst the 10" models are fitted with 1.5 B. H. P. motors.

The 12" models are of similar construction but the exhaust hood, having cast-in ducts, is provided with an outlet to which an independent motor-driven suction fan is connected. The latter draws the process dust and discharges it into a suitable receptacle. The fan motor (developing 0.25 B. H. P.—3000 r. p. m. synchronous) is wired to start up simultaneously with the main driving motor.

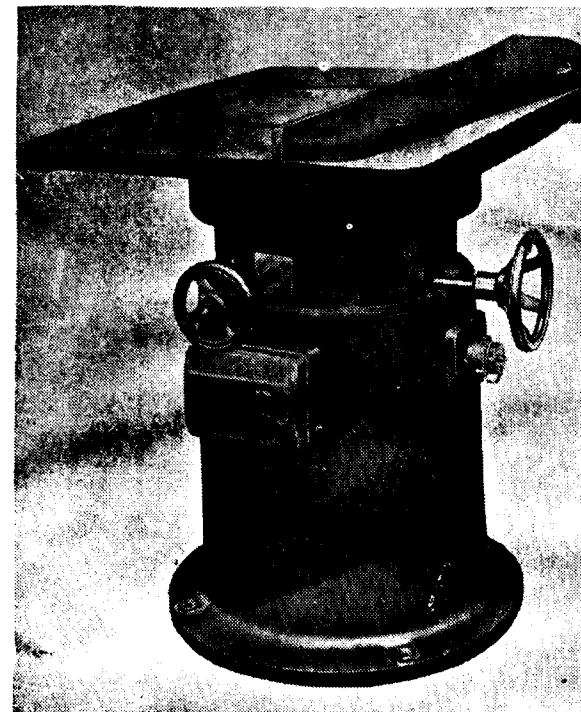
The driving motor, mounted vertically in the grinder casting, is of the Totally Enclosed, dust proof type, of special design having high torque and low starting current features. The rotor shaft, made of high tensile steel, is fitted with deep groove single row ball-bearing at the top, and double purpose ball-bearing at the bottom end, both being stauffer lubricated. Continuously rated to B. S. S. 168/1936 developing 3 B. H. P. at 1500 r. p. m. synchronous.

For A. C., 2 or 3 phase supply, an Inset pattern push button direct-on line starter is fitted in the base of the machine, and is provided with no-volt and overload releases.

For A. C., single phase supply, a hand operated graduated type starter is provided with no-volt and overload releases.

The 14" size, powered by a B. H. P. motor, can also be fitted with the independent motor-fan unit, but we recommend with this machine the use of our No. 2 Self-contained motorised Dust Collector Unit. For grinding operations involving large quantities of process dust, the No. 3 size extractor unit should be employed, this being similar in construction to the No. 2 size, but the fan in this case is driven by an 0.75 B. H. P. motor.

Designed for particularly heavy duty application—



The illustration shows a "WRIGHT" Model 55/20 Vertical Spindle Horizontal Table Surface Grinder, widely used for various surface grinding operations in Machine Shops, Tool Rooms, Assembly Lines, Factories etc.

Available in Six different sizes from 8" up to 20" diameter wheels. Patents granted in all Principal countries.

Models 55/16 and 55/20 have 16" diameter and 20" diameter cup-type grinding wheels respectively. These are carried on a cast iron wheel hub, spigotted on to the upper end of the rotating member of the vertically adjustable piston, the latter being of high tensile steel and carried in a double row angular contact bearing. Compensation for wheel wear and/or adjustment of depth of cut is controlled by operating a handwheel, which engages through gearing the vertically adjustable piston. Setting of depth of cut is maintained by means of a handwheel-operated locking device.

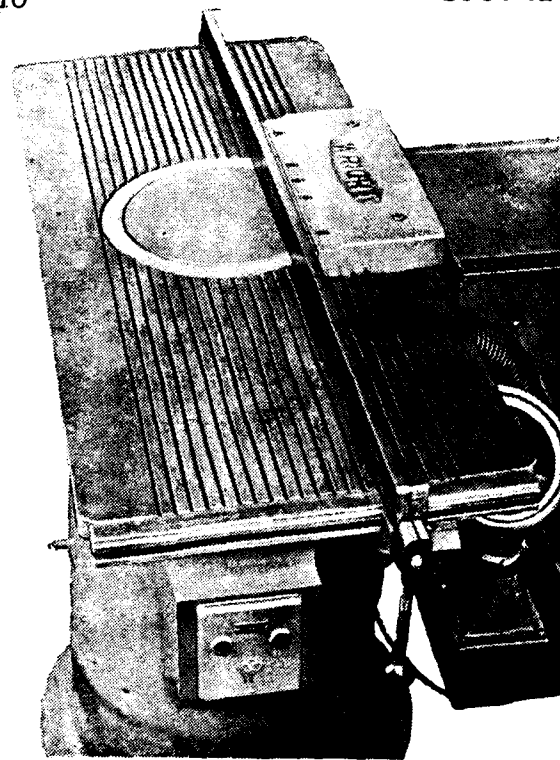
The 16" machine has a cast iron, rectangular box section table 38" in length by 23" wide, the 20" model table is 40" x 30". They are provided with an insert and wheel centre disc made of high tensile, wear resisting, hardened steel. The whole surface of the table is accurately machined and ground over. A guide fence is fitted, faced with a hardened-steel strip, the body of the fence being of cast iron and arranged so that it acts as an exhaust hood, having cast-in ducts for carrying dust to an outlet, to which a dust extracting system can be connected. The grinder body is of heavy cast iron construction to give extreme rigidity. The whole rotating mechanism is finely

balanced to ensure smooth and vibrationless operation.

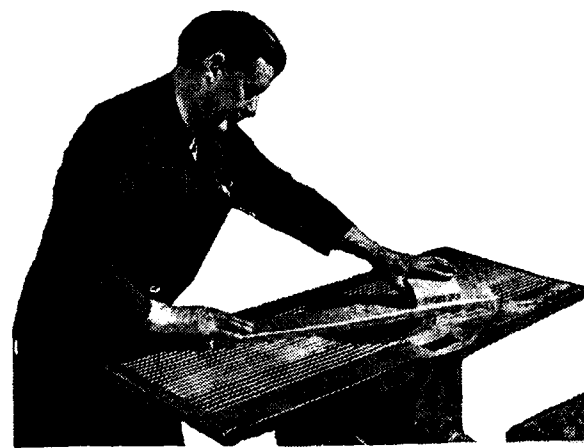
The 16" machine is driven by a Totally Enclosed motor, mounted vertically in a heavy base casting. The motor, which is of the squirrel cage type for A. C. supply, is of special design and incorporates high torque, low starting current features. Continuously rated to B. S. S. 168/1936 developing 5 B. H. P. at 1450 r. p. m.

Control is by an Inset pattern triple pole Air Break Contactor, push button operated, direct-on line starter with inherent no-volt release and three compensated thermal overload releases.

The motor powering the 20" model develops 7.5 B. H. P. at 960 r. p. m. and is controlled by a triple pole Air Break Contactor operated, automatic Star Delta starter with overload and no-volt releases, having "Start" and "Stop" buttons fitted. However, for installation in areas where electrical supply regulations permit direct-on line starting of 7.5 B. H. P. motors, this model could be fitted with an inset pattern triple pole Air Break Contactor, push button operated, direct-on line starter with inherent



"WRIGHT" Horizontal Table Surface Grinder—
Model 57/MIC.12



The illustration shows a "WRIGHT" Model 57/MIC-EX.12 Horizontal Table Surface Grinder, on which a grey iron casting is being surface-ground and from which the Guide Fence and Wheel-Centreplate have been removed

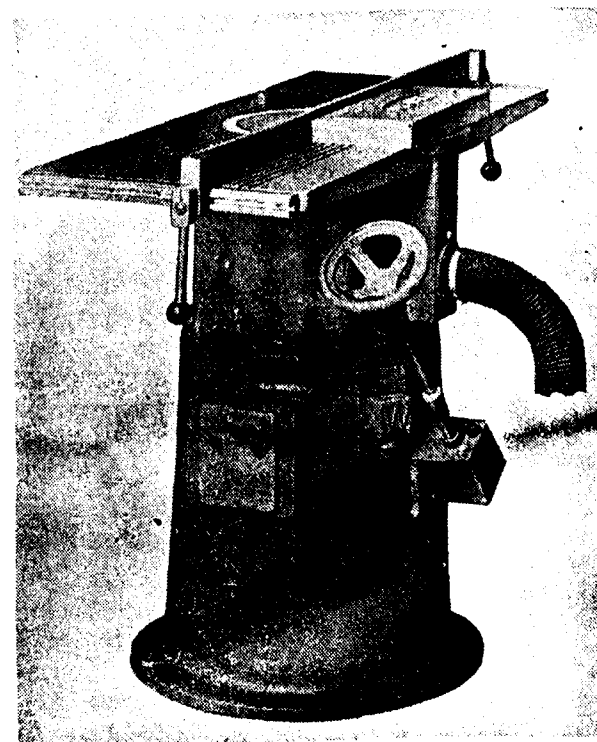
no-volt and three compensated thermal overload releases.

With all our grinders a parallel hand feed attachment, complete with workpiece adaptor can be supplied as an optional accessory if required, as well as diamond-tipped wheel dresser.

We stock spare grinding wheels in grits and grades to suit application. These are available as Category A—Aluminium Oxide Abrasive, and Category C—Silicon Carbide Abrasive.

With the object of speedy production grinding "WRIGHTS" have recently developed a self-contained motorised Vertical Spindle Surface Grinding Head which can easily be adapted as a versatile attachment to Planing, Milling, Boring and Turning Machines.

The vertical spindle motor, developing 1 B. H. P. at 3000 r. p. m. synchronous for A. C. 2, or 3 phase 50 cycles supply, is of special design (Provisional Patent Register No. 11957/54), dust proof, Totally Enclosed, with triple pole "ON-OFF" rotary type starting switch fixed direct to shell. The rotor spindle, made of high tensile steel, is fitted with double row angular



Model 57 MIC - EX. 12 Table Surface Grinder fitted with fluted working table, adjustable guide rail and micrometer control for wheel adjustment.

(Depth of cut and compensation for wheel wear). Guide rail and wheel centre plate are removable to facilitate oscillating of warped or distorted workpieces, (For instance: Cylinder Heads), across the 12" diameter wheel. Provision is also made for connecting up to dust extracting equipment..



The illustration shows a "WRIGHT" Model 57/MIC14 Table Surface Grinder, indicating how very indispensable these machines are for quick and accurate re-conditioning of distorted or corroded engine blocks, cylinder heads, manifolds etc.

contact ball bearing at the top, and deep groove ball bearing at the bottom end.

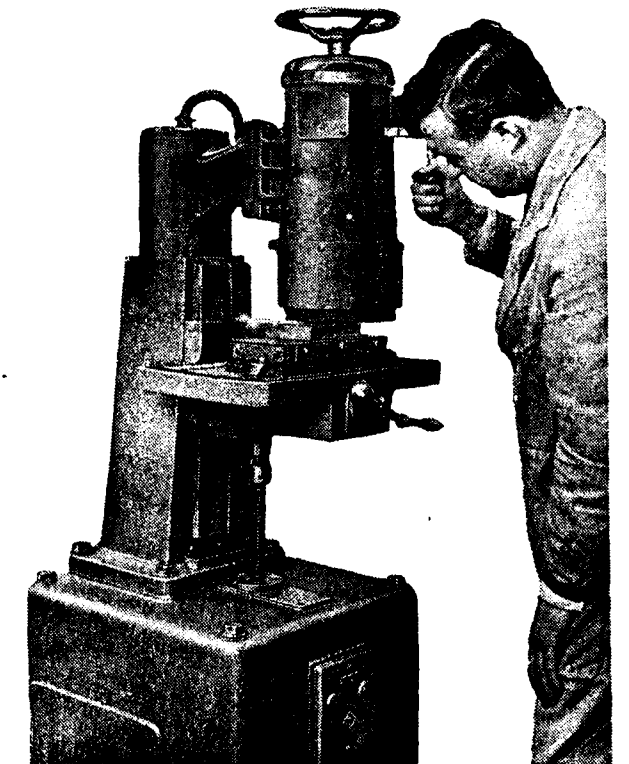
A cup type grinding wheel of 8" outside diameter $\times$ 6 $\frac{1}{2}$ " inside diameter $\times$ 2" deep, (peripheral speed 5560 ft/min.) is clamped with a steel plate and screwed to cast iron wheel hub. The latter is keyed on to the tapered shaft extension of the driving motor and secured through a lock nut. Compensation for wheel wear and/or fine adjustment of depth of cut is obtained by vertical adjustment of the motor rotor by means of a spring-loaded handwheel positioned at the top of the motor, the handwheel engaging the Acme threaded top ball bearing housing. Below the handwheel is fixed an accurately calibrated scale ring and locking screw, for securing the vertical adjustment position.

Higher powered units up to and including 5 B. H. P., having correspondingly larger diameter grinding wheels, are being developed.

WRIGHT ELECTRIC MOTORS SURFACE GRINDING MACHINES

Wright Electric Motors (Halifax), Ltd., Pellon Lane,

Halifax, have recently developed the type 58/V6 cross-swing, column mounted, surface grinding machine, shown in Fig. 1, for use in toolrooms and machine and assembly shops, for accurately grinding small components, such as dies, precision rings, and keys.

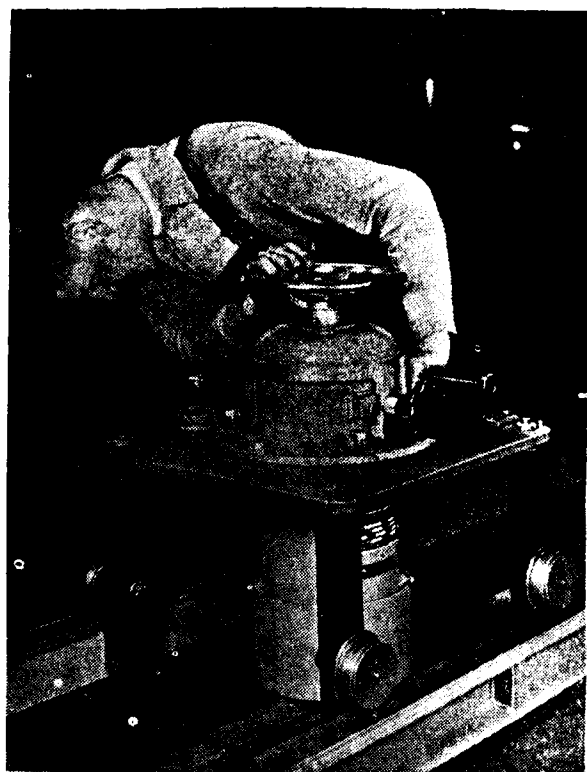


The illustration shows the prototype of our recently designed and developed Model 58/V6 Column Mounted Cross-Swing Surface Grinder.

The motorised Grinding Head, developing 1.5 B.H.P. at 2900 R.P.M. is dust-proof, totally enclosed and fitted with heavy duty ball and angular contact bearings. Setting of depth-of-cut and compensation for wheel wear is obtained through lateral movement of the motor-rotor.

A box-section column, with vertical slideways, supports the work table, and is bolted to a cabinet base which forms a tool cupboard. The motorised grinding head is secured to a sleeve on the top of the column, which is fitted with high-precision taper roller bearings. Dry grinding is performed by swinging the head by hand in an arc over the table. Alternatively, the head can be locked in the central position and used in conjunction with an auxiliary compound table which provides for longitudinal feed of the work under the grinding wheel.

To enable wet grinding operations to be performed,

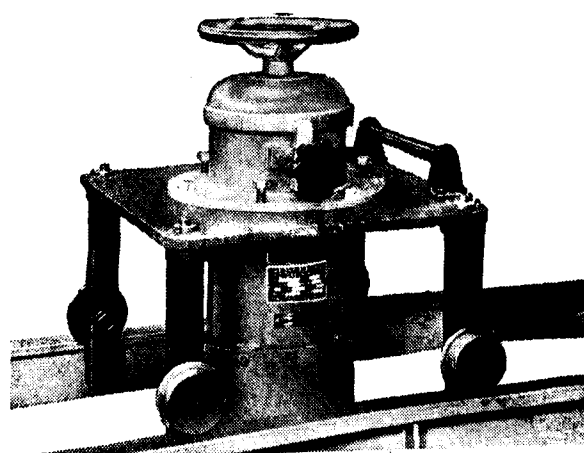


there is a coolant trough surrounding the work table, which has a T-slotted surface measuring 14½ by 10 in. Vertical adjustment of the table is obtained by hand lever, gearing and screw, and the maximum distance from the grinding wheel to the surface is 10 in. The table can be locked to the vertical slideways in any desired position and, if desired, bellows can be fitted to protect the ways.

Motorised grinding heads are available for A. C. 2— or 3-phase, 50- or 60-cycle supply, and can be wound for any one standard voltage. The units are of the totally-enclosed, dustproof type and are fitted with heavy-duty, dual-purpose, angular contact ball bearings.

A handwheel at the top of the head provides compensation for wheel wear and a fine vertical feed, the maximum adjustment being 1½ in. A scale-ring calibrated in increments of 0.001 in. is provided below the handwheel. Normally, the ring grinding wheel is of 6 in. diameter, 5 in. bore, and 1½ in. thick, but, if increased work area coverage is required, an 8-in. diameter wheel of 7-in. bore can be employed. The floor space occupied by the machine is 22½ by 19½ in., and the approximate weight is 8 cwt.

Fig. 2 shows an interesting application of the self-contained motorised grinding head, which has hitherto been supplied as an attachment for use on heavy-duty



The Illustration shows a "WRIGHT" Model 2/2P Self-Contained Motorised Grinding Head, Flange Mounted into a four wheeled Bogie, running on Rails.



The Illustration shows a "WRIGHT" Model 1.5/2P Self-Contained Motorised Grinding Head, Flange Mounted into a four-wheeled Bogie, running on Rails and in this instance being used for surface-truing of turbine foundations.

Photograph by courtesy of Messrs. C. A. Parson & Co. Ltd., Newcastle-upon-Tyne.

lathes, also on planing, milling and boring and turning machines. The unit is shown in operation on a building site, and is flange-mounted in a 4-wheeled bogie, arranged to run on rails, for surface grinding large components which cannot be accommodated on a conventional machine.

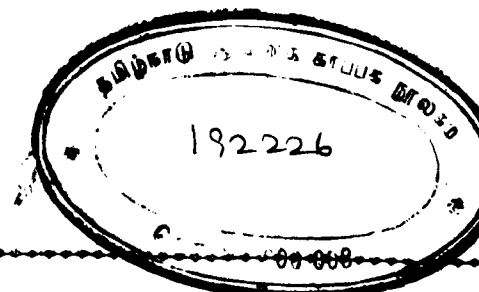
This grinding head is available in five sizes up to 4 h. p., at 3,000 r. p. m. synchronous. To enable the operator to control the wheel-working load, an ammeter can be fitted to the head. The rails are 3 by 2 in. steel channel sections, fitted with machined facing strips, and are available in standard lengths of 3, 5, 7½ and 10 ft.

(Reprint from 'Machinery', 4th March, 1959 Issue)

GOLDEN RULES OF CONDUCT FOR RAILWAYMEN

1. Do you plan your work daily? Get the more essential things done first and do not neglect the important ones sidetracking them to the fag end of the day.
2. Do not express casually careless opinion. Never venture forth an opinion unless asked for it.
3. Remember that most of our mental worries come either from trying to fight life hard or from trying to run away from life. Do neither.
4. Learn to accept people as they are, love them, respect them, praise them, encourage them, differ with them, but above all, learn the priceless art of give and take.
5. Cry neither for the moon, nor over spilt milk.
6. Accept the things that you cannot change; have the courage to change the things that you can, and possess the wisdom to know the difference.
7. Do not drive too hard a bargain with yourself.
8. Accept life as it is—its wonders, changes, disappointments, frustrations etc., etc.

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Managing Editor : T. S. Krishna Rao

CLEANLINESS LEADS TO HEALTH AND HAPPINESS

Clean orderly habits contribute to general health and welfare and as such to happiness and prosperity: they are ~~more important than~~ medicines.

Cleanliness prevents disease; medicine only attempts to cure.

Cleanliness of the person, of the houses and colonies, reflects discipline in the individual and the community. Discipline is the ~~foundation~~ stone for progress of oneself and the country. Cleanliness is a good habit. It is also cheap.

All Railwaymen should set an example of cleanliness. This will help others and themselves.