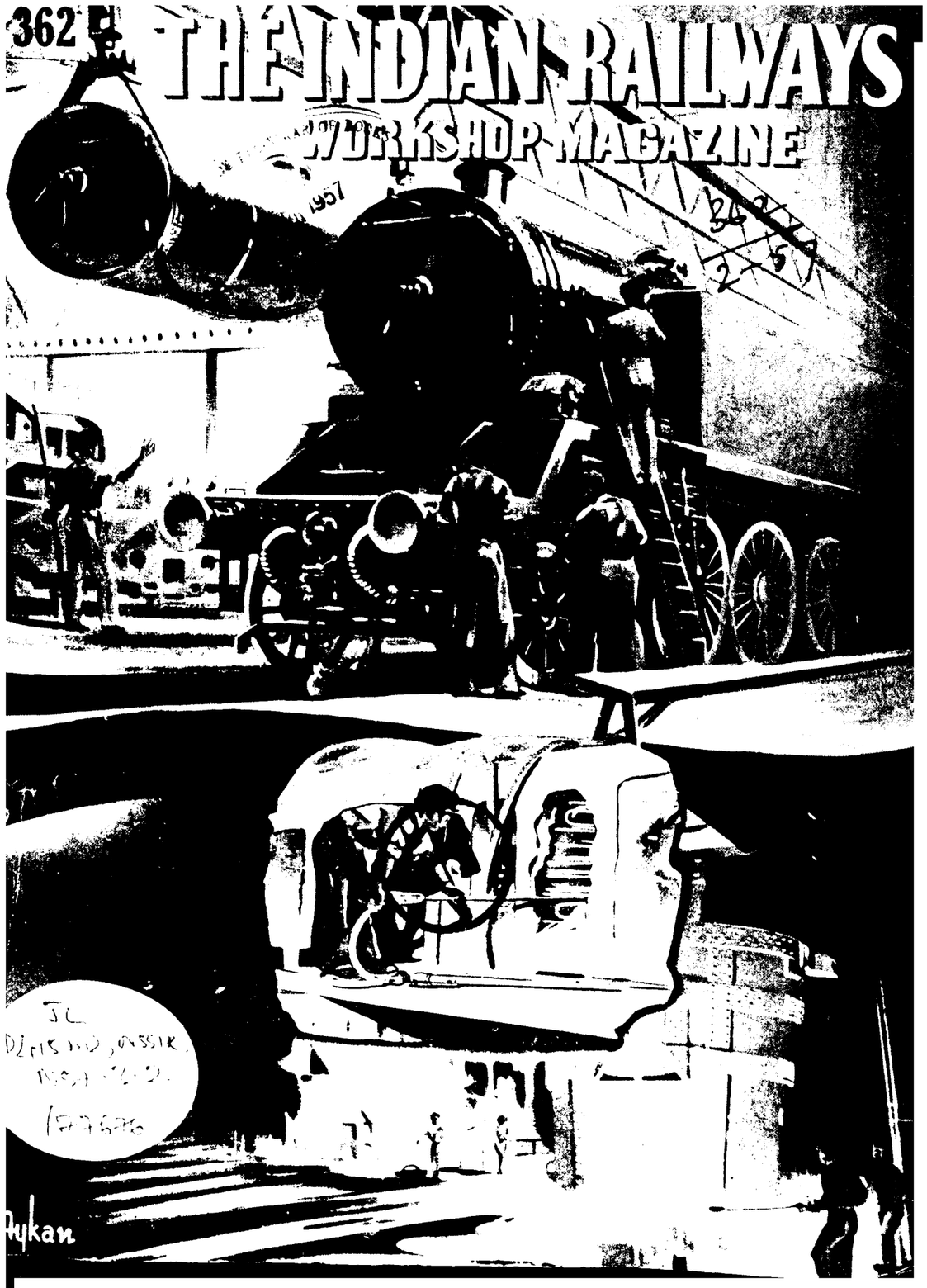
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THE INDIAN RAILWAYS
WORKSHOP MAGAZINE
1957
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THE INDIAN RAILWAYS WORKSHOP MAGAZINE

ENGINEERING & INDUSTRIES SUPPLEMENT

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THE GRINDING WHEEL IN MODERN INDUSTRY

By A. Suddons
Carborundum Universal Ltd., Madras

While the use of abrasives to produce a beautifully polished surface is an ancient art, the advent of synthetic abrasives, have made possible great advances in the application of grinding wheels in industry. In India, the demand for abrasives has been growing and with the start of a modern factory in Madras, the needs of the country in its rapid industrialisation can be fully met.

THE use of abrasives for removing excess material and producing attractive surface finishes is not by any means a modern conception. Some of man's earliest written records, for example, the Bible, speak of the use of the "Grind-stone" and the beautifully finished work in metal and stone of Egypt, Rome, Greece and India bear testimony to the skill of ancient craftsmen in their handling of the natural abrasives, mostly seashore and river sand, at their disposal. For hundreds of years grinding wheels have been hewn and shaped from natural stone, usually of the soft sandstone varieties; old prints and records show such wheels in use in the 18th century in England, sometimes in "batteries" of five or six wheels at a time, so that they have a peculiarly modern appearance. Such grinding wheels were used particularly by cutlers and it is only in recent years in England that the use of "natural" wheels has ceased in favour of artificially produced abrasive wheels.

The Industrial Revolution in Europe had many far-reaching social and industrial effects, one of which was to bring grinding wheels into wide-spread and increasing use as industrial tools, particularly at first on rough jobs such as the grinding of foundry castings. Though natural abrasives had perforce served their purpose in earlier days, the need began to be felt for abrasives which could be produced commercially on a large scale. As it has so often happened, the answer to this need came almost accidentally in 1891 when Edward G. Acheson in America first produced Silicon Carbide by artificial means.

For some months Acheson was under the impression that the hard crystals he had produced were composed of corundum and carbon but subsequent research showed that the new compound was Sic, Silicon Carbide, rather than the compound first supposed. Acheson had the vision to see the possibilities of the material as a synthetic abrasive having already sold his first supplies to New York lapidaries, and before the end of the summer of 1891 he incorporated the Carborundum Company and started out to fill his first order for 60,000 wheels. This was the beginning of the synthetic abrasives industry, which to-day is world-wide. Following hard on the heels of the commercial production of Silicon Carbide, there came in 1900, also in America, the production of Aluminium Oxide from Bauxite ore. Although fused Aluminium Oxide was developed later than Silicon Carbide, it makes up the largest volume of abrasives used today, exceeding even Silicon Carbide in the annual tonnage used. These two abrasives, Aluminium Oxide and Silicon Carbide, form the basis of grinding wheel manufacture throughout the world to-day.

APPLICATION IN ENGINEERING

The advent of synthetic abrasives made possible great advances in the application of grinding wheels in engineering. During the past fifty years the abrasives industry and machine tool industry have together developed and almost bewildering range of grinding wheels and machines, capable in many instances of precision work of the highest character. No modern tool-room or machine

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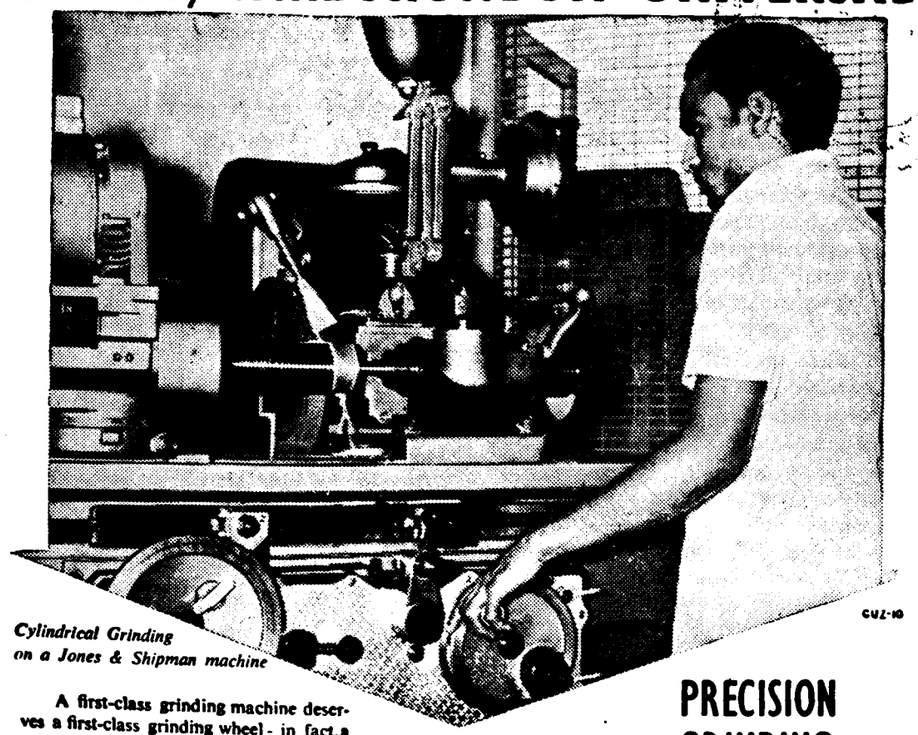

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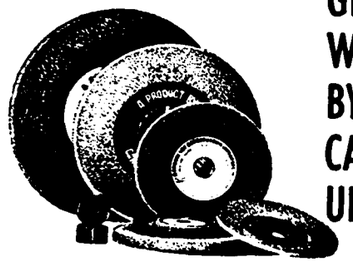

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shop is without grinding machines and new uses for grinding wheels are developed almost daily. The main advantages of synthetic abrasives over natural abrasives, which have made such advances possible are: the control of quality and exact duplication of the product which can be exercised with synthetic abrasives, the far higher percentage of abrasive present in synthetic wheels and the ability of the manufacturer to produce synthetic wheels of any required size and shape—within reason. Natural abrasive wheels were rough and ready and no exact grinding techniques could be developed with such tools.

Nowadays, particularly when mass production methods are employed, speed of production and accurate repetition on grinding machines are essential factors and this demand is met by the modern synthetic wheel. In the automobile industry, for example, grinding machines form an integral part of the production line and, particularly with the accent on automation, many parts now pass through a series of grinding machines from rough to finish operation without any manual handling at all. This is particularly so on centreless type grinding machines with hopper feeds and automatic sizing, which are capable of producing thousands of work pieces hourly to accurate limits and good surface finishes. Machines for tool and cutter grinding, surface grinding, internal grinding and cylindrical grinding as well as for such special jobs as spline, roll and slideway grinding are used in great numbers in machine tool, automobile, railway and general mechanical engineering workshops, so that the demand for grinding wheels has grown so great that the abrasives industry now occupies an important place in the industrial world.

The demand for abrasives in India has swelled every year and the present programme of industrialisation is sure to call for increased supplies. It is to meet this demand that a factory has recently been built near Madras by Carborundum Universal Limited and from this factory a comprehensive range of vitrified bonded grinding wheels is already going into industry.

We have already seen that the two abrasives in use to-day are Aluminium Oxide and Silicon Carbide. These abrasives are bonded into grinding wheel shapes with a variety of bonding mediums—ceramic and organic, the organic bonds being resinoid, rubber and shellac. A range of ceramic bonds is available, each having characteristics which make it suitable for allying with a particular abrasive for a particular job.

Silicon Carbide is used in two types: regular and green; Aluminium Oxide is used in two types also; regular and White. As each of these four abrasive types is available in a wide range of grit sizes and also a controlled range of wheel hardness is used, the selection of the ideal grinding wheel for a given task may at first sight seem to be rather a formidable proposition. In actual fact a little consideration and some experience can reduce the margin of error to practical limits. It might be helpful here to show how a typical grinding wheel grading is made up:

Vitrified Wheel Marking AA60-K5-V8.
AA = White Aluminium Oxide abrasive
60 = Grit size
K = Wheel grade or Hardness
5 = Wheel structure
V = Vitrified bond
8 = Manufacturer's bond symbol.

DIFFERENT TYPES FOR DIFFERENT JOBS

Each part of the wheel grading is linked with the work for which the wheel is intended: the abrasive is determined by the material to be ground, the grit size by the stock removal and surface finish required,

(Continued on page 5)

BRANDED SYNTHETIC ENAMELS AND THEIR APPLICATION TO COACHING STOCK

By Gibson Taylor
Jenson & Nicholson (India) Ltd.

THE Railways decision to return to the application of Branded Synthetic Enamel as a standard means a return to Pre-war travel conditions.

It is a critical situation when the travelling public are anything but happy at the thought of a long train journey; so let us see how the re-introduction of high quality paints is going to improve travelling conditions in India.

The outward appearance of Passenger Coaching Stock viewed from the station platform is of paramount importance.

Branded Synthetic Enamels have proved to be the most durable, protective and most

(Continued from page 4)

the wheel grade by the type of material and machines, whilst the bond usually is an automatic choice which is governed by the abrasive used. Normally, Aluminium Oxide abrasive is used for grinding steel and all high tensile alloys with White Aluminium Oxide reserved for jobs where the grinding must be done with the minimum of heat, since White Aluminium Oxide is extremely free cutting. Silicon Carbide is used for all low tensile strength metals such as Cast Iron, Brass, Copper and Aluminium and also for grinding Glass, Wood, Rubber and plastic materials. Green Silicon Carbide is used particularly for grinding tungsten carbide tools which cannot be ground really successfully with any other abrasive apart from a Diamond abrasive wheel. Even when all the factors have been carefully weighed, a margin of error remains and sometimes various wheel gradings must be tried before the one best suited for the work involved can be isolated. Most grinding wheel manufacturers print explanatory literature concerning grinding wheel selection and are usually pleased to supply such literature to those interested.

Particularly in the last ten years there has been great activity in the abrasives industry and, apart from vitrified bonded grinding wheels, diamond abrasive wheel and resin bonded wheels have been the subject of intense research and competition. Diamond abrasive wheels are becoming increasingly popular for the grinding of tungsten carbide and the modern diamond wheel can show very economical and efficient results in this field. For most diamond wheels a metal bond or matrix is used, though for certain applications a resin bond is employed. However, resin bonds find their real scope in the field of high speed grinding and cutting, which is largely confined to foundries, steel plants and any job where large numbers of pieces of metal must be ground clean or cut to required lengths. The normal vitrified bonded wheel does not as a rule operate above 6,500 surface feet per minute, but high speed resin bonded grinding wheels usually work at 9,500 surface feet per minute, whilst resin bonded cutting wheels work at speeds up to 16,000 surface feet per minute. Such wheels are capable of surprising performances; for example, a resin bonded cutting wheel 16" diameter and 1/8" thick will cut steel bar at the rate of 1 sq. inch per second. Though at present diamond wheels and resin bonded wheels are not in wide use in India, there is no doubt that in the next few years, the use of such abrasive tools must gain currency.

superior economical coating ever applied to coaching stock.

Synthetic Enamels are not new to Railways, trials were carried out as far back as 1934 and Enamels supplied by Messrs. Jenson & Nicholson (India) Ltd., London Varnish & Enamel and other leading manufacturers, were accepted by the Railway Board in 1936 as Standard Exterior Finishes.

The standard of workmanship at this time and upto 1940 was very high, and the coach painter assured with this extraordinary Enamel and Varnish, coupled with the lining and numbering with Gold Transfers was producing a body-side finish equal to that of any British or American Railway.

State Saloons, Patiala & Baroda, Bombay Governor's Saloon, Railway Officers' Saloons and The Deccan Queen painted in colours Cream, Blue and Gulf Red were examples of a first class coach finish and maintained a smart appearance at all times.

Unfortunately during World War II, quality finishes faded out as attention was diverted to war work.

From 1940 to 1947 painting and general repairs to Coaching Stock were sadly neglected, and when the war was over repairs and paintwork were in such a bad state it became a major job trying to bring the stock back to something like normal.

In the absence of Synthetic Enamels, cheap quality paints were applied, these failed miserably inside six months hence we saw the trains (both local and main line stock) in a general shabby condition.

Coaching Stock in general is subjected to the most rigid atmospherical and mechanical tests.

Synthetic Enamels applied to the exterior coach bodies are subjected to tropical sun, monsoon rain, humidity, cold and sandsstorms. In addition the bottom side panels are subjected to pan supari spital (containing lime) and other nuisances committed by the travelling public. Infact, anything which is deposited through a moving train window deposits itself on the bottom side panels.

The return to Branded Synthetic Enamels is immediately noticeable on the Central Railway new experimental DeLuxe Air-Conditioned trains painted in Green / Cream, Red / Cream and Blue / Cream and which will run on the Northern, Western and Southern Lines.

It is also encouraging to note that three full 3rd Class trains of vestibule ended coaches (allowing full length corridor throughout the train) have been put into service.

Dining cars are also receiving special attention.

Interiors have not been forgotten, tinted ceilings are replacing the plain white, walls are being panelled in a variety of Indian Timbers and French polished. Fittings, ashtrays, fans etc. are being stove enamelled in pleasing colours and in a number of clever hammer and trick finishes.

We may all look forward to the immediate future and really enjoyable rail travel.

DRY BATTERIES

The National Carbon Co. (India) Ltd., Calcutta have undertaken the manufacture of a variety of miniature dry batteries including several types of medium and high voltage batteries required for electronic equipment and other scientific apparatus. The bulk of the requirements of these batteries is not met by imports. Inquiries may be addressed to the Development Engineer, National Carbon Co. (India), Ltd., P. O. Box 2170, Calcutta giving relevant details regarding the size of the battery required, voltage, available compartment space, maximum permissible weight, etc.

Concrete on the Railways

TRADITION ON THE RAILWAYS

FOR many years past the use of cement concrete, both plain and reinforced, has been steadily increasing on Indian Railways. A hundred years ago, when the first railway was built in India, lime concrete and wrought iron were the materials chiefly used for railway structures, and many of these structures still stand-monuments to the careful designing and excellent workmanship of the early railway engineers. These structures have not only stood the test of time, but have also been carrying, in many instances, much heavier loads than they were originally designed to carry—proof of the remarkable conservativeness in the codes of railway engineering practice. This "play-for-safety" attitude continues to this day on our railways and can be seen even in some very recently built bridge structures. The explanation of so much conservatism lies partly in the vigorous and fluctuating conditions of loading to which railway structures are subjected and partly in the fact that railway engineers have to guard against failures which may result not only in damage to public property but also in the loss of a great many lives.

In recent years, however, our knowledge of the behaviour of structures under load has been much advanced by scientific investigations and research, and with the modern materials now available for structural works, a stage has been reached when considerations of economy must be balanced against those necessary to ensure safety.

CONCRETE REPLACES STEEL

In the past, when the tempo of construction was slow, steel was available or could be imported in time for new works. Again, for frames of minor structures and for posts, trusses and purlins of the thousands of sheds which the railways need for a variety of purposes, secondhand rails were always ready at hand. This sufficiency in new steel and old rails is no more with us. We cannot afford to import: our own output of steel is unable to meet the full demands even of works of first rate importance and the indiscriminate use of rails for structural work would, under the present circumstances, be a waste of national assets. Worn rails can be re-rolled into structural sections or into rounds for reinforcement and then put to far more economical use in structures.

CONCRETE PRODUCTS

With steel so difficult to obtain, it is cement concrete that has helped the railways to cope with the heavy post-war rehabilitation schemes. Concrete has been used extensively in the make-up of station and way-side signboards and name-boards and even in signal posts and gantries. Small public amenity structures like water huts, tea stalls, benches etc. have been rapidly erected to type designs on many station platforms, using concrete components precast under controlled conditions in central casting depots. The rapid fencing in, of the many railway storeyards and workshops that have been established after the war has been carried out with the help of precast grooved pillar and sliding panel units.

CONCRETE MASONRY AND PRECAST CONCRETE

Large-scale manufacture of hollow concrete blocks has made possible the construction of railway colonies at speeds of a bungalow or a staff-quarter per day. With experience gained in hollow block masonry construction

on large projects such as the Chittaranjan Loco Works, the Assam Rail Link and Kandla Deesa Projects, initial defects have been overcome and concrete masonry is now being extensively used on all the railways, particularly in cities, where the cost of burnt bricks is high and in the many areas in the interior where good bricks and building stone are not available. The development of gunite and precast concrete work on the Western Railway and of composite precast and in-situ concrete work on the Central Railway have enabled these and other railways adopting the practice, to build far more "low-cost" staff quarter in the last few years than would have been possible in brick or stone masonry.

CONCRETE MARCHES ON

Meanwhile, research in this country and in Europe and America is showing to the solution of many problems. The many lessons learnt from field investigations have led to improved design details and better construction methods which must benefit the railways to a tremendous extent. Concrete used on the Railways, more than elsewhere, is often exposed to extreme and unusual weather conditions such as the dry heat and large variation of daily temperatures in most Indian deserts or the torrential downpours and persistent damp in the coastal monsoon areas. Fast-flowing rivers abrade bridge piers and the alternate wetting and drying by salt waters in tidal creeks eat them away. The smoke and fumes from locomotives attack chemically the underside of bridges crossing the track and the walls, pillars and roofs of running sheds and workshops. Investigations directed to making concrete weather-resistant will produce the answers that will help railway engineers to select materials and designs to suit these varying conditions.

Much progress has been made in the knowledge of cement and concrete since research works began in England and America some 30 years ago. In our own country, railways have carried out investigations in concrete and in the application of its results. Experiments on the water-cement ratio strength relationship were carried out as early as 1934 by the Bombay Baroda and Central India Railway (now the Western Railway). In recent years the inter-relationship between the size, grading and other characteristics of aggregates and the work-ability and economy of concrete mixes have been investigated. Based on these investigations a method of rational proportioning of concrete has been evolved which has been employed by the Western, Central and other railways to obtain concretes of known and requisite strengths.

CONCRETE IN LOCO SHEDS

In the majority of locomotive sheds in India steel components in the form of beams, rafters, trusses and stanchions still predominate. The rapid deterioration to which steel is subjected in the warm, moist, sulphurous atmosphere makes repairs and even replacement of sections of the sheds necessary at comparatively short intervals so that heavy maintenance costs are incurred.

Concrete, on the other hand, is not so sensitive to chemical attack and past experience has shown that if properly cured its deterioration, when subjected to normal loco shed atmospheres is negligible. In case of severe conditions, such as those obtained through the burning of low grade coal, the application of two coats of a bituminous solution to all exposed surfaces has proved effective in protecting the concrete and preventing condensation. Hence with the provision of an adequate cover to the reinforcement and the adoption of a few simple precautions the adoption of reinforced concrete components in the construction of loco sheds gives to the structure a longer trouble-free life than can be expected from steel.

British Railways have made considerable use of reinforced concrete for loco sheds in the post-war years. Faced with the reconstruction and renovation of about thirty sheds at the same time in one of the regions it was decided to undertake the big task by using precast reinforced concrete units which were standardised for the various components of the structure. Both straight sheds and roundhouses, most of which varied in shape and size, were constructed by this means. Apart from the economy effected and the greater life imparted to the structure, speedier construction resulted. This is borne out by the fact that the reconstruction of the roundhouse at Carlisle which comprises of nearly 10,000 precast units was completed in nine months including a delay of five weeks due to bad weather.

CONCRETE FOR ASHPANS

Both precast and cast-in-situ concrete ashpans and inspection pits are now in common use in yards and loco watering points. These are more economical than the masonry ones which preceded them and concrete being a good reflector of light provides an additional advantage.

CONCRETE IN WORKSHOPS

In workshops, warehouses and similar structures where a large, unobstructed floor area is an essential consideration, difficulty has always been experienced in the design of roofs. Due to its considerable dead weight the ordinary reinforced concrete slab and beam type of construction is uneconomical for such a large span so that steel trusses and sheets despite their high renewal and maintenance costs are still in common use on our railways. However, the development of the shell roof, the adoption of which results in considerable economy, provides an excellent solution.

Shell roofs, which have been constructed for several industrial structures in India have shown excellent stability and strength compared to other structures under similar conditions and possess the following advantages :

(i) they make possible a considerable reduction in dead weight as a very small thickness of concrete suffices,

(ii) they result in lower costs due to the reductions in concrete and steel quantities,

(iii) they provide large unobstructed floor areas,

(iv) they lend themselves to varied architectural treatments, and

(Continued on page 10)

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KAMANIS CONTRIBUTION TO THE INDIAN RAILWAYS

THE contribution of Kamanis to Indian railways dates back to the War years when for the first time in India, Arsenical Copper Rods were successfully manufactured at their Jaipur factory for locomotives boilers. The Jaipur factory of Kamanis was engaged in supplying Phosphor Bronze, Manganese Bronze, Naval Brass and Silver Solders for railways and defence requirements. The Bombay factory (at Kurla) of Kamanis was also supplying cupronickel strips and arsenical copper plates to meet urgent Government and railway requirements.

In the post-war era, Kamanis established an Engineering Sales Division for import and supply of heavy and light electrical, mechanical and articultural machinery and equipment and engaged and trained a team of experienced engineers and technicians. Kamanis are now representing some of the most renowned manufacturers of plant and machinery in Austria, Belgium, Germany, Italy, Japan, etc. Kamanis were able to secure orders for locomotives, boilers, wagons, etc. from the Railway Board and thus serve the best interests of the country by introducing new manufacturers who could give very cheap prices and earlier deliveries. Kamanis are agents in India for rolling stock and ancillary equipment manufactured by firms like Wiener Lokomotive-fabrik and Simmering Graz Pauker in Austria and the Finmeccanica Group in Italy. Kamanis have also received an order from the Northern Railway for some telecommunications equipment.

Kamanis are having the biggest plant in India for design, fabrication and galvanising of steel structurals at their factory at Kurla. The contribution made by this plant for fabricating towers for high tension transmission lines in various power projects in this country is indeed prominent. Worth mentioning is the order placed by the Integral Coach Factory at Perambur for steel structurals for Shop Structures which was executed promptly. A recent contract has been avoided to Kamanis for supply and erection of complete 33 kV Transmission Lines from Howrah to Burdwan Main Line and Tarakshwar Branch. Work on this erection is proceeding apace.

At the plant at Okha, Kamanis are assembling wagons which are imported in c. k. d. condition from abroad for the Railway Board. The output in the assembly plant at Okha exceeded the target fixed by the Board by 50 per cent and this achievement was highly appreciated by the Railway authorities.

Other items of manufacture of the Kamani Group include electric house service meters, copper and cadmium copper conductors, non-ferrous sheets and strips, zinc oxide, etc.

(Continued from page 9)

(v) any shape including the north light type can be adopted.

In India, the advantages of the use of concrete units and the thin shell concrete roof for railway workshops have still to be realised. Steel is in short supply and its conservation is a national necessity. This is a significant factor which calls for increased use of reinforced concrete in which the quantity of steel required is small compared to that employed in steel frames, trusses, etc.

Ferguson-the Most Popular Tractor

IN the efforts to raise India's agricultural production, the contribution made by Ferguson tractors is outstanding indeed. Since the introduction of the Ferguson tractor in this country, Indian ryots have bought as many Fergusons as all other wheeled tractors combined. Year after year, India's leading farmers have chosen Ferguson tractors in lieu of cash at the annual prize distribution of Krishi Pandit Awards.

The popularity of the Ferguson tractor is not confined to India. More than half a million Ferguson tractors have been produced at the Coventry factory in the last nine years. There are Ferguson tractors on more than fifty per cent of all British farms. In 117 countries Ferguson tractors are engaged in agricultural development. This phenomenal success of the Ferguson tractor is not accidental. Its popularity is based on its unique features and performance.

A REVOLUTIONARY SYSTEM

The Ferguson System of hydraulically controlled mounted agricultural implements, invented by Mr. Harry Ferguson a quarter of a century ago, has brought new standards of efficiency, safety and manoeuvrability to farm mechanisation. For the first time in the history of agricultural machinery a tractor was available which was light but efficient; for the first time traction and penetration were obtained without heavy in built weight. This was achieved by making both tractor and implement work together as a single integral unit with the help of three-point linkage and automatic hydraulic control.

Ferguson implements, which are hydraulically controlled and mounted on the tractor, transfer extra weight to the rear wheels of the tractor and keep the front wheels stable. This System has given the Ferguson tractor the unique advantage of automatically adjusting its weight to the job resulting in less fuel consumption and low operational costs. The hydraulic system allows the implements to follow the contours of the ground and so give even depth of operation.

Versatility is another outstanding feature of the Ferguson System. There is hardly any important farming job for which a suitable Ferguson implement is not available. All implements in the Ferguson range have been exhaustively tested by farmers and field advisers under actual operating conditions in a wide variety of soils and climates.

Every Ferguson tractor and implement sold is backed by a fully comprehensive after sales service operated by all Ferguson Dealers. This system of service provides each new tractor with constant attention during the critical early months of the tractor's life. Free service vouchers covering six months are included with each new tractor. During this period the machine will be checked and inspected at frequent intervals, free of charges, by fully trained Ferguson servicemen.

After the expiration of the free voucher scheme the Ferguson servicemen will continue to call periodically to inspect and advise, and to recommend when service is needed. No charge is made for these calls.

INDIA'S TRACTOR

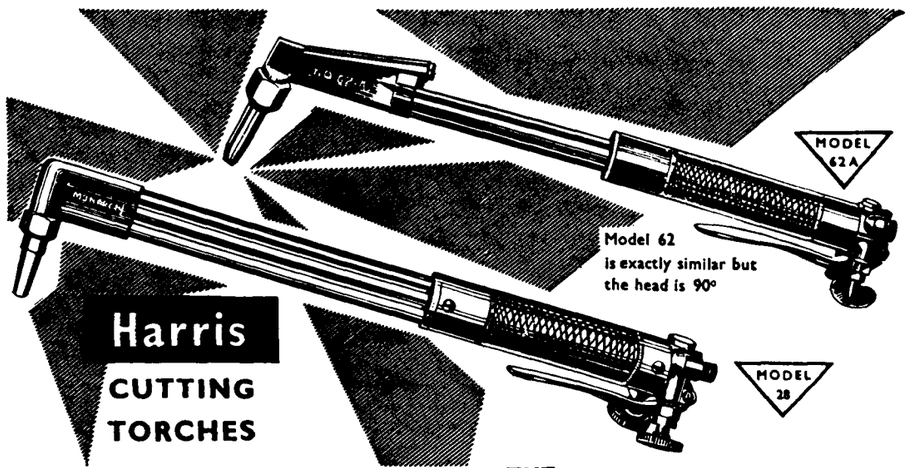
Massey-Harris-Ferguson (India) Ltd., have not confined their activities to the marketing of this outstanding tractor. A consistent policy of the Organisation has been to design

implements to suit Indian conditions. A special department in the Indian Company is engaged in the sole task of designing new equipment to meet Indian requirements.

Two years ago the Company introduced a new implement for Wet Paddy Cultivation, which was designed in India to fulfil local needs. The Ferguson Paddy Disc Harrow has proved tremendously successful in India and the yields obtained by using this piece of equipment have exceeded bullock-worked results by 25—75 per cent.

A comprehensive Education plan is one of the most remarkable features of the Ferguson Organisation. Two Ferguson Schools are in permanent operation in India to-day; one is run by Massey-Harris-Ferguson (India) Ltd., at their Head Office, in Bangalore and the other is conducted at Kashipur near Delhi by the Escorts (Agents) Private Ltd., the Ferguson Distributors in North India. These schools educate the Dealers' personnel in all aspects of the operation and maintenance of farm machinery.

The Government of India have granted approval for the progressive manufacture in India of the Ferguson Tractor, under licence, by Standard Motor Products of India Ltd. Production of Ferguson tractor will be carried out shortly in an extensively and modern factory located near Madras.



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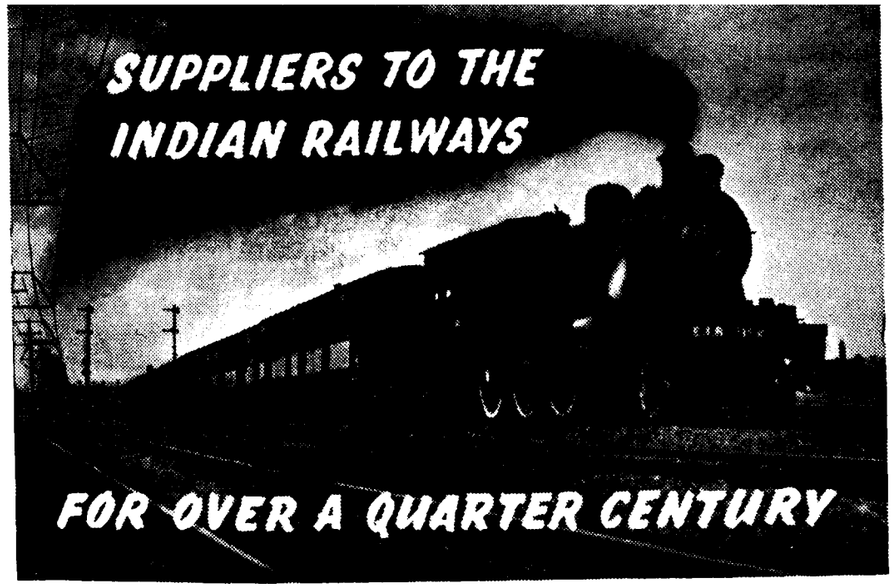

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PAINT - AN INDUSTRY IN INDUSTRY

THE Paint Industry has its own charms and attractions but not without difficulties and limitations under Indian conditions today—limitations in that :

(a) For quality products, the country is dependent on many imported raw materials.

(b) The essential raw materials form a part of the basic chemical industry—which India has yet to develop.

(c) Skilled technicians with long years of experience are not generally available, although undoubtedly the future is safe in the hands of the present technologists, who are rapidly waxing in experience, learning and recording as they grow up.

(d) The conception of paint and indeed definition of it has changed considerably over the past few decades ; the making of it (general paint) perhaps once a simple affair, is no longer so. Research and development in the technology of paint and other branches of Science, such as Physics, and Chemistry, Mathematics and even Geology, and has made paint formulation and production a highly complex affair. To be in the forefront in this knowledge, there must be constant endeavour. This requires experience, funds, time and unrestricted support and co-operation of the users of these paints, particularly those engaged in industry.

(e) In India today, the Paint Industry is one of the most competitive, where the necessity of healthy competition in the development of products and techniques cannot be overstressed ; perhaps, the situation in the industry at the present time is not as healthy as one would like it to be. The acute competition is very largely due to under usage of the present installed capacity. In between, there has been the 1st Five Year Plan and the 2nd is in the embryo. Out of sheet desperation, there has been cut-throat competition but the future can be faced with optimism in view of the all round increase in industrial activity. The Paint Industry, which is largely a service industry will have plenty of scope for 'service' in future years. Competition there will be and must be, and it will operate with the interests of the ultimate consumer in mind—he (or an industry) must be given a better product, better in every desired respect and at a cheap price.

(f) A gallon of Indian made paint is perhaps the most expensive in the World, not because of 'profiteering' by the manufacturers (indeed conditions are such that most of them are earning nominally) because of determinable and indeterminable loadings on cost, viz. the wide fluctuations in price of imported raw materials, the fluctuations in price of essential oils available in the country. A reflection on price is usually conditioned by Government's export policies, the import duty on certain raw materials and now excise duty.

QUALITY CONTROL

A quality control system has been established in many of the leading paint factories, whereby the raw materials, imported or indigenous are tested and analysed at every stage of manufacture as per specifications laid down.

For some years now, the Indian enterprise in the manufacture of paint and ancillary products has been progressing satisfactorily and it reflects no small credit to the advancement that has been made, when we find that these products are well established in all the markets of the country in spite of the competition the Industry has to face in the marketing of their products So that their products are more and more popular with a variety of consumers they have to cater, their development and research work in well equipped laboratories are being stepped up and tuned to turn out quality products.

In spite of the advance the paint industry has made during the recent past, a survey of the cross sections of the consuming public will reveal the surprising fact that the vast majority of people are not paint conscious.

Most of us have little or no knowledge of the complexity of modern paints and their importance in our economic structure, both domestic and commercial.

PAINT AS A DECORATIVE

As decorative, paints play a very important and vital role. Indeed, its selection and conscious utility is usually a pointer to mankind's progress. They must necessarily stress how far the people of a country are advanced in their aesthetic sense and values. With the accent laid more and more on the streamlining of buildings, furniture, limousines, etc. and with the many faced Second Five Year Plan of our Government, the paint industry assumes particular significance and importance, whether the application be in architecture or industrial finishes.

AS A PROTECTIVE

In the modern era, paint is no longer a luxury product but a necessity. Not only paints add beauty and colour wherever they are intelligently used, but they also help to minimise recurring expenditure and investment in view of their protective properties. Whilst the decorative urge remains, the chief factor influencing the average buyer, the economic angle of the protective quality of paint coatings calls of more emphasis. We have not yet evolved any structural material, which does not deteriorate on exposure to the elements of nature, and paint coatings still remain the cheapest method of ensuring that maintenance costs are kept down to the minimum. As a 'surface coating' the necessity of paint cannot be over emphasised–gigantic structures to cycles, 100-storey sky scrapers to the modest bungalow, a kitchen stove or Bensen Burner, luxurious automobiles or the ricksaws, are surface coated in a manner that would appeal and protect.

COLOUR APPEAL

Efficient employment of colour is verily like a magician's wand transforming as it touches. It will create a 'New Look' gloss over imperfections and reflect beauty and colour to what was common-place before. Today, we are in the midst of a renaissance of colour in the field of decoration.

To quote from an American Paint Journal "By the very nature of things, colour enters most prominently into the art of living. It registers on the most dominant sense in all normal people—the sense of sight. The eye cannot see, form or design, without the contrast colour affords. Perhaps that is why a large percentage of all retail buying decisions in stores are made for or against merchandise because of colour ? And this is based on impulse in which colour plays the strongest role. This all is due to part of the fact that the eye is 400 times quicker than the ear—and because people are influenced 90% by the emotional appeal colour contributes and only 10% by reason."

PLASTIC PAINT—THE FINISH WITH A FUTURE

There has been major development in the paint field and the latest is the introduction of Plastic Emulsion Paints.

Plastic Paints have won almost instantaneous acceptance. This encouraging success of Plastic Paints marks them as something different from the usual range of paint processes. The market for this type of paint is enlarging, and a close analysis will reveal that the reasons for this are in the method of application and the comparatively negligible capital layout by way of special equipments for their application. In needs no special skill or technique, and even a layman can get an excellent finish with the brush.

These Plastic Paints are made available in a galaxy of pleasing pastel shades and they do enhance the beauty of the place you live in and totally change the atmosphere. Nothing in nature give us more pleasure than the perception of colour.

AUTOMOBILE FINISHES

Perhaps, the most important and the costly finish a paint manufacturer has in his range of manufacture is the Automobile Lacquer. The trend in the automobile industry in the country today is to lay more emphasis on colour. Paint insures a better look, increases to sales appeal and above all provides a positive attraction to the prospective buyer of an automobile, and that is why paint manufacturers have something special though costly to offer in Nitrocellulose Lacquers to this vital industry. Here again, the colour range produced is brilliant and extremely pleasing. Hi-gloss lacquers, iridescent lacquers, metallichrome lacquers, etc. Each manufacturer, and in India, there are only a few at present—has his own specific schedule of application of his products. To guard against premature failure, painting is resorted to only after preparing the metal surface and properly treating it. The automobile finish is a highly specialised aspect of the paint industry; the control in their manufacture, the research in their development is more rigid and demands the exercising of greater skill and labour—this is inexorably so both in manufacture and application.

To paint an automobile to a perfect, pleasing and scintilating finish, right from the preparation of the metal surface to the ultimate finish, a host of ancillary products like the Metal Prep., Primer Surfacer, Putty, etc. are employed each having a specific function and each demanding a fair treatment in application in enhancing the final outlook of the vehicle.

Many are the industries to which the paint industry caters its manufactures. The Motor Car Industry, the fan manufacturers, the furniture manufacturers, the pencil industry, toy manufacturers, the Textile Mills, Ship Building, Aircraft, railcoaches—indeed what not.

The many projects in the country, and the expansion of major industries in general, the railways, bus transports, and the many phases of development envisaged by the Second Five Year Plan—all go to make up an interesting and prospective colour carnival.

With the progress now visible in all walks of life, with the numerous schemes of our Government in the near future, we may hope that paint industry in particular would have secured for itself a worthy place in the panel of many industries in the country. It is an Industry that is "Essential" for Beauty, for Industry, for Pleasure and for Craft.

An Example of Mechanical Lubrication Applied to a Modern Steam Locomotive

BRITISH LUBRICATORS FOR SOUTH AFRICAN RAILWAYS

SOUTH African Railways are now being supplied with ninety 4—8—4 locomotives and although not all of these are being manufactured in this country, they are all being supplied with British lubricators and lubricating systems. These engines, fitted with condensing tenders to provide economy in water also have mechanical stokers feeding the boilers which work at 210 p. s. i. Locomotive design is such as to provide a very high degree of efficiency and economy and impressive results are expected from their performance.

The lubricating systems are particularly interesting and in some respects unique for they represent the latest developments in modern steam locomotive lubrication. Each locomotive receives positive lubrication to 49 points from two lubricators. One of these lubricators which is a 24-feed unit utilises only 16 feeds and supplies the points by means of Dividers. This lubricator feeds to 48 points, whilst the second unit is a single feed lubricator feeding to the stoker engine only.

The lubricators are made and supplied by Davies & Metcalfe Ltd., Romiley, Stockport, and lubrication of the cylinders and chassis is effected by one of their FSA/3 Valveless Mechanical Lubricators fitted with 16 outlets. Metcalfe Patent 2-way and 4-way Oil Dividers are extensively used so that positively regulated feeds are supplied to 48 points from this lubricator. The use of these Dividers greatly simplifies the piping arrangement and yet ensures a positive feed to each point. The Dividers do not merely split the feed from the lubricator but ensure that each point receives a pressure fed accurately dispensed quantity of lubricant.

Feeds to valves and pistons are fed through Metcalfe Olva III high pressure terminal check valves and atomisers. The importance of feeding atomised oil with the steam ensures lubrication of every moving part that comes into contact with the steam.

LUBRICATION OF DIEBLOCKS

A feature of the lubricating system that is of particular interest is the lubrication of the expansion link dieblocks. The pipeline is transferred in an ingenious manner on to the moving link and oil is thus conveyed to the working faces of the dieblocks. This arrangement should go a long way to reducing the wear on these parts caused by dusty atmospheres in which these locomotives frequently have to operate.

LARGE OIL RESERVOIR

Another feature of the system is the fitting of a large oil reservoir of 25 gal. capacity and fitted with calibrated oil level sight glass and a large filling plug with fine mesh strainer. This reservoir feeds by gravity into the lubricator casing which is thus permanently filled and enables large distances to be travelled between refills of the reservoir. This also cuts down attention required and minimises risk of oil shortage due to errors in routine maintenance.

Steam heating is fitted to both lubricator and oil reservoir so that immediate operation from cold in extreme temperatures is ensured.

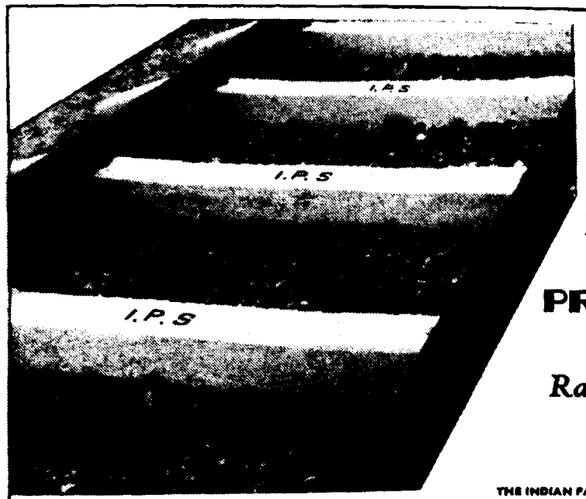
The drive for the F. S. A. 3 lubricator is taken from the expansion link trunnion and

conveyed to the lubricator by rods fitted with pre-stressed rubber bushings. The lubricator is fitted with a roller ratchet drive (and crank handle for hand operation when necessary) and embodies a calibrated sight glass and two internal strainers. The pump units are of valveless design as are all Metcalfe lubricating oil mechanical lubricators.

The mechanical stoker is driven by a small steam engine and it is this engine that is lubricated by a Metcalfe S. 2. valveless single feed lubricator. This supplies oil to the engine cylinders through a Metcalfe Olva III high pressure terminal check valve. A 2-gallon oil reservoir supplies oil by gravity to the lubricator and this reservoir is fitted with a calibrated oil level indicator glass, a large diameter filling plug and a fine mesh strainer. The drive for the lubricator is taken from the engine flywheel and conveyed to the roller ratchet drive on the lubricator by means of rods fitted with pre-stressed rubber bushings.

STEAM INJECTORS (*Non-Condensing Engines*)

Each boiler is also fitted with a Metcalfe type VN Live Steam Injector each of which has a capacity of 5,250 gal./hr. These Injectors are fitted with fixed cones and are of the automatic re-starting type. The design of the cones enables a large range of regulation for the delivery capactiy to be obtained.



The First Name in **PRESTRESSED** *Concrete Railway Sleepers*

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RECORD RAILWAY CASTING

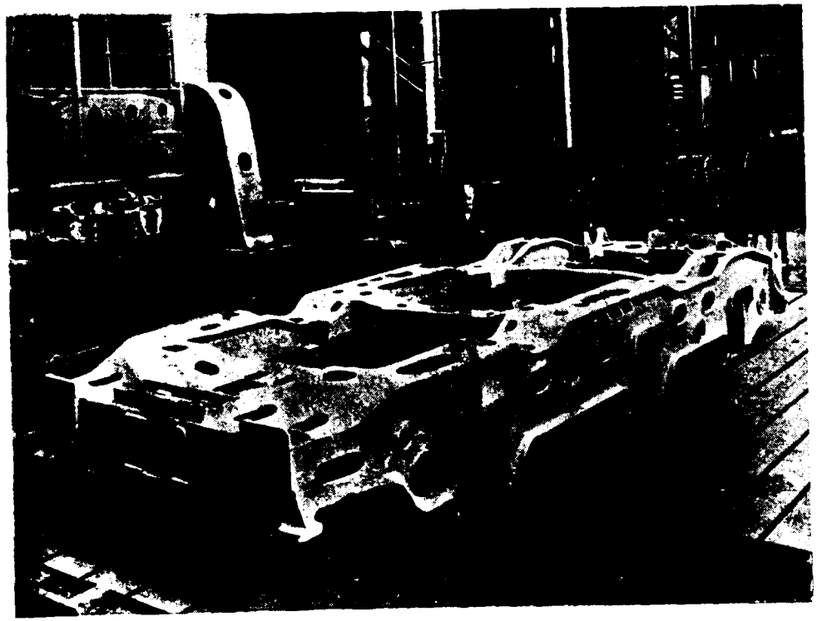
ENGLISH Steel Castings Corporation, Ltd., Sheffield, one of the E. S. C. subsidiaries, recently despatched the largest railway casting of its kind ever made outside the United States.

It was the first of a series of one-piece cast steel three axle driving truck beds for New South Wales Government Railways' 3820 H. P. 0–6+6–0 electric locomotives, which Metropolitan Vickers–Beyer, Peacock, Ltd. are building at their Stockton Works, and for whom English Steel Castings Corporation are sub-contractors.

Measuring almost twenty-five feet in length by eight feet in width, and weighing approximately 7½ tons, the truck beds, which are of heat treated steel equivalent to A. R. specification M. 201–52 Grade 'A', are designed to carry three 1,500 volt force ventilated motors mounted on each axle.

The locomotive superstructure is carried on a pair of truck beds, joined by means of a special articulation coupling which permits spring controlled lateral movement, whilst the locomotive is traversing a reverse curve. To compensate for the shortening of truck centres on curves, one of the pair is allowed one inch of longitudinal movement at the centre of the casting. The rail load per axle is 18 English tons, whilst a notable design feature is the mounting of the draw and buffing gear on the truck headstocks.

The locomotives, forty in all, which are for lifter goods or passenger traffic, will be used on lines running over the Blue



One-piece cast steel three axle driving truck bed for New South Wales Government Railways, made by English Steel Castings Corporation, Ltd., Sheffield.

Mountains, where the track rises from sea level at Sydney to 3,500 feet, with ruling gradients of 1 in 33. Their maximum operating speed is 70 m. p. h.

*** *** ***

TRANS-ATLANTIC CO-OPERATION OUTSTANDING SUCCESS

Three years of Anglo-American co-operation in its most practical form is now showing very promising results at E. S. C., and at the same time proving a great dollar saver for the Sterling Area.

On March 3rd 1953, English Steel Corporation Ltd., signed an agreement with the General Steel Castings Corporation of Granite City, Illinois, to produce under licence, 'Commonwealth' type one piece cast steel bogies. This type of bogie has been used for many years in the U. S. A. where their durability, strength and reliability have been well demonstrated. Their design combines maximum strength with minimum weight, and they have acquired the reputation of giving smooth, easy riding at all speeds, ensuring a long maintenance free life.

Since 1953, approximately 2,300 bogie sets of many types and valued at over £3,000,000 have been ordered from English Steel Castings Corporation. They range from small carriage bogies 10 ft. long and weighing 27 cwt. to monster electric locomotive beds 25 ft. long and weighing 7½ tons for 3,820 H. P. locomotives. The castings are destined for the railways of Brazil, South Africa, East Africa, Eire, New South Wales, New Zealand and other overseas countries. At home, in connection with the British Transport Commission's modernisation scheme, British Railways have recently ordered a number for large scale trials on diesel electric and electric locomotives, and passenger coaches.

AMERICAN VISITS

Since the agreement was signed English Steel Castings Corporation has sent a number of its technical staff to visit the General Steel Castings Corporation in America to study production methods, processes and techniques. New production layouts based on the ideas gained in the United States, and capable of producing over fifty bogie frames a week are nearing completion at the Grimesthorpe foundry.

The new equipment includes 'roll over stands' to simplify the handling of moulding boxes, a speedslinger, an almost entirely automatic sand preparation and feeding plant, a very large mechanical shake-out machine, mould and core drying ovens and a new core shop layout.

The speedslinger, purchased in the U.S.A., and already in use, is capable of ramming sand at the rate of a ton a minute. Whereas it previously took two skilled moulders 17 hours to ram the bottom half of a mould, one operator using the speedslinger now takes forty minutes. The men released by the new process are now employed on the coring up and closing operations.

PROBLEM SOLVED

One of the problems solved by the visit of our technicians to America, was how to get rid of gases trapped by the molten metal in the moulds, where there is a considerable amount of sand cores almost entirely surrounded by thin sections of liquid steel.

The flow of information was not all one way however. We too were able to offer useful advice especially on very heavy casting work.

SAFETY SHUNTING GEAR FITTED TO I. R. S. METRE GAUGE COUPLERS

REDUCTION of, but preferably obviating altogether, the potential danger arising through shunters entering between moving vehicles to set couplers during marshalling operations is a problem which has become increasingly important to solve. In the United States Central Automatic Couplers are provided with operating handles which the shunter can manipulate in safety whether the vehicles are at rest or moving.

A. B. C. Coupler & Engineering Company Limited, Wolverhampton, England, who for somewhere around half a century have been manufacturing Metre Gauge couplers, have now succeeded in providing a complete answer to this dangerous hazard by the introduction of a few inexpensive components into the coupler without the necessity for modifying the coupler in any way. The accompanying illustrations show a Metre Gauge vehicle fitted with the Safety Shunting Gear. Figs. 1A and 1B show alternative views of the gear in the normal coupled position: Figs. 2A and 2B show alternative views of the same gear in the uncoupled position. By lifting the handle at either side of the vehicle the hook is raised where it remains even during the roughest shunting operations: by pushing the operating handle

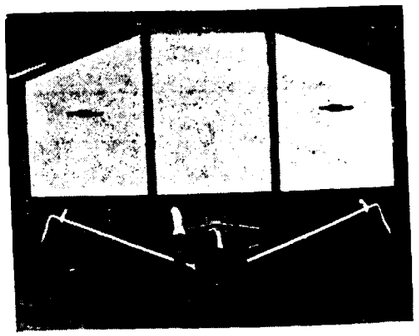


Fig. 1A

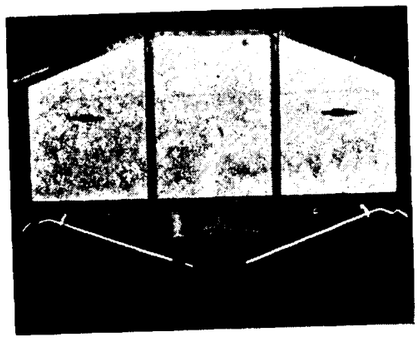


Fig. 2A

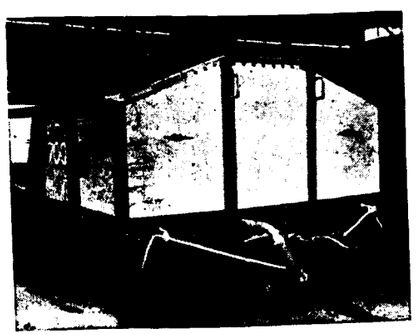


Fig. 1B

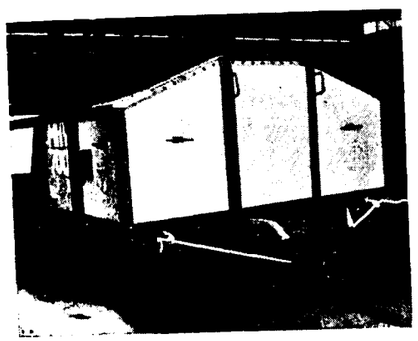
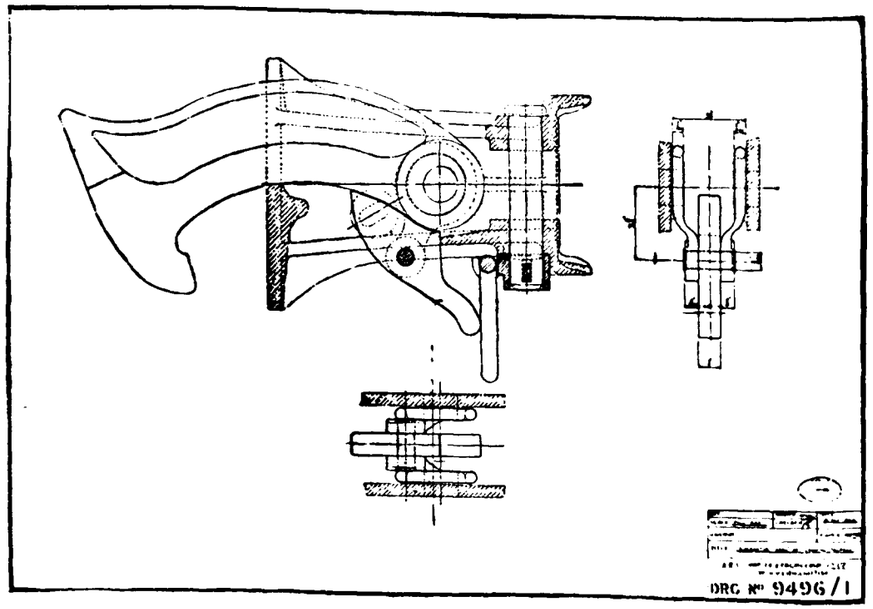
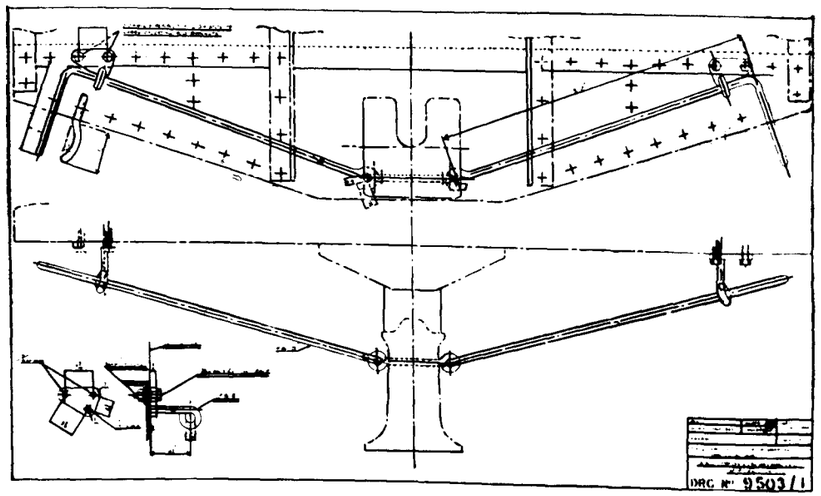


Fig. 2B





down the hook is restored to its normal horizontal position when it is free to couple automatically.

Fitting this simple device precludes absolutely any necessity, or even temptation, for the shunter to pass between vehicles in motion : he will, of course, require to pass between stationary adjacent vehicles in order to couple or uncouple the brake hoses, also to tighten or loosen the coupler slack gathering gear.

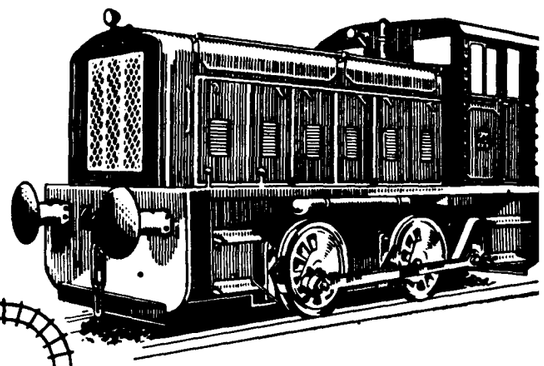
Standard I. R. S. Couplers are at present fitted with a Column to hold up the hook in the Hook Head and a Slipper to facilitate uncoupling, in the Yoke Head : the Slipper and Column are no longer required when Safety Shunting Gear is fitted. Not only, therefore, is safety secured to the shunter but the marshalling operations are speeded up by as much as 30%. A further advantage is the indication given to the shunter whether adjacent vehicles are coupled or not by the position of the Operating Rod Handles.

The components comprising the gear consist of the two Operating Handles, which can be seen in the photographs and which are retained in position on the end of the wagon by means of the Eye Bolts. A Bearing Bracket is slipped over the bottom extremity of the Pivot Pin and held in position by the existing Split Cotter. From this Bearing Bracket a trunnion-mounted Lever is freely suspended in a vertical plane, the extremities of the trunnion arms being formed into eyes which connect with the lifting handles. To provide an actuating mechanism between the Lever and the hook an Intermediate Assembly is introduced. This Assembly of three components provides an Intermediate Member or Tailpiece which rests upon the two Hook Bolt bosses where they protrude into the Coupler Head. When the operating handle is moved it revolves the Lever which makes contact with the Intermediate Member which in turn operates the hook. The Intermediate Member is so shaped on its face which connects with the Lever that when the hook is raised the Lever becomes captively retained in a pocket from which it cannot escape until the operating handle is moved in the opposite direction.

Mighty 'work horses' for a growing nation

The benefits of diesel loco haulage are to be observed readily at industrial works sidings, harbours, docks etc., in countless situations throughout the world.

Clean and economical running, easy maintenance, low costs, no stand-by losses, always ready to get on with the shunting job from cold, and ready to demonstrate fuel economy... these sum up the Ruston diesel shunting locomotives ... but may we send you more details?



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THE ATLAS CYCLE INDUSTRIES LIMITED, MANUFACTURES ONE CYCLE EVERY 1½ MINUTES

THE name of our Company hardly needs any fresh introduction. It is a name fairly well known throughout India as manufacturers of the famous bicycle the "EASTERN STAR".

The history of our Company is a live story of great enterprise and progress. Started only about 6 years back, our Factory has made huge strides and has, so to say, worked wonders.

The Foundation Stone for the main Factory Building was laid in May, 1951 and within almost a year, the first batch of complete bicycles was made by the Factory and released to the market. Since then it is a story of continued progress and achievements. Production continued at an accelerated pace and every month saw an increase of 25% to 50% in the production. The production at the end of 1952 was 120 cycles a day. It is today producing 400—500 cycles a day.

As already stated the progress being made by our Factory, has been almost phenomenal. It was on the 7th September, 1954, that our Factory completed its first 1,00,000 bicycles. It was a day of proud rejoicing for our Factory as it marked a distinctive milestone in its progress.

The Management desired to celebrate this occasion by an act of dedication. They decided to present the 1,00,000th bicycle produced by the Factory, to a noble cause—through the noblest son of India, Shri Jawaharlal Nehru. The Prime Minister graciously consented to receive this gift, a product of an out-and-out Indian Factory. Six bicycles bearing the Factory numbers 1,00,000 to 1,00,005 were presented to the Prime Minister at the Prime Minister's House, by our General Manager, Mr. Bishamber Das Kapur and our Works Director, Mr. Jai Dev Kapur. "Pandit Ji" was very much pleased to receive these cycles and he made keen enquiries about our Factory.

The following production figures showing graph of our progress speak for themselves:—

1951	..	8609
1952	..	12131
1953	..	44644
1954	..	72248
1955	..	101125
1956	..	115212

No. of employees

1. Workers — About 1500
2. Staff — About 300

Components worth only Rs. 15/—c. i. f. value per bicycle are imported by us against the retail price of Rs. 135/—per cycle. In 1957 this price will be reduced to Rs. 10/— only. With the increased production, we have been able to reduce the price of our bicycles by Rs. 18/—last year.

LABOUR WELFARE ACTIVITIES

The facilities given to our workers are one of the outstanding ones in the history of Indian Industries. Distinguished visitors including Ministers from the Centre and Provinces and public men have commended these activities to other Industries in both the Private and Public Sectors. There are Clubs for Officers, Staff and Drama lovers subsidised by the Management. The Dramatic Club is manned mostly by workers

(Continued on page 25)

NEW CHAIRMAN, RAILWAY BOARD

SHRI G. PANDE, outgoing Chairman of the Railway Board, who recently relinquished charge of office on attaining the age of super-annuation, has been succeeded by Shri P. C. Mukerjee, erstwhile Member (Engineering), Railway Board.

Born on October 30, 1904, Shri Mukerjee joined Government service on November 26, 1925 as an Asst. Engineer on the former East Indian Railway. Between 1926–1940 he held various posts on the E. I. Railway such as Asst. Supdt. (Staff), Employment Officer, Executive Engineer, Personnel Officer, etc.

In August 1940, his services were placed at the disposal of the Department of Supply, Government of India, where he was appointed as Deputy Director-General, Munitions production. He returned to the former E. I. Railway in 1947 and took over as the General Manager of the B. N. Railway in 1948. A year later, he became the first General Manager of the Chittaranjan Locomotive Works and played an important part in nursing this project during five formative years. Earlier, he headed a Survey Committee appointed by the Government of India for locating a suitable site for the Chittaranjan Locomotive Works. He was also a member of the Defence Ministry's Ordnance Factory Capacity Committee.

From Chittaranjan, Shri Mukherjee went as the General Manager, Eastern Railway in March 1954 and six months later, joined the Railway Board as Member (Engineering). He was also appointed the Chairman of the Hindustan Machine Tools Factory.

Shri Mukherjee comes from a family of renowned public servants. His father, Shri S. C. Mukherjee, was a member of the Indian Civil Service in Bengal. His younger brother, Air Marshal S. Mukherjee is Chief of staff of the Indian Air Force; his sister, Smt. Renuka Ray is the Minister of Rehabilitation, Government of West Bengal.

(Continued from page 24)

and their performances have been appreciated even in the Central Capital. There are two special Committees for Cultural and Sports activities and workers' representatives are functioning on these Committees. Regular facilities include free medical aid, free sports material, cycles on instalment basis, Cinema Shows, Provident Fund, Leave with wages, Library & Reading Room, Ladies & Children Park, free supply of Milk, Gur and Tea to certain class of workers, Education Stipends and lumpsum grants to the workers' children, free cloths, cycle purchase concession, Provision Stores etc. A modern Canteen has been built last year at a cost of about Rs. 2 lacs which accommodates 400/500 persons. A meal comprising of one vegetable, dal and four chapaties is available to workers at Annas four, a Theatre where workers stage their Dramas, Atlas Ladies Sewing School for imparting training in sewing, cutting and embroidery to workers' wives and daughters. Last year the Management gave two months' salary as Bonous to all its employees for the year 1955.

Amongst the distinguished visitors to the Factory recently were Mrs. Indira Gandhi, Shri K. C. Reddy, Union Minister of Production, Shri Gurmukh Nihal Singh—Governor of Rajasthan, Shri Mohan Lal, Finance Minister of Punjab, Shri D. P. Karmarkar—Minister for Trade, Shri Manubhai Shah—Minister for Heavy Industries and several other distinguished citizens from all parts of the country.

A7676.

Research on Indian Railways— Lucknow Centre's Annual Report

DETAILS of the progress made in research work on the Indian Railways are given in its annual report for 1955—56 published by the Railway Testing and Research Centre at Lucknow.

The Centre functions directly under the Railway Board, in charge of a Director at present Shri S. L. Kumar.

Among the important investigations carried out at the Centre during the year were trials in connection with the running of high speed vestibuled air-conditioned train services on some trunk routes; development of cycle trolleys; use of loco. coal ash as building material; performance of different types of sleepers in the track; formulations for compounds to prevent corrosion of rails; design and construction of better instruments for measuring forces exerted by locomotives, riding quality and comfort of coaches, pressure exerted by soils and development of paints and varnishes.

Successful designs of broad gauge and metre gauge trolleys capable of being pedalled without fatigue by one man at a time at a speed of 8 miles per hour when carrying a load of about 1,200 lbs. were finalised. Only two trolleymen would be required in place of four for running these trolleys, which are light enough to be removed off the track by two men without any difficulty.

UTILISING LOCO. ASH

Nearly 1.5 million tons of loco. ash are annually produced by the Railways, and a large quantity out of this goes to waste. This material has been successfully used by the Centre in building materials and attempts are now being made to pulverise it when it can replace a portion of cement in concrete work without affecting strength. The economics of pulverisation are being studied.

An unusual complaint of bug nuisance was received frequently from passengers travelling by the Bombay-Poona Janata Express. Two samples of insecticidal varnish sent to the Central Railway by the Research Centre were found effective in destroying the bugs and also in preventing re-infestation for a period of two months.

Research is also being carried out on bridges and structures as well as on the effect of wind pressure on platform shelters.

The report says: "Our investigations have convinced us that there is a wide field of study in railway engineering, whether in the track work or in the design of locomotives and rolling stock. Indeed, almost the whole problem of track-in-relation-to-the vehicle remains unsolved."

The Centre publishes a quarterly journal called the Indian Railway Technical Bulletin. Documentation Notes giving a survey of technical literature are issued every month to all the Indian Railways and to a number of Railways outside India, particularly those in the ECAFE region.

LATHES IN RAILWAY WORKSHOPS

By A. C. Bhattacharya, A. M. I. Prod. E.

MODERN Specifications covering the construction and upkeep of Railway rolling stock call for a high grade of finish on all constructional parts, corresponding to the latest advance in technical knowledge. The man in the Workshop is only capable of meeting the ever-increasing demands made by the designer if the machine—tool industry produces suitable machinery which will enable him to machine the parts in question in a practical and economical manner.

Probably the most primitive form of machine tool was a sort of lathe which has been in use for centuries past by the brass and wood workers of India. This lathe has the head and tail stocks consisting of wooden stakes driven into the ground at the required distance to take the work, and a bar of wood lashed to them to support the tool. The spindle was driven by a kind of bow, made from a stick about a yard long with a cord attached to its end, the cord making one or two turns round the spindle, which was caused to rotate, first in one direction and then in the other, by alternately pulling and pushing the stick, the work being turned during the forward stroke by means of hand tools, just as was common practice in brass finishing shops until quite recently.

Though it was of a very simple form, but the human skill and pride of craftsmanship enabled excellent work to be turned out. Development from this crude tool to the highly complex machine tool of present times is comparatively recent and may generally be considered to have commenced towards the end of the 18th century.

HISTORICAL RESUME

Although the boring machine, built by John Wilkinson in 1775, is considered the first "modern" tool, this machine was, after all, only a special adaption of the lathe, the latter being considered as the parent of all machine tools, as from it have been derived the drilling, milling, screwing, sawing and grinding machines, in addition to the boring machine.

Till 1680, the lathe was developed to an extent where-by only high class wood work could be turned out of it very easily. In 1741, Hindley, a clockmaker of York, produced a small screw-cutting lathe, having change gears.

The real foundation of the modern lathe was laid by Henry Maudslay, who designed the first slide rest to receive general practical application in about 1794. In his own works in London in 1800, he produced his first screw-cutting lathe with 28 change wheels embodying the feature of the self-acting slide rest. Commenting on this invention, James Nasmyth, who is famous for his association with the development of Steam hammer, stated—"it is not at all saying too much that its influence in improving and extending the use of machinery has been as great as that produced by the Steam Engine". In fact this invention paved the way for the rapid and continuous development of the lathe along the familiar modern lines.

TYPES OF LATHES

The lathe is undoubtedly the most widely used of all machines in all workshops including railway workshops and is regarded as essential for certain types of work. For mass production, the plain lathe has been supplanted by specially developed turning machines, such as the multi-tool production type, the automatic, capstan and turret lathes, screw-cutting or threading machines, etc.

Among the special purpose lathes used in railway workshops are the wheel lathe, axle

journal returning and burnishing lathe and axle turning lathe. Most of these more or less complicated types have been developed from the plain metal turning late of the past.

Multiple-tool lathes are used for machining a large number of identical parts in greater speed and is suitable for mass-production purpose. As the name implies, in place of a single tool that has to be changed for each individual turning operation, a number of fixed tools are provided in the multiple-tool lathe. A front set, mounted on the saddle tool rest for turning parallel diameters is usually incorporated in this type of lathe so that when these tools are fed along the bed, towards the headstock, all the different diameters can be turned at a single operation.

For producing corners, radii, shouldering, bevelling, forming etc., another set of tools, which are fed towards the work together, is provided at the back of the saddle. The single feeding operation does all this work at once. Thus in two operations, viz: a bed feed and a traverse, the complete machining is accomplished.

In the automatic machine, the machine itself need only be started and it then operates automatically. The work piece, is fed into the headstock chuck and after machining ejected automatically through a guide or conveyor to a hopper. The machine needs no attention until all of the work stock is used up. Mud plugs and fusible plugs of locomotives are usually manufactured in this type of machine.

CAPSTAN AND TURRET LATHES

Capstan lathe is a very popular type of lathe for quick production of similar parts and is very widely used for production of studs, machined bolts etc. in railway workshops. Operating on the same principle as the plain type, it is provided with special facilities for rapidly changing over from one tool to another. Further the tools may be fed on to the work by hand in a convenient manner, stops being provided to limit their movement.

The special tool-holding arrangement, known as the Capstan, consists of a substantially designed circular or hexagonal block mounted on a vertical bearing. Holes located in each of the hexagon sides carry a separate machining tool. The capstan unit is mounted on a long dovetailed sliding member working in corresponding guides in a similar direction to that of the ordinary lathe saddle on the lathe bed. In some capstan lathes there is an automatic feed for the capstan unit, a special lead screw being provided for this purpose.

Possibly the machine tool which has been developed to a greater extent than any other and which is most certainly indispensable in the locomotive workshops, is the turret lathe. This lathe is in fact a development of the Capstan lathe and designed mainly for a longer and heavier class of work than in the case of capstan lathes.

In turret lathes, the saddle moves directly on the bed being fed from a lead shaft with a range of different feeds. Usually two type of turret lathes are used in railway Workshops viz.: one for producing finished articles from the bar, which is held on a special bar-feed device behind the headstock and fed in through the hollow spindle of the latter, and the other, the combination turret lathe which is suitable for both bar and chuck work. Items like piston valve port bushes, cylinder liners, crown stays, stay bolts etc., are turned, bored or screwed as necessary at a high production rate, utilising tungsten—carbide tipped tools on combination turret lathes.

SURFACING AND BORING LATHES

For work of general nature in railway workshops, the surfacing and boring lathes are increasingly favoured. The work piece in this case is machined while being held in a chuck. They are extremely economical and the standard tooling can be easily and cheaply adapted to suit varying type of workpiece.

Fig. 1 Illustrates a 36" swing surfacing and boring lathe, manufactured by John Lang & Sons Ltd., machining a typical chucking job. Amongst the many noteworthy features

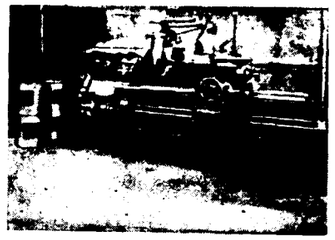

Fig. 1. Lang 36" swing Surfacing and Boring Lathe.

incorporated in this machine and explained below, are that it has a spindle speed numbering 12 with a range of feeds (cuts per inch) from 12 to 168 (normal) and 3 to 42 coarse.

The machine has the centre height from the floor as low as possible, consistant with strength, in order to give the operator an uninterrupted view of the cutting tool and facilitate gauging of large diameters.

The clearance of cuttings is well catered for in the form of a chute with conveys swarf to the rear of the bed. The tool holders in the hexagon turret are designed to suit most work of small batches and to take standard lathe tools.

The saddle is provided with quick power traverse motion in both directions along the bed, this being engaged by the normal sliding handwheel being pulled outwards towards the operator and given a part turn in the direction in which the saddle is to travel. Release of this handwheel automatically disengages the motion and stops the saddle traverse.

The gearbox is of the multi-change type giving a choice of 28 changes of feed in the normal range; by movement of a lever on the headstock a second range of 28 feeds, four times coarser than normal, can be obtained. The apron is arranged to give easy control to the operator, all levers being grouped for convenience. Provision is, of course, also made for an adequate coolant supply.

This machine is specially suitable for dealing with locomotive eccentric straps and sheaves and white metal liners.

Illustrated in Fig. 2 is a Lang 17" in Swing special precision tool room lathe to cater for light high speed turning. As a tool room is indispensable for any modern machine shop, similarly a lathe of this type is obsolutely essential for a tool room.

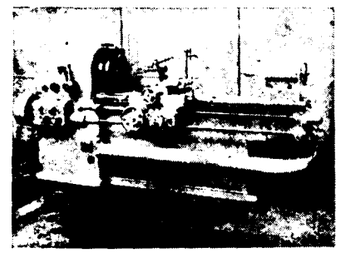

Fig. 2. Lang 17" swing precision centre lathe.

The bed of this machine is made of close grained cast iron containing a high percentage of steel to ensure the greatest possible rigidity under cut. The limits of error to which the machine is built, are of an exceptionally fine degree.

These lathes are on special demands supplied with a Monobloc Hydraulic Profiling Attachment enabling a batch of work to be

copied from a model held between centres at the rear of the machine. Complete accuracy is ensured and very high rates of production are obtained owing to the elimination of non-machining time.

WHEEL LATHE

The machining of the outsides of the mounted wheels with their tyres represents one of the most difficult turning operations that are encountered by railway workshops. To get over this difficulty, the wheel set lathe, often called wheel lathe only, has been designed.

The wheel set lathes are in fact centre lathes with special contrivances for turning the tyres, both treads and flanges, of wheels mounted on axles. To shorten the operation time both wheels are turned simultaneously. Two carriages are therefore adopted for each wheel with chucking and driving arrangements on both sides of the machine, on the headstock and on the tail stock. Both are connected to the same driving device.

Fig. 3 depicts a wheel lathe manufactured by Maschinenfabrik Deutschland, Germany for dealing with carriage and Wagon Wheel sets with outside axle journal.

The placing of the wheel set between the centres and the performance of gripping in this machine is effected by two synchronised pendulam clamping devices with electro-mechanical control. This arrangement provides automatic, rapid centering and clamping as well as positive driving of the wheel sets. The pendulams are equipped with adjustable friction drives to compensate variable clamping diameters.

The roughing tool posts are for turning the treads and flanges of tyres in their main inclination whereas the final shape is given by the profiling tool post. The roughing tool posts also carry tools to plane new tyres at the faces to exact dimensions and gauge distance. The profiling tool posts operate on cam principle, one cam being provided for the shape of the flange and one cam for the taper of the tread. Each of these cams is controlling a traverse of one tool, thus dividing the total length of the profile to be machined into two parts.

The variety of wheel sets, regarding the diameter of wheels and gauges, as well as the possibility of centering and driving call for different types of machines and different manufacturers have placed in the market

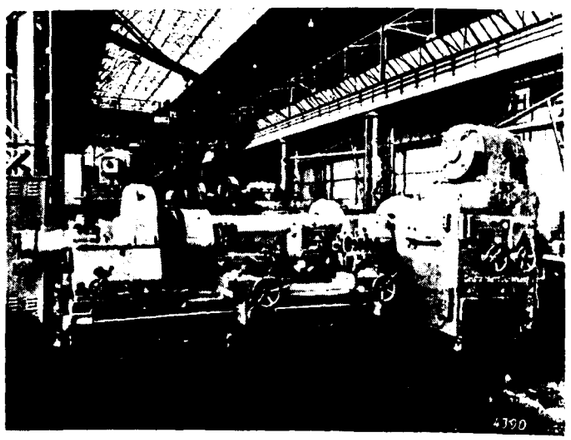

Fig. 3. MFD Wheel lathe for wheel sets with outside journals.

different types, each having its own distinguishable features, so as to offer a wider scope of selection. Illustrated in Fig. 4, is a CRAVEN 4'—0" faceplate double railway wheel lathe in operation. The tool rests in this case are fitted with turrets of 4-position type and arranged to take both high speed and carbide tipped tools. They are, as may be seen in the photograph, are mounted on a turret slide which is fitted on a swivel slide to be set at the correct angle for the tread. The tool slides have longitudinal and transverse continuous feed traverse in both direction.

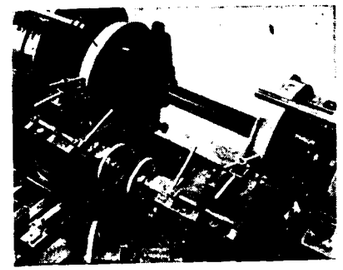

Fig. 4. 4'—0" Face plate C & W wheel lathe of craven make with turret type tool rests.

AXLE JOURNAL RETURNING AND BURNISHING LATHE

Fig. 5, illustrates the friction roller drive type axle journal returning and burnishing lathe to deal with outside journals of carriage and Wagon axles with the wheels mounted.

The lathe consists of a straight main bed with short members mounted on each end forming a double gap to take the wheel sets. The short members are provided with slideways on the upper surface upon which are mounted the saddles and the fast and loose headstocks.

The two live friction rollers acting on the treads of the wheels are driven by a shaft along the bed, from a constant speed motor and change speed gear box at the end.

The burnishing is effected by means of three rollers. A device is incorporated in the arrangement to bring the rollers readily into position against the journals, the frame carrying the top roller being balanced. A four-position turret tool rest, having variable self-acting transverse feed traverse, with adjustable stops for tripping the feed, and hand operated transverse and longitudinal adjustment is mounted at the front of each saddle for returning and radiusing the journals, and facing the outside bosses of the wheels.

Fig. 6 shows the special type of sliding bed lathe arranged for the returning of railway axle journals. The machine is

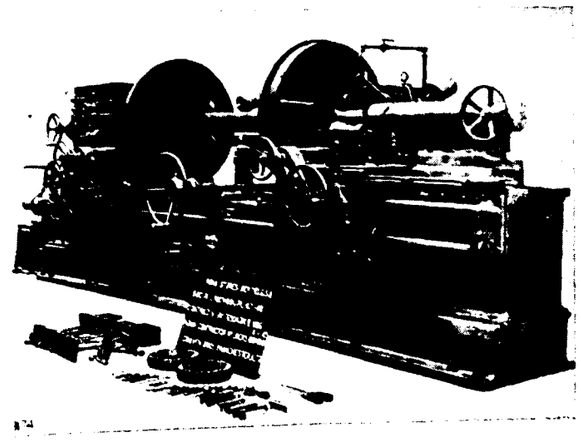

Fig. 5. Friction roller Type axle journal returning & Burnishing lathe. (craven make)

arranged with a double sliding bed so that two gaps may be formed to take the wheels while the axle journals are being machined. Two saddles are fitted at each piece of sliding bed.

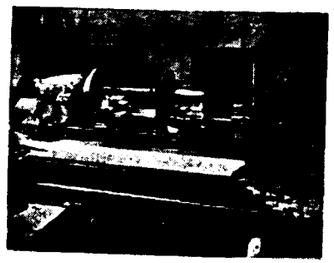

Fig. 6. Lang Axle journal re-turning break lathe.

The lathe is suitable for returning journals which are inside or outside the wheels. The width of the gap can be varied to suit different lengths of axle.

AXLE TURNING LATHE

The typical arrangement of a lathe suitable for axle turning is shown in Fig. 7. The

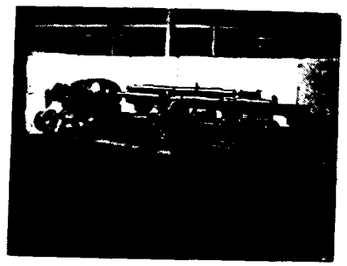

Fig. 7. Axle turning lathe.

machine is arranged with a special two-speed drive to the fasthead giving two speed ranges as follows :—

Fast : 12 speeds, 12.8 to 630 r. p. m.
Slow : 12 speeds, 4.4 to 219 r. p. m.

The slow range of speeds is intended for finish turning the radii of the journals and water scraping the journals. The fast range enables full use to be made of tungsten carbide tools on high speed cuts giving a fine finish.

The saddle is arranged with two mild steel square turrets one at the front and one at the rear of the machine. This enables the tools for machining the radii of the journals to be drawn into the work without any indexing of the turret. The saddle is arranged with a clock and brackets for length rods which can be used for accurate sizing if required.

The lathe is arranged with taper turning attachment with capacity of $4\frac{1}{2}$ deg. at either side of the centre line with a maximum length of taper of 30", enabling the taper in the centre of the axle and the taper on the wheel seat to be machined.

AXLE TURNING BY PROFILING

A recent advance has been made from the above method of axle turning whereby the axle is machined by profiling from a master carried at the rear of the lathe as shown in Fig. 8.

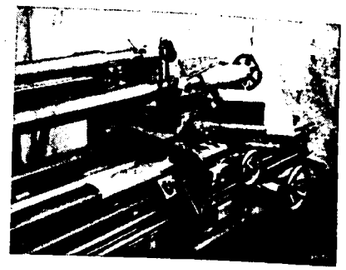

Fig. 8. Axle turning by hydraulic profiling.

Many different means of operations have been developed for profiling. They are electronic, hydraulic, pneumatic, electronic-hydraulic and pneumatic hydraulic. Each method has its own peculiar advantages and disadvantages, but for economy and reliability, the simple hydraulic methods are generally preferred.

It is however emphasized that all methods are essentially error-operated that is, the following stylus must be displaced to produce movement of the tool slide. The electronic methods are the most sensitive from this point of view and are therefore more accurate. Nevertheless, for normal machining purposes ample accuracy can be obtained hydraulically and this method has now been generally adopted for profiling on lathes.

In the machine illustrated, which incorporates a hydraulic profiling arrangement, the action of the profiling is as follows :—

A 45 deg. tool slide is operated by a hydraulic cylinder which is controlled by a stylus bearing on a master. As the saddle traverses the stylus causes the cylinder to move the tool in such a way as to reproduce the profile of the model on the work. An adjustment is provided to allow the tool to be moved relative to the stylus to adjust for diameter and shoulder position. The arrangement ensures consistent accuracy between each axle and also produces faster production times owing to the elimination of non-cutting time.

Before concluding the writer wants to emphasize that the machines illustrated and described are by no means the only suitable examples of their kind rather it has been his endeavour to select some typical and present day models from along the impressive array turned out by the machine-tool builders of to-day with a view to showing the progress so far made in this direction.

BHILAI IRON AND STEEL PROJECT

It is reported that the Soviet instrument builders manufacturing electronic potentiometres for the Bhilai Plant have progressed much in the work. These instruments are to be used for the automation of production processes in the Indian Plant. They simultaneously measure the temperature of molten metal with a high degree of precision and record and control the present temperature within the range of upto two thousand degrees. At present the plant is working on the first batch of fifteen such potentiometres. Some other Leningrad plants are also reportedly busy filling orders for India. Universal boring machines have been shipped to India from the Sverdlov Works. These machines are automatically controlled which greatly eases the work. They are designed for high speed operation. The USSR Refractories Institute is reported to have completed the technical design of the refractory materials department of the Bhilai Works. It will be equipped with up-to-date machinery including a mechanized rotary furnace for the calcination of dolomite with an annual capacity of several score thousand tons. A series of special installations for the Bhilai Works have also been developed. One of these will be used for checking thermocouples and resistance thermometres used in iron and steel production. Other installations will be used for automatic control and recording of thermal processes, flow of liquids, pressure and other purposes etc.

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INDO-JAPANESE TRADE AGREEMENT

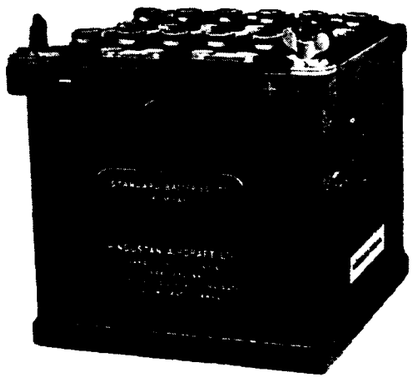
It is understood that the Government of India will shortly buy from Japan light and heavy machinery and industrial plants e. g. railway rolling stock, machinery for aluminium refining etc. against India's supplying to that country part of the steel for Japan's automobile plant at Djakarta in Indonesia. The total amount of India's imports will be about Rs. 350 crores.

Pioneers in Progress

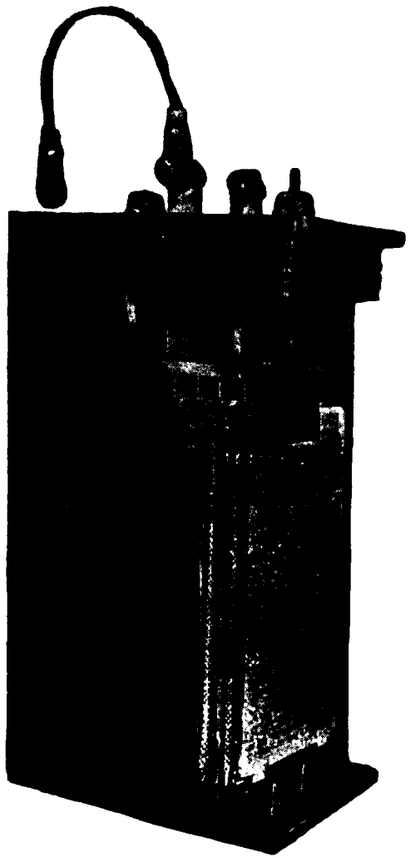
INDIA'S most versatile battery manufacturers — Standard Batteries Limited — started life thirteen years ago as a private limited company, manufacturing the battery plates only. It was converted into a public company two years later and established India's first modern manufacturing plant, comprising more than 600 men and occupying a built-up area of 1,13,000 sq. feet. New and latest equipment are constantly added to keep abreast of battery technique in the world.

FRUITFUL COLLABORATION

In 1954 Standard Batteries Ltd. entered into a technical collaboration agreement with Messrs. A. B. Tudor of Sweden, a firm of repute in the battery industry. The collaboration has proved fruitful and many of the Swedish firm's patents as well as their technical know-how, are at Standard's disposal. Tudor's engineers are at present in India, and have implemented many new manufacturing methods, processes and testing, which have enhanced the quality and performance of 'Standard' batteries.



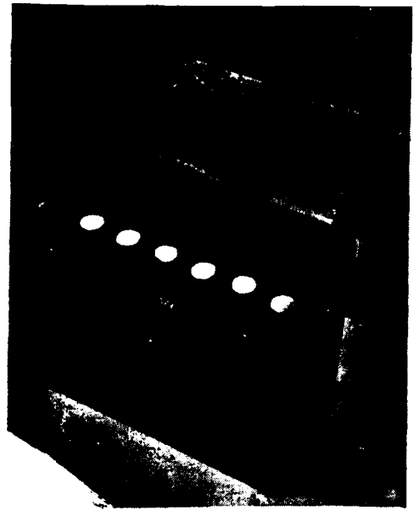
'Standard' aircraft battery, specially designed for India's first trainer, the HT-2



'Standard' type RPg lead-acid railway battery (cut-away view)

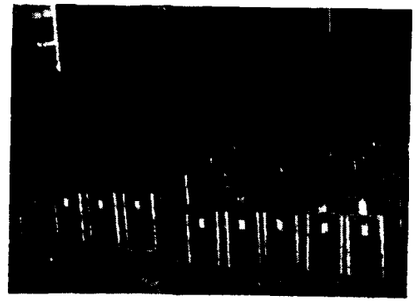
NEW DEPARTURES

In addition to car, lorry, truck and bus batteries—Standard's have entered into the specialised fields of train and telephone batteries as well as batteries for tractors, aircraft, radios, wireless, marine purposes, etc. The latest development is the new Standard RPg train-lighting battery which incorporates many



Close-up view of field wireless battery

new features—including 'MITEX' microporous latex rubber separators, proof against both acid and oxidation at temperatures up to 180°; pre-shaped grid protectors to minimise corrosion of the grid material; protective perforated Ebonite sheets to prevent damage to the elements in the cell during service; and the internal retainer of special spun glass fibre with an outer perforated P. V. C. sleeving, which brings down the ratio between the capacity and weight of the battery and, at the same time, ensures it



Field wireless batteries, in wide use with the Defence Services, ready for despatch

a longer life by preventing the shedding of active material.

Standards are producing special batteries for the defence services and aircraft, which are subjected to very strict quality control and rigid specifications.

CONSTANT IMPROVEMENT, STEADY EXPANSION

The Standard Batteries factory has grown considerably in size as well as in technical achievement since its start thirteen years ago. And this improvement and expansion are continuing—thanks to the tireless research and constant insistence on perfection which lie behind every STANDARD battery that leaves the factory. Standards are justly proud of their laboratory for control, testing and development work under a qualified scientist.

100 U.S. DIESEL LOCOMOTIVES FOR INDIA

THE Railway Board has placed an order for one hundred 2000 h.p., Diesel electric locomotives as a major step towards meeting the heavy goods traffic demands of the Second Five-Year Plan. The order, which is worth Rs. 10.7 crores (22.4 million dollars) has been secured by an American firm—Alco Products Incorporated of New York. All engines will be broad gauge and the first lot of 20 is expected to be shipped to India in June this year. These powerful engines, which will be able to haul bigger than train loads faster compared to the conventional steam locomotive, will help relieve the pressure on traffic that is anticipated on account of the new steel plants and the increased coal production. At present there are no diesel engines on the main lines of the Indian Railways' broad gauge system. A few shunting engines are in use in yards. There are also a few Diesel engines running on the Kandla-Deesa metre gauge line. Alco Products are expected to enter into a collaboration agreement with the Government of India for the training of Indian personnel in the repair and maintenance of the new engines. The training is to be given both in India and America.

Denham's Engineering Co. Ltd.

Model SR 10V High-Speed Lathe

FAST HEADSTOCK is designed and constructed throughout to transmit ample power through a wide range of 18 spindle speeds for high speed production turning using carbide alloy tools on the higher part of the range whilst allowing for high-speed steel tools on the lower speeds. With this end in view the normal spindle speeds are 1000—30 R. P. M. For some types of work or material, whilst the utmost strength and rigidity are required—as offered in this model—lower speed ranges are necessary, and these are available at customers' option, being either 750—22 or 500—15 R. P. M. By using a 2 speed motor, the higher ranges can be doubled (with reduced horse-power available on the lower range of speeds) to provide—

1000—30 and 500—15, or 750—22 and 375—11 R. P. M.

Where reversing is required (in all cases where Hydraulic Copying Attachment is fitted) a reversing main motor drive can be provided covering the whole spindle speed range.

The Spindle is machined from a solid high tensile steel forging, being accurately ground cylindrical, and bored 3.13/16 inches (97 m/m). At the work end it terminates in a flange of 10 in. (254 m/m) diameter for the reception of faceplates, chucks, etc., whilst at the rear end arrangements are provided for steadying bars passing through the spindle bore. The spindle is carried on special precision paired bearings, pre-loaded dual-purpose ball bearings taking the end thrust in both directions and in combination with ball and roller bearings taking the journal load. Shafts in the headstock are machined from nickel steel, ground and splined for the reception of sliding gears, and are mounted in ball bearing. Drive to the first motion shaft is transmitted through a powerful multi-plate disc clutch which provides a quick-acting brake on disengagement by the main control lever.

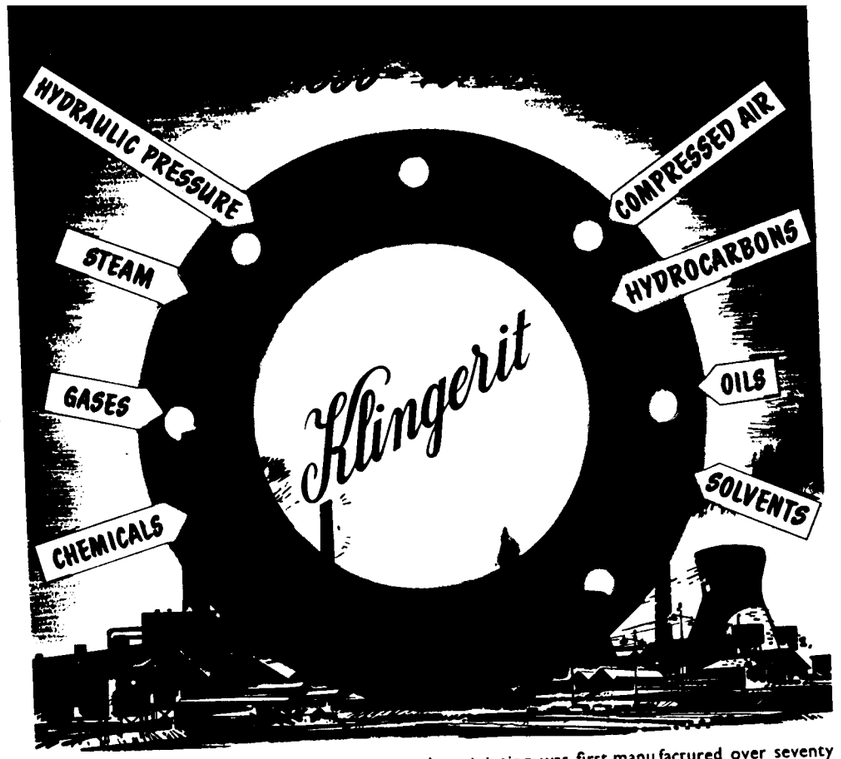
Final drive is by one of two gears mounted immediately behind the front spindle bearing. For rigidity and to avoid radial thrust on the spindle within the headstock it should be noted that a third bearing is provided for the spindle by a central rib in the headstock casting.

Gears are initially machined from air-hardening nickel chrome molybdenum steel in its annealed state, they are then further heat-treated and sand-blasted after which they are ground on the bore, face and toothform to ensure perfect fit on their shafts, balance for the speed at which they run, and correct toothform.

Oil for lubrication of the shafts and gearing is pumped through a filter to a trough in the top of the headstock (via an oil sight dome) from which it cascades and is piped to the necessary points. The spindle bearings are separately lubricated through nipples by a pressure oil gun.

Motor Drive is by veeropes from a motor fastened by adjustable slide-rails which are rigidly bolted to the lathe bed. Sufficient adjustment is available for rope-tensioning and the ropes are totally enclosed.

Tailstock is of massive construction, is designed to give sufficient thrust for adequate support in high speed rough turning, has



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Grams: "Waudco."

generous bearing on the lathe bed with location from the rear Vee and can be set over for taper turning. The spindle is of large diameter (4½ in.—115 m/m), is graduated in ⅛ in. for depth drilling and is marked along the centre line to assist tool-setting. Spindle locking is provided by a handle on top of the loosehead body. The heavy-duty running centre which is a necessary attribute of high speed turning is designed as an integral part of the loose-head, being housed completely within the loosehead spindle; in addition a plain centre bush and No. 5 M.T. centre are supplied. To facilitate moving the loosehead along the bed, a bracket is fitted with a pinion engaging the rack.

Bed is cast from a special mixture which gives a close-grained grey cast iron registering a Brinell hardness of 180/200 on the bearing surfaces. This, together with the liberal dimensions of the bearing faces, ensures a long and accurate life. The bed is of heavy and rigid design, with diagonal cross-ribbing to withstand the heaviest cutting strain and has inverted Vees for saddle and loosehead location. It can be supplied either straight (without gap) or with a gap of large capacity into which a half gap piece is fitted. The bed is supported by two or more cabinet legs according to length, and has easily removable chip trays, with the sump and pump for coolant in the tailstock end leg.

Saddle and Slides are well proportioned with large bearing areas, the saddle alignment being taken from its long engagement with the front Vee of the bed. Adjustable taper strips are fitted to the cross slides to take up any eventual wear, and thrust on the cross-traverse screw is provided by a pair of ball thrust bearings. Wipers are fitted to the saddle to prevent ingress of swarf or dirt with a long guard extending forward on the front Vee. The cross-slide is graduated in degrees to facilitate the setting over of the swivel slide for the turning of short tapers, and all micrometer dials are die-indexed and numbered for accuracy.

Standard Toolpost is of the English four-bolt two-pad type for the easy mounting of turning tools, boring bars, etc. and has a movement of 6½ in. (165 m/m). The toolslide screw is completely covered to prevent ingress of cuttings.

Square Turret Toolpost which is available as an extra, either in place of or in addition to the standard toolpost, is machined from a solid steel forging with the four sides gashed out to receive turning tools, and has all exposed surfaces hardened. It has accurate location in its eight positions and the screw and nut on its slide give a movement of 6½ in. (165 m/m) and are completely covered to prevent the entry of dirt.

Power Topslide can be supplied if specified at the time the machine is ordered. This is a very useful feature for the power turning of short, steep tapers such as on bevel gears, and is mechanically driven from extra shaft across the saddle.

Taper Turning (when ordered as an extra) is of the tangent-bar type. The maximum length of taper which can be turned with this attachment is 20 in. (508 m/m) with an included angle of 20 degrees.

Apron is of full box form with double bearings for all shafts, the fast running shafts being ball bearing mounted. A spring-loaded worm is incorporated to provide adjustable overload release and operation of longitudinal trip stops. Lubrication is piped from a distribution block fed by a pump from an oil sump in the bottom of the main casting.

Multi-Change Gearbox offers a very wide range of 54 feeds without the use of change-wheels All gears are of heat treated nickel chrome steel, mounted on multi-splined

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Railway Trunk Line in the Siberian Taiga

By N. Antonov

OF the 6,500 kilometres of new railway lines to be built during the sixth five-year period, the Stalinsk-Abakan line will account for 400 kilometres. This is a new line, an integral part of the South Siberian trunk line. It will pass through the as yet undeveloped districts of the Kemerovo Region and the Krasnoyarsk Territory. It will bring in reach the rich deposits of iron ore, coal, building materials and other valuable minerals, it will clear the way to the large forest lands.

Construction work along the line is in full swing. The work is conducted under very difficult conditions. All attempts to reach the natural riches of this area failed in the pre-revolutionary period. Prospectors called this area "the land of untouched wealth". One of the documents dating back to 1912 gives the following description of this area: "A desolate taiga area with numerous trees uprooted by the wind, with grass taller than man, where one cannot pass through either in summer or autumn without using an axe. There are no roads, not even a path which could be used to make a preliminary survey of the locality. The contour of the earth's surface varies to such a great extent, so sharply and so capriciously, that the laying of a railway is impossible according to technical rules".

Soviet people are successfully developing this territory. Railroad construction is being conducted simultaneously from both ends. Railway construction workers under the supervision of R. I. Kondratyev, a young engineer, are making good headway eastwards. Another party of construction workers under engineer V. S. Bondarev is making their way towards them from Abakan. They are being assisted by numerous construction gangs.

At present the demolition gangs have reached one of the most difficult sections of the new road called the Kazyr "press". In this place sheer cliffs stand on the very banks of the turbulent river. The men have to work in suspended cradles, hauling six-ton compressors and other equipment up the cliffs.

The entire length of the road has already been "inhabited". Trains for construction gangs have been pressed into operation on some sectors of the road, thus easing the work.

(Continued from page 38)

shafts running in ball bearings. An internal plunger pump provides lubrication by cascade from an oil trough to the gears and by piping to the bearings. Reversing motion to the feeds is operated by a conveniently positioned lever on top of the gearbox.

Screw-Cutting. The leadscrew is very accurately cut, within a guaranteed limit of 0.0012 in. per foot (0.010 m/m per 10 cm.) and a maximum cumulative error of 0.004 in. in any six foot length (0.102 m/m in any two metre length). The multi-change gearbox provides for the cutting of a range of threads from 2 to 80 threads per inch covering (with a very few exceptions) the whole of the Whitworth, British Standard Pipe, British Standard Fine, American Standard and American Pipe ranges of thread forms. Additional Metric or B. A. threads can be cut by using additional change-wheels available amongst extra equipment.

Coarse Pitch Screw-Cutting is available as an extra feature, whereby threads of ½ in.—¾ in. —1 in.—1½ in.—2 in. and 3 in. pitch can be cut. For this a special drive to the gearbox is employed and the threads are cut only when using the three lowest spindle speeds.

Standard Equipment supplied with the machine comprises :—

- 20 in. (510 m/m) dia. faceplate
- Tailstock racking bracket
- Heavy-duty tailstock revolving centre
- Apron control of headstock clutch
- Duplex driver-plate and drivers
- Electric suds pump and fittings
- Centre bushes and pair of centres
- Set of spanners and handles.

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EDITORIAL NOTICE

The Editor invites contributions from the Engineers and Workshop Managers of Railway Workshops as well as company-managed Engineering Workshops in the form of original articles, research write-up, production technique etc. relating to Workshop practices in India and abroad. Besides, suggestions for the technical improvement of various aspects of Railway Workshop practice are also invited with suitable write-ups accompanied by photographs wherever possible.

Contributions are accepted on the distinct understanding that they are sent solely to "THE INDIAN RAILWAYS WORKSHOP MAGAZINE." The Editor accepts no responsibility for the views and statements of the contributors.

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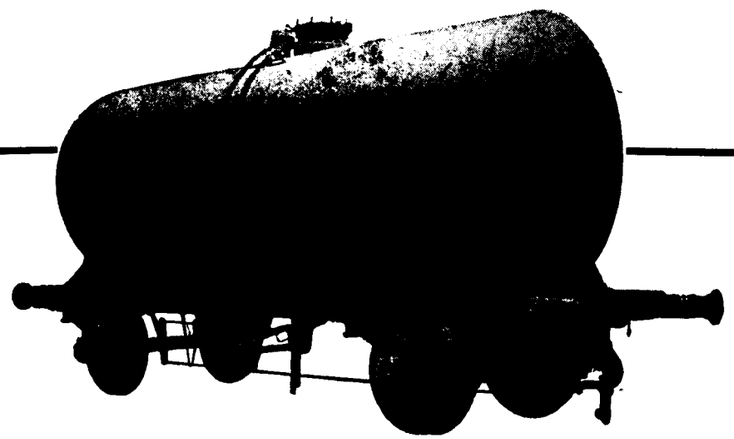

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