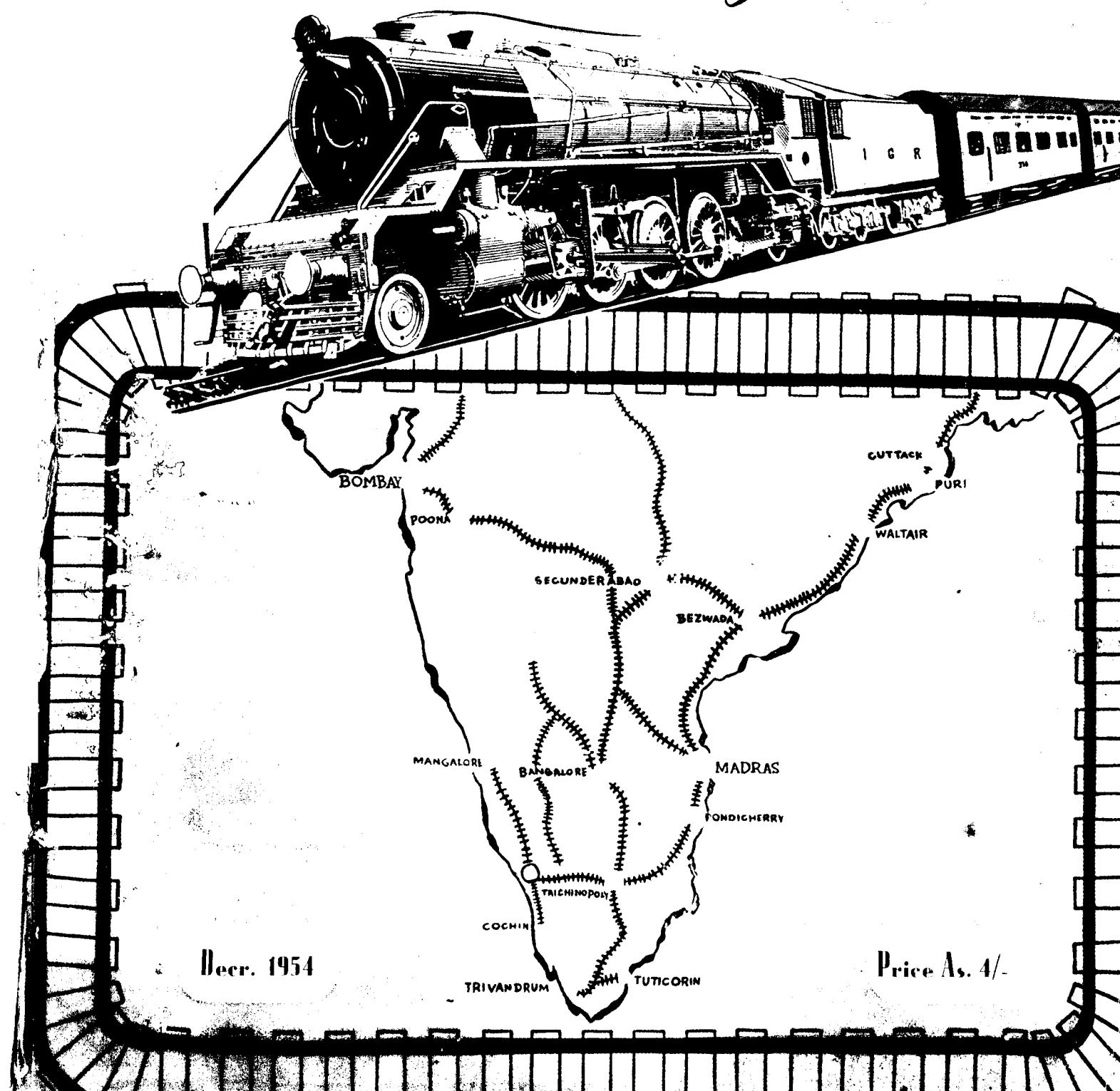


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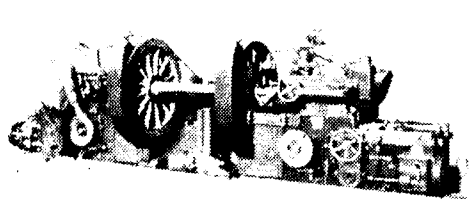
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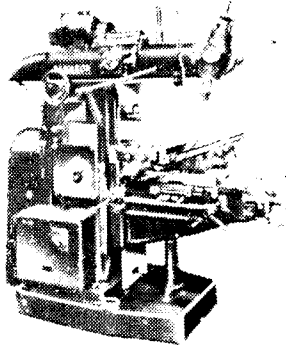
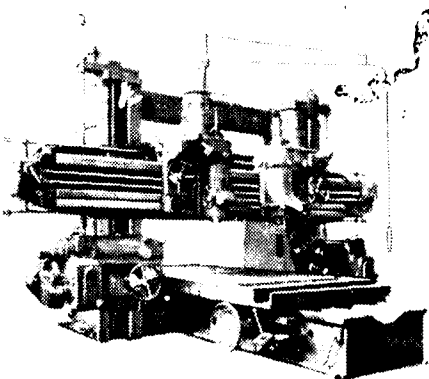
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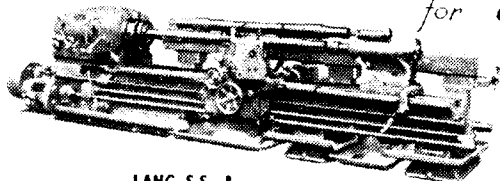
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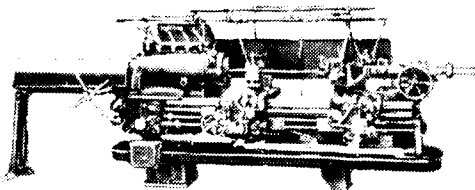
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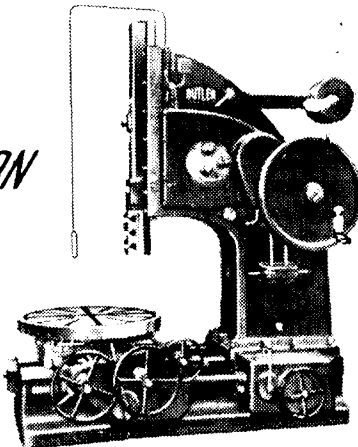
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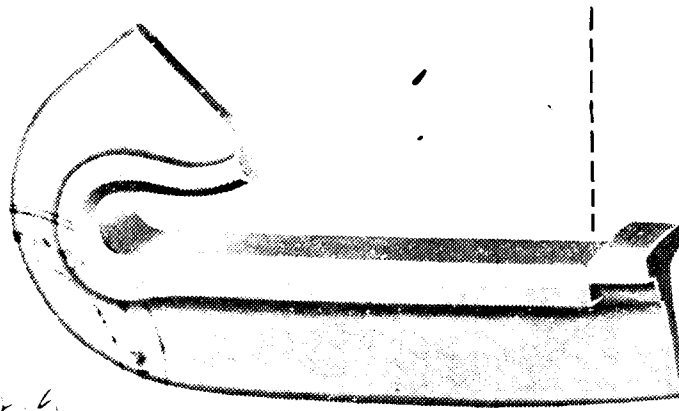
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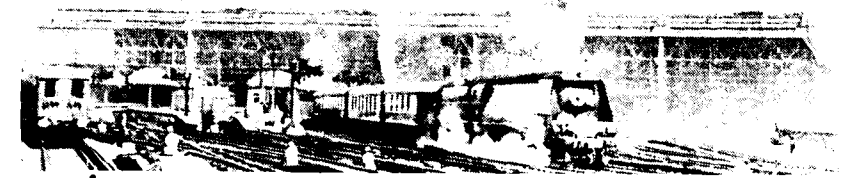
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*Our London Letter
by A Correspondent*



A new, light weight, double deck bus, capable of carrying eight more passengers than the present 56 seater has been seen for the first time at the Commercial Motor Show which opened at Earls Court on 24th September. The bus has a four wheeled vehicle and has almost the same dimensions as the 56 seater. The Prototype vehicle was developed and constructed in association with the Associated Equipment Company and Park Royal Vehicles Ltd. The vehicle is 27 feet long by 8 feet wide with a wheelbase of 16ft. 9ins. The estimated weight is 11 tons; to economise in weight, extensive use was made of light alloys, fibre glass and foamed plastics for the seating and so on.

The body structure serves as the load-carrying unit, with sub frames — to mount the mechanical units at front and rear; units are easily removable for repairs. Independent front suspension and a patented form of coil-spring rear suspension are used to obtain good riding characteristics. A special design of engine mounting prevents vibration. The gear selector pedal has been eliminated, direct engagement of gears being electro-hydraulic, controlled by a column-mounted lever. The engine, steering, and front suspension, are carried on a sub-frame of two pressed channel section longitudinals with cross-members. There are four body attachment points, large pins forming the main attachment, the two pins at the front bulkhead vertical, and those at the rear horizontal. Design is such that the body structure is easily removable for repairs to both the mechanical equipment and body structure. The engine is the A. E. C. 9 — 6 litre direct-injection unit developing 125 b. h. p. at 1800 r. p. m. Because of the absence of a conventional frame and leaf springs, the engine can be mounted offset, and it is slightly modified. It is basically the same as that at present used by London Transport. Transmission is through a fluid flywheel and independantly mounted epicyclic gear box. Brakes are operated by direct hydraulic pressure, eliminating the gear change pedal. Direct gear selection is by electro-hydraulic valves.

Many other interesting exhibits were on exhibition. These included a new line in taxi cabs fitted with intercom equipment to facilitate directions being given by the passenger to the driver. There was also a variety of mobile workshops and a travelling library. "Trick" exhibits showed an hydraulic device which turns the tail boards of a goods vehicle into a powerful lift. One man can operate a load of one ton by merely pressing a button. There was also portable "bus shampoo" equipment consisting of sprays and revolving brushes which can wash a bus as it is driven between them. Amongst the heavier vehicles was a 24 wheel trailer with a carrying capacity of 140 tons. This should prove a real joy to the private motorist who should be so unfortunate as to have to drive behind one of these monsters!

On September 26th certain fare stages on London Transport's buses and trains were increased which will produce an extra £4,400,000 revenue yearly to cover the increased cost of operation. This is the fifth increase since the end of the war. On Monday 27th September the new fares caused long queues at booking offices mainly due to passengers having insufficient change to obtain tickets from the ticket machines and also because they had to ask questions. Delays were almost eliminated the following day.

The conveyance of passengers in and out of London to the suburbs is entirely the responsibility of London Transport and the suburban sections of British Railways. An international group of engineer want to build an extra transport system, a mono railway with 100 seater coaches which would speed along a single rail supported on 15 feet high concrete pillars. They plan to build it in the middle of existing roads. One road they have in mind is the Great West Road. This is travelled by more than a million people a year riding in coaches to and from London's air port. To draw these millions out of London's traffic jams a 15 mile mono rail is proposed. The Great West Road is 120 feet wide and the up and down traffic is separated by a narrow kerb and grass verge down the centre. It is proposed to

build the mono rail over this. Travellers would step aboard the stream lined trains and ride towards the air port at 50 miles an hour in complete silence for the wheels gripping the single rail would be faced with rubber. The scheme is being worked out by Mr. Roger Orr, an Edinburgh solicitor and company director following talks with Sir Alfredle Maitre, the Controller of Civil Aviation Ground services. The system is a development of the propeller driven 'railplane' which a Glasgow inventor George Bennie built in 1930. The propeller has been abandoned to cut noise. It is estimated that the proposal would cost about £ 6,000,000.

On August 22nd the prompt action of a Southern Region signalman averted a serious collision between a goods train and a passenger train at Whitchurch, near Andover. The goods train was approaching the station at the same time as a passenger train from Winchester to Newbury was arriving in the opposite direction the track being single at this place. On applying the brakes the driver of the goods train found that they had failed. He sounded his whistle continuously to attract the signalman's attention. The latter quickly realised that something was wrong and diverted the goods into a siding with a sand drag. The driver and fireman jumper clear as their engine and six wagons, loaded with timber, fell down an embankment. The passenger train stopped a few years from the accident. The passengers continued their journey by bus.

The Southern Region, which operates the most intensive suburban electrified service in the United Kingdom, is renowned for keeping right time. Writing in the Southern Region section of British Railways Magazine, Mr. S. W. Smart, Superintendent of Operation, thanks passengers for their splendid co-operation in helping trains to be on time. Reviewing the four weeks ending July 17, Mr. Smart records that the average late arrival on weekdays was 1.8 mins. for steam trains and 0.67 mins. for electric trains. "For these excellent results much praise is due to all staff in any way connected with train operation", wrote Mr. Smart. "Our thanks are also due to our passengers and their splendid co-operation in joining and alighting quickly and closing carriage doors".

Railway stations in England are noted for their gardens and where possible every station has a garden of some sort on the platform or near the entrance. These gardens are inspected every year by a team of officials and prizes are awarded for the best. It is not always possible to have gardens at stations in city areas and floral decorations take the form of potted flowers and baskets of flowers hanging from canopies. However, atmospheric conditions at some of these stations are such that the life of real flowers is

considerably shortened. On his account the North Eastern Region is to experiment with hanging baskets of artificial flowers painted in natural colours on foil. They will include pink and red geraniums, nasturtiums, lobelia, silver leafed fern and trailing plants.

A light weight steam engine has recently been developed and is designed to be mass produced at a cost of about £100. It was invented by Sir Harry Ricardo under a development contract from the National Research and Development Corporation. The work that can be done by this small unit is incredible. Composed of three separate parts, readily assembled, the furnace measures about two feet each way, the boiler a foot by about 18 inches and the engine a little more than a foot each way. Fed on peat, one of three units on display at a public demonstration at Dorking was supplying power simultaneously to a lathes, a saw and a grinder, and six other devices. Another gave hot water, conditioned air and electricity for a bungalow and a small X ray unit. A third operated a log cutting chain saw and pumped water. A cheap engine of this nature would be of great use in the rural areas of India where power is not yet available.

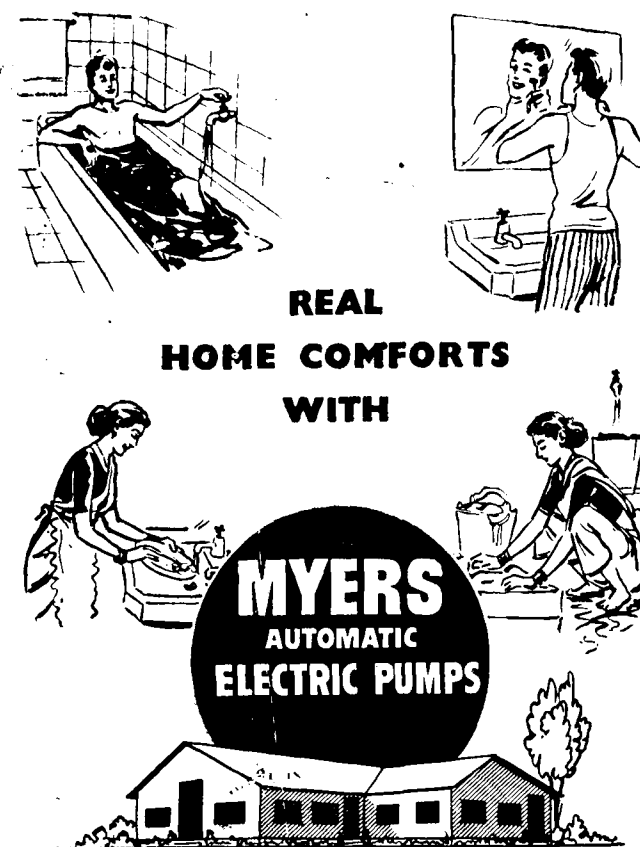
The first Underground Railway was opened in London in 1890. It was the prototype of the vast underground network of railways which now constitute the most up to date and efficient system of city and suburban transport in the world. Other cities now have their underground railways among the senior of which is the Paris Metro and the various rapid transit subways in New York and other cities. The Moscow Metro was opened between the two world wars and other railways have been opened in South America. The latest addition was the Toronto subway opened in the early portion of this year. Istanbul is likely to join the number of cities with underground railways. Trial borings have begun for a line linking the quarters of Sisli and Yenikapi, passing under Galata and crossing the Golden Horn on a bridge. A French firm, The Societe Generale de Traction et d'Exploitation, the former Paris Metropolitan Railway Company, which is interested in promoting underground railway systems overseas, is to construct the line and it is proposed to use rubber tyred trains, presumably on the system now being experimented with by the Paris Metro. Yenikapi is to be the site of the future main line terminus of the European lines of the Turkish State Railways and the section of main line running thence along the Bosphorus to the present Sirkeci terminus will be abandoned. Later on a second underground line is intended which will begin at the suburb of Yedikule, on the European side, and describe a wide arc, cutting the first line and then crossing the Bosphorus by bridge to Uskudar and ending at Haydarpasa, the State Railways terminus on

the Asiatic side. It may then be possible to travel by underground railway between two continents.

In the early days of railways there were many who decried this form of travel on the grounds that it was dangerous and attended with risk to life and limb. A pamphlet on railway accidents published 100 years ago states - "It is safer to remain where you happen to be: but if you must journey from one place to another by train you may possibly increase your chance of survival by following certain precepts. Express trains are attended with more danger than ordinary trains. Those who desire the greatest degree of security should use them only when great speed is indispensable". In this present age, railway accidents still occur but taken in proportion to the total number of passengers who travel by rail, the fatalities per million passengers carried is remarkably low. No such outcry has been made against the risks of air travel no doubt because in this present age the public no longer regard the introduction of something comparatively new in transport with distrust and suspicion.

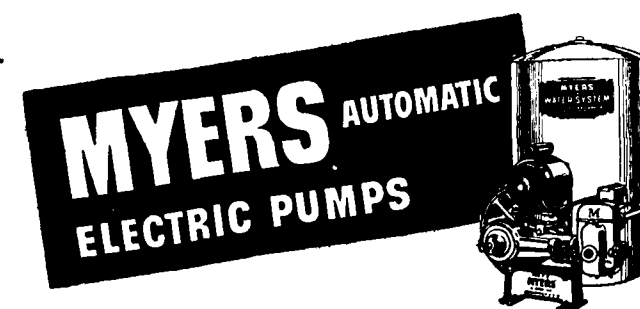
Those who have worked on Indian Railways have no doubt had some experience with staff who send lengthy and verbose telegrams. A story is told of a locomotive foreman named Gilligan who worked on an Irish Railway. He was guilty of sending long, rambling telegrams regarding accidents and other urgent matters. One day he received a letter of censure from head quarters warning him that if he did not reduce the number of words in his messages disciplinary action would be taken against him. Shortly after headquarters received the following message regarding an engine derailment from him:— It read "Engine No. 33, off again, on again, gone again, — Gilligan".

Renovation work is to be undertaken on Big Ben, the world's famous clock which stands near the Houses of Parliament. The long job of surrounding it with scaffolding is to start in order that war damage can be repaired. Three of Big Ben's faces are also to be reglazed and the ornamental details over the clock are to be regilded. Big Ben is 316 feet high and was erected in 1859. The dials are 23 feet in diameter, the figures 2 feet long and the minute spaces 1 ft. square. The minute hands are made of copper, are 14 ft. long and weigh about 2 cwt. The hour hands are 9 ft. long. The pendulum is 13 feet long beating 2 seconds. The first blow on the bell, which weighs 13½ tons, indicates the hour. A light if kept burning in the clock tower while the house is sitting.



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COAL AND THE RAILWAYS

THE development of both coal-producing and coal-consuming industries is naturally, and almost inevitably, bound up with the development of railway transport. Coal-mines can hardly be opened up, much less can their products be disposed of and supplied to industries, without the basic and adequate means of transport. Coal is a bulky product, produced and required normally in large quantities, and railway facilities are thus almost imperative to handle and transport it. The connexion between the railways is still further strengthened by the fact that the railways themselves usually become heavy consumers of coal through their own locomotives. In India the railways have now a coal bill of about Rs. 30 crores per annum: they consume one-third of the total annual coal production, and are in fact the largest consumers as shown in Table 1.

TABLE 1—CONSUMPTION (1952) OF COAL.

(Approximate figures)

Railways	..	..	11.5 million tons
Mills, Works, etc.	..	..	3.0 "
Electricity Generations	..	..	2.5 "
Cement Manufacture	..	..	1.0 "
Iron & Steel Works	..	..	4.0 "
Brick Burning	..	..	2.0 "
Domestic	..	..	3.0 "
Bunker & Export	..	..	3.5 "
Other Industries	..	..	2.5 "
Collieries	..	..	2.0 "

35.0 million tons

Commercial exploitation of coal in India started in 1774 in the Sitampur area of the Raniganj Coalfield. Lack of transport facilities delayed developments for many years, until the East Indian Railway took the track as far as Raniganj in 1855. Rapid development followed, and the output of coal steadily increased. Before the turn of the century the railways had reached the Jharia Coalfield (Katras, Kusunda and Pathardih) and by 1904 the line from Midnapore to Gomoh via Bhojudih was completed by the Bengal Nagpur Railway. The construction of the Grand Chord Line in 1907 made Dhanbad and Asansol into important centres of coal-mining. Over 80 per cent of the coal produced in India today comes from Bengal and Bihar. The concentration of coal-mining in these two States is not accidental but is a matter of historic development,

closely linked with the development of the railway system of the country. As stated earlier, adequate means of transport of coal are vital to the development of coal-mining and to industrial growth.

The seams worked in the early days had comparatively low ash (often below 13 per cent) and high calorific values and they were often good coking coals. The early locomotives were designed to operate on such fuel, and these coals came to be accepted in India as typical loco fuel. Coal in a locomotive is used for steam raising, and the efficiency of steam raising depends not only on the calorific value but also on the free-burning qualities of the coal. The calorific values of coking coals (on unit coal basis) are only about 5 to 10 per cent higher than those of non-coking coals, but coking coals do not possess free-burning properties. Consequently, locomotives may be expected to give equal, if not better, performance with non-coking coals, provided the ash in the coal is not high and provided also that there is adequate furnace volume, that the draughting is adjusted and preferably that a suitable secondary air supply is admitted to the furnaces. Non-coking (high-volatile) coals give off higher quantities of volatile matter, require a larger furnace volume for its complete combustion, and require also less powerful blast or draught through the grate. The admission and control of a secondary air supply assumes great importance in the efficient combustion of non-coking coal.

In the past the locomotives have used good quality coking coal (largely due to historic development as pointed out) and even today a considerable proportion of loco fuel is coking coal. Coking coals are, of course, required for making metallurgical coke for the production of iron from iron-ore in ordinary blast furnace, and the reserves of such coal in India, though adequate for present needs, are not excessive. For some years there has been concern over the possible future shortage of supplies of these coals, especially in the light of the proposed expansion of the iron and steel industry. Accordingly, the railways have in recent years committed themselves to a change-over from coking to non-coking coals for their loco requirements. Such transition must naturally be gradual; it can be effected only as the older types of locomotive now in use become replaced by newer models, designed to burn non-coking coals.

The problem now arises of supplying the railways with moderately good grades of such coal. Though the newer types of locomotive can take coal with up to 22

per cent ash, the use of such coal (especially at present prices) is uneconomic. The efficiency of the loco is reduced, and useless inert matter has to be carried sometimes over very long distances. The known reserves and production of good quality non-coking coals in the country are sometimes said to be relatively small, but there is uncertainty on this issue and in any case it involves definition of "good quality" non-coking coal. Many such coals have been given a comparatively low grade largely on the score of their high natural moisture. Such moisture is by no means the handicap that ash of equivalent amount involves in steam raising: the present grading system requires adjustment in this respect.

Disparity in zonal production also creates difficulties in supplying non-coking coals to the railways in certain areas. Another difficulty is that the railways require lump coal of size above one inch, and the production of this size of coal is only a fraction, though a major fraction, of the run-of-mine output. It presents the colliery, however, with the problem of how to utilize the slack below one inch. Washing the coal may help in some fields, but the Raniganj non-coking coals, for example, are particularly difficult to beneficiate in this way. We return to these problems later.

Another approach is to develop alternative methods of rail traction in the country. Hitherto steam traction has been the backbone of rail communication in India as in many other countries. The present annual consumption of coal in steam locomotives is in the neighbourhood of 10 million tons. In the next 20 or 25 years, progressive industrialisation of the country is likely to double this figure as the rail services will have to be much augmented. The reserves of comparatively low grade coal are considerable, and they can be used for power stations and electrification of the railway where practicable. Meanwhile, we may note that thermal efficiency of a steam locomotive lies between 4 and 6 per cent—a very low figure. The alternatives to steam traction are: (i) diesel traction, (ii) gas turbine traction, and (iii) electric traction. Of these, the diesel locomotive has the highest thermal efficiency, about 30 per cent, depending on the working conditions, and this type of traction is favoured where the oil supply is cheap and indigenous, as in the U. S. A. Compared with steam, diesel locos have superior traction characteristics, and diesel services are cleaner and more adaptable to varying loads of traffic. In the absence of indigenous diesel oil supplies, however, the case for complete dieselization is weak. It is probable nevertheless that the oil refineries now being set up in India will produce enough diesel oil to allow some expansion of diesel traction, even though the output of such oil from the refineries will be mostly employed to meet defence and

industrial requirements. In the event of shortage of oil supplies from any cause, there would remain the danger of paralysis of the transport system. But, as stated, it is probable that the use of diesel locos in India is justified under certain conditions, e. g. long distance from coalfields and where there is a shortage of water.

As regards gas turbine traction, oil-fired gas turbine locomotives are now in use in the U. S. A., U. K., France, Switzerland and other countries. Reports indicate that they can compete successfully with diesel traction due to simpler design and easier maintenance. For India, however, the scope for oil-fired gas turbine locomotives is again influenced by possible shortage of oil. A coal-fired gas turbine, however, has a special appeal, and this type of locomotive is at present being constructed in U. K. The reported thermal efficiency is of the order of 12 to 15 per cent; but with improved cycles, combustors and heat-exchangers, a higher value is probably attainable. But even if the low value of 12 per cent is taken, this figure is double the normal steam loco efficiency, and a proportionate decrease in coal consumption could therefore be effected by replacing existing locomotives by coal-fired gas turbine locos. The Indian Railways, the Council of Scientific & Industrial Research and other departments of the Government are exploring the possibilities of development in this direction. The Fuel Research Institute has undertaken to do work on the design and performance of combustors, the coal feed arrangements, and the combustion chamber. Researches on other aspects of gas turbine development are in progress at different centres in India, notably at the Bengal Engineering College, Sibpore, and at the Indian Institute of Science, Bangalore. No immediate relief by the adoption of coal-fired gas turbine traction can be expected at this stage, but if the test locomotives now being built in U. K. are successful, there may well be a major change-over in India in the coming decade.

Electric locomotion, the third possibility, has the advantage of an overall efficiency (to rail) of 15 per cent, and it is superior to most other forms of traction in giving frequent and faster services, cleanliness and comfort, absence of smoke nuisance, and in many other ways. The thermal efficiency is about three times that of steam traction, and the electric power can be derived from thermal stations burning comparatively low grade coal, or can be produced hydro-electrically in some areas. Modern thermal plant will generate steam with high efficiencies (85 per cent) in pulverized coal-fired boilers from even low grades of coal containing up to 35 per cent ash. Such plant should be located in or near the coalfields to avoid (uneconomic) transport of low grade coal over long distances. For suburban services electric traction has perhaps on equal, as the electrification of

railway lines around Greater Bombay has already demonstrated in this country. Electric traction is also satisfactory where gradients are severe. On existing tracks the traffic capacity can often be increased by as much as 50 per cent.

Important issues for consideration in establishing electric traction are the heavy initial capital expenditure and the running costs and revenue in relation to the traffic density. Investigations have shown that, unless the traffic density is high, electrification cannot compete economically with steam traction in spite of economy in fuel and the advantages stated above. In other words, steam is the cheaper mode of traction at low traffic densities: the heavy burden of depreciation and interest charges on large capital expenditure for power stations and transmission and distribution systems which has to be carried by electric traction causes the system to be uneconomic in such cases. Regarding cost of electric energy, estimates show that in general it should not exceed 0.5 anna per kWh. This means that electrification is least feasible in distant parts of the country where the power cost is high and traffic density low. The 1952 Report of the Enquiry committee on Railway Fuel Economy suggests electrification of certain areas covering a total of nearly 2,000 miles of track, e. g. the Howrah-Moghulsarai line of the Eastern Railway and the Suburban Services around Greater Calcutta. It would appear that electrification of the Howrah-Moghulsarai section (via the Grand Chord) will probably effect an annual saving of some 400,000 tons of coal, a proportion of which is high grade coal.

The true values of the advantages of electrification are, however, difficult to gauge in terms of money. In the general interest of the country, electrification of railway traction will itself help in industrialisation and go far towards solving some of the railway fuel problems. But for the average traffic density prevailing in most districts in India, steam traction must for some years remain of prime importance—on purely economic grounds.

Regarding the better class coals of the country the broad picture is as follows: Steam locomotives require good class coal, and industries situated at a distance from the coalfields should also be supplied with good class coal on the score of transport costs alone. There is, however, a tendency (for one reason or another) for all classes of coal to fall in grade, and this raises the question of coal cleaning. Large coal can sometimes be cleaned by hand; but, if not, then cleaning in washeries becomes necessary. There are very few collieries in India which produce 100 tons of coal per hour and coal washing by individual small mines is often impracticable. 'Group Washing' or Central Washer-

ies may be considered, but the transport and financial and other problems should be faced squarely. The low ash coals produced could be distributed from the washeries throughout the country, and much wagon capacity saved. The middlings from the washeries may in some cases be utilized in pulverized-fuel-fired thermal power stations situated near-by to generate electricity for distribution to industries and indeed to the railways for their own electrification schemes.

It is clear that the future of Railway fuel is in the balance. The potential developments are briefly, (1) improved performance of existing steam locomotives, (2) gas turbine locomotives running on either coal or oil, (3) diesel traction, and (4) electrification. Probably each of these developments has its particular sphere of use. Thus existing locomotives could be fired and stoked more intelligently, but instruction of employees may be necessary to achieve this. Secondary air supply and its effects may well be investigated with advantage both as a research item and as a practical issue. And there are also potential improvements in design.

The gas turbine locomotives (on coal using a cycle in which the ash and exhaust gases do not pass through the turbine) has great potentialities especially in districts where there is shortage of water or where the water supply is corrosive or objectionable on other grounds. Developments are afoot in U. S. A. and U. K., and they should be critically appraised before embarking on this project in India. This potentiality has a special appeal in India, where coal is an indigenous fuel.

Regarding diesel traction, the advent of the new oil refineries at Bombay and Visagapatnam should stimulate development. The efficiency of diesel traction is remarkably high (30%) and diesel locomotives are particularly serviceable in shunting where normally there is much loss of fuel in the standing periods. Diesels avoid this. In Bombay and its neighbourhood, which is at a considerable distance from the coalfields, it is probable that "dieselisation" will meet with its optimum sphere of action i. e. in the Western and North Western parts of the country, e. g. Saurashtra. Diesel engines also have the advantage of not requiring large amounts of high grade water, and as stated above they are of great service in shunting. Regarding the use of diesels and of oil-fuel, the objection that, in the event of war or other emergency, oil supplies would not be available is probably taken too seriously. Large quantities of diesel oil can be stored and spread throughout the country, and the transport services need not be paralysed. But in any case electrification would be paralysed far more rapidly by the bombing of the main generating stations. If therefore such emergencies are to be the guiding factors,

all the numerous and important schemes of electrification whether hydro-electric or thermal should not be erected. This would mean virtually "no development"; it is a policy of despair.

With regard to electric traction, the experience in and around greater Bombay already provides a valuable basis from which to work and assess potentialities. There is little doubt that the case for electrification of greater Calcutta and of certain sections of the main lines is now strong. It should be repeated that the low grade coals of India can best be used as powdered coal in thermo-electric stations, where they can be consumed with high efficiency (in pulverised form) and thus provide a truly economic use of what is normally a somewhat difficult fuel to consume with efficiency. Moreover, electric power will be available also in many districts from the hydro-electric stations now in course of construction; and the electrified railways could draw upon them.

The problems of locomotive fuel are thus not by any means bound up with washing the inferior grades of coal. Whenever such washing is undertaken, there is of necessity some loss of combustible matter (in middlings or in

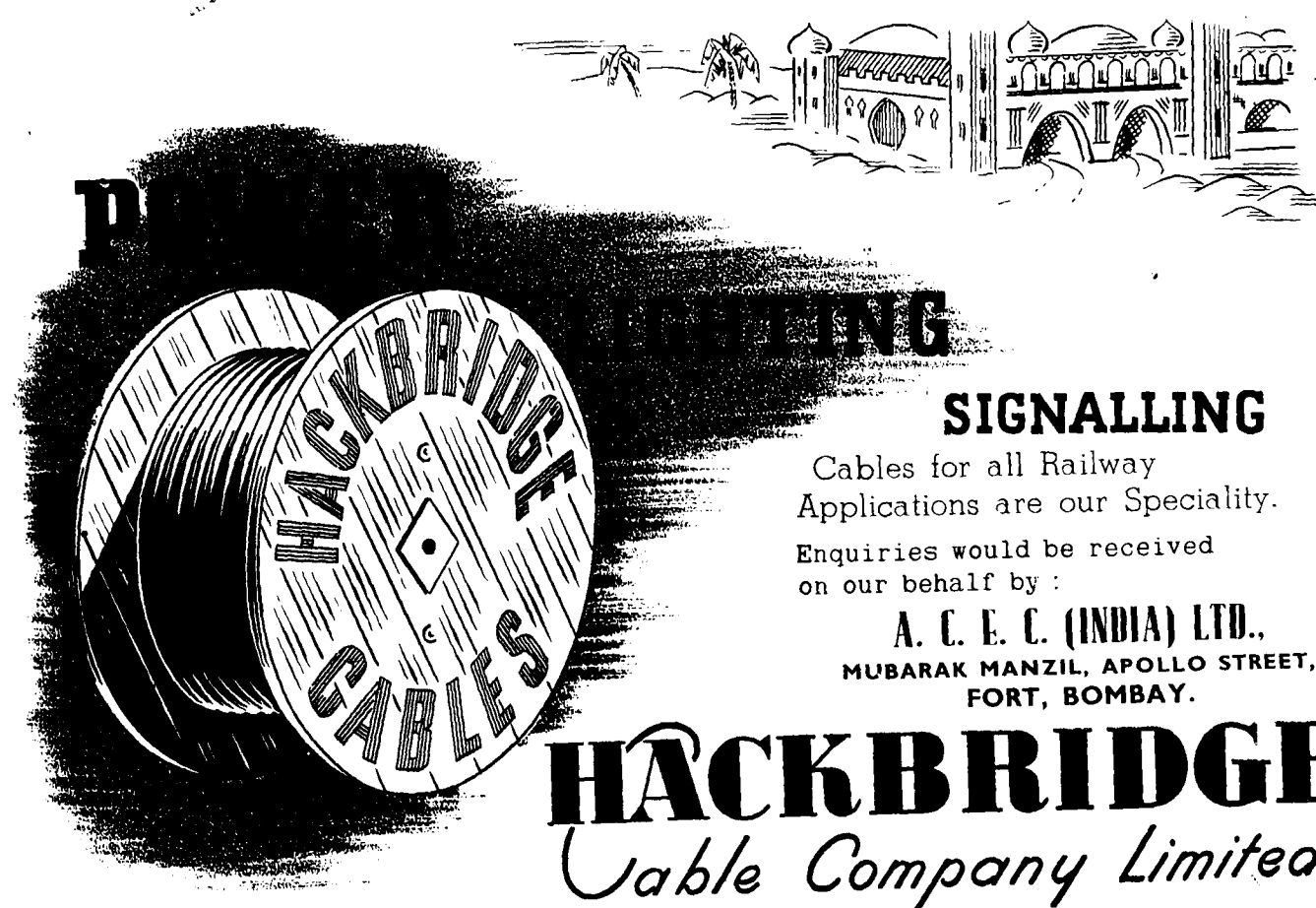
rejects or in slurry) and the cost of treatment is not small. In fact, in Australia where similar coals are being treated, it is considered that the higher grades of coal produced should carry a price of Rs. 5 to Rs. 7 per ton (10 sh.) more than that of the raw coal. In a word, there is no one solution to the existing railway fuel problems, there are several. (Fuel Research Institute News.)

RAJASTHAN NEEDS MORE RAIL LINES

The Railway Board may soon consider the possibility of constructing new railway lines in Rajasthan.

With the completion of the Bhakra Nangal and Chambal projects, a considerable increase in goods and passenger traffic is expected when power becomes available. The Rajasthan and Chambers of Commerce have accordingly, suggested the Railway Board to provide 12 new lines in the region.

The Chairman of the Railway Board, it is understood, has promised to explore the feasibility to the proposal.



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INDIAN STANDARDS AND RAILWAYS

By S. O. Shukla, M.Sc., Ph. D., M.S.E., Technical Officer, Indian Standards Institution

"STANDARDIZATION may be broadly defined as a kind of formulation intended to define or specify a particular object or procedure with a view to attaining uniformity and accuracy in its production and utilization. It is a science of wide applicability with its main roots lying deep in commerce and industry". Standardization requires relevant knowledge of an industrial process, techniques of sampling and of interpretation of working data. Standards provide acceptable basis for transactions between buyers and sellers, enabling them to speak the same language. From time to time, the standards are revised and brought up-to-date to keep abreast of technological experience and advancement.

STANDARDIZATION—BRIEF HISTORY

Standardization movement in India may be taken to have been initiated on a group basis with the appointment of an Inspector of Local Manufacturers in 1909 by the Railway Board. This officer inspected materials ordered from firms in the Calcutta area, and encouraged the purchase of local industries by railways which conformed to Railway Specifications. The next important stage was the setting up of the Metallurgical Inspectorate by the Railway Board for the efficient inspection of a 20,000-ton yearly supply of rails and fishplates which the newly started Tata Iron and Steel Co. Ltd. had contracted for five years. This inspection and testing organization laid the foundation of group standardization in India. Among other organizations which have grown up since then to develop standards in their own spheres, mention may be made of the Central Standards Office of the Railway Boards; Directorate of Technical Development, Army Headquarters, Directorate General of Supplies and Disposals; etc.

STANDARDIZATION ON NATIONAL SCALE

Standardization work on national scale began with the setting up of the Indian Standards Institution (ISI) in 1947, in pursuance of a Resolution of the Government of India, to serve as the central standards organization for fixing Indian Standards for commodities, materials, structures, practices, operations, etc. Prior to this, purchase and, therefore, manufacture were based on British and, to a lesser extent, American Standards, or on departmental standards issued by various Government

departments and other purchasing agencies. This led to diversity in specifications and conflicting evaluation of quality of materials. The conditions of manufacture and supply in India were not always kept in sight, and the impetus which Indian industry had a right to expect from Government patronage was not always forthcoming in full measure. One of the main objects for which the ISI was established was to promote production in the country both in respect of quality and quantity.

FORMULATION OF INDIAN STANDARDS

The technical work of ISI is distributed among its Division Councils, four of which have been set up and are functioning, namely the Engineering Division Council, the Chemical Division Council, the Textile Division Council and the Building Division Council. For preparing a particular standard or a group of standards, the Division Council concerned appoints a Sectional Committee. The Central Standards Office of the Railway Board is invariably represented on all ISI Committees concerned with the preparation of standards on subjects of interest to the Indian Railways. A draft standard, drawn up by a Sectional Committee, is first issued for comments generally for a period of three months. It is circulated to (a) National Standards Bodies of all Commonwealth countries, (b) Research Laboratories in India, (c) all sustaining members of ISI who are interested in the subject, (d) all Indian firms concerned with the material, (e) principal users and producers, and (f) to any one else who may ask for it in response to the press note published when a draft is issued. The opinion of National Standard Bodies outside the Commonwealth is also sought when the sectional committee concerned considers it necessary. The comments so received are carefully considered by the sectional committee, which finalizes the draft and authorizes its publication subject to the approval of the chairman of the Division Council concerned, who endorses the draft on behalf of the Council and the chairman of the Executive Committee of the ISI who approves the draft on behalf of the Institution. During the preparation of Indian standards all ISI committees on such items which are of interest to Railways make it a point to recognize the requirements of the Railways and incorporate them in the Indian standards. Almost invariably, therefore, the Indian standards on these items are issued in full collaboration with the Railway representative on the various ISI committees.

Indian standards are voluntary and great care is taken in their formulation to consult industrialists, technologists, scientists, various Government departments and consumer interests where such interests have been organized. It is an invariable practice with the ISI to give weightage to consumer interests in the formation of its technical committees. While manufacturing interests extend their co-operation in the formulation of standards and are willing to adopt the Indian standards voluntarily, their course of action is naturally determined by the extent to which the consumer interests insist on their purchases to be made on the basis of standards published by the ISI. To a layman every article is good enough so long as it claims to serve his purpose and has not been proved by trial to be unsatisfactory. The Indian Railways, on the other hand, constitute one of the few very big organized consumers in the country and have the necessary facilities for inspection and testing. Their purchases in accordance with Indian standards play a vital role in popularising them and encouraging production of goods of standard quality.

INDIAN STANDARDS ADOPTED BY CSO

The ISI has so far issued about 400 Indian Standards, and the work is gathering momentum. Of these, 95 standards, as listed in the Appendix, have been adopted by the Railway Board according to the extent of their interest; the largest group of these standards relates to the standardization of colours for ready mixed paints, pigments, extenders, drying oils, thinners and solvents for paints, ready mixed paints and enamels. Railways in India consume a little more than one-sixth of the entire production of paints and varnishes in the country. Two other important subjects, the Indian Standards on which have been adopted by the Railway Board, are lubricating oils and refractories. It is recognized that in some of the applications concerned with the railways, refractories are required to meet service conditions peculiar to the railways. The tentative Indian Standard Recommendations for "Refractories for Railways" (IS: 194-1950) takes full cognizance of such requirements. For instance, in addition to high temperature, refractories used for constructing locomotive boiler arches are subject to excessive vibration during service. Trial experiments to establish suitability of the recommendations contained in IS: 194-1950 are being carried out by the Eastern Railways. So far the results of investigations have proved to be satisfactory.

One of the important Indian standards to be adopted by the Railway Board is the specification for structural steel (IS: 226-1950). Owing to the present difficulties in

obtaining proper raw materials, rigid adherence to the existing specifications, where phosphorus in steel is limited to 0.060 percent, has been found difficult. The maximum phosphorus content in this specification has, therefore, been raised to 0.065 percent. However, a provision has been made that when steel is required for structures subject to dynamic loading, such as bridges, parts of railway rolling stock, etc., phosphorus should not exceed 0.060 percent. This will make possible the use of raw materials containing higher phosphorus content which otherwise would have been wasted.

Another important Indian standard to be adopted by the Railways is the Specification for Ordinary, Rapid-Hardening, and Low Heat Portland Cement (IS: 262—1951). Formerly, the Railways used to get their cement according to the British standard on the subject, the main difference between the two specifications being in magnesia content and insoluble residue. During the preparation of the Indian standard advice had been sought from America and other countries that magnesia and insoluble content within the limits mentioned in Indian standard were not harmful to the strength and durability of cement. Other Indian standards to be similarly adopted are on porcelain insulators for telegraph and telephone lines, padlocks, sliding door bolts for use with padlocks, dry cells and batteries, plain austenitic manganese steel castings, mild steel wire, miscellaneous chemicals like heavy acids, potash alum, aluminium sulphate, copper sulphate road tar, coal, tar pitch, acetone, etc. have been recognized.

CSO AND ISI—THEIR MUTUAL CO-OPERATION

Standardization of items of special interest only to Railways such as railway coaches, rails, locomotives, etc. is carried out by the Central Standards Office. On the other hand, there are items, such as cement and structural steel paints which are of interests not only to the Railway Board but also to other agencies. The standardization of these items is carried on by ISI. However, there is no sharp border line between the items to be handled by the CSO and those with are to be standardized by the ISI. A carriage fan, for instance, has a similar purpose to fulfill as an ordinary ceiling fan for which the ISI has already issued the Indian Standard. The standardization of carriage fan can be taken up either by the Central Standards Office or by the ISI.

The purchases on behalf of the Railways are made by the Controllers of Stores and Directorate General of Supplies and Disposals. There is, however, a certain

time lag involved in taking note of the new Indian standards and in getting them considered for adoption for future purchases by the Railways. With a view to reducing this delay and providing a means for their automatic adoption, the ISI has proposed to the Government that a suitable policy directive be evolved for the guidance of its purchasing agencies and departments.

ISI LIBRARY

The ISI Library maintains complete sets of standards issued by all the various national standards organizations of the world as well as other well known standardizing bodies such as the ASTM, IEC etc. It also receives proceedings of committees and conferences of standardizing bodies of other countries of the world, and drafts of codes of practice of these countries. These may be of held to the railway organization.

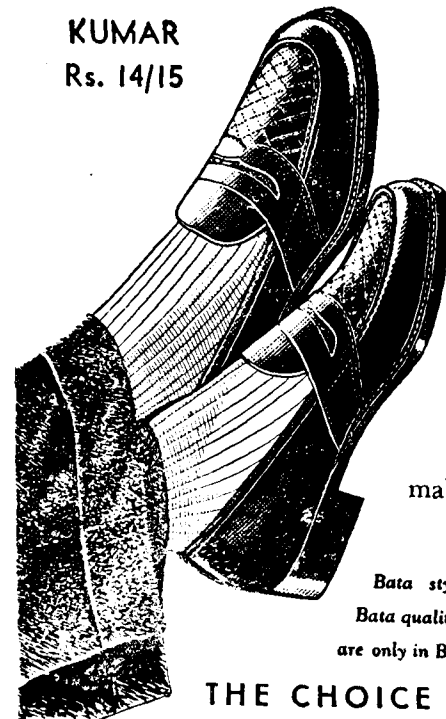
QUALITY CONTROL AND CERTIFICATION MARKS

In the pre-war days, most of the railway stores were imported from abroad through firms of Consulting

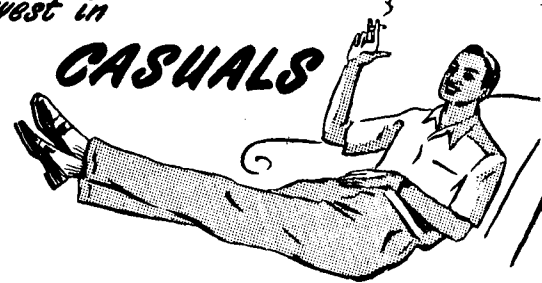
Engineers in London and their agents in India, and a small balance was purchased from indigenous sources. Now-a-days about 23 percent are imported through the agency of the DGS & D in London and New York, 12 percent from overseas firms through their agents in India, and the balance of 65 percent from indigenous sources. One of the complaints sometimes made against local supply, however, is its quality. The recent statutory recognition which the Parliament has bestowed upon the Indian Standards Institution empowering it to establish Certification Marks and to grant licences for their use to manufacturers producing goods conforming to Indian standards is a noteworthy forward step in promoting the quality of Indian manufactures. To carry out the purposes of the ISI (Certification Marks) Act, 1952, rules are being framed, and when the Act comes into force and certification marks become available to the industry of the country, the Railways and other purchasing organizations would be assured of the quality of all goods which carried ISI Certification Marks.

- | | | |
|---|------------|---|
| 1 | IS: 5—1949 | Colours for Ready Mixed Paints |
| 2 | IS: 6—1949 | Moderate Heat Duty Fireclay Refractories, Group 'A' |

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3	IS: 7—1949	Moderate Heat Duty Fireclay Refractories, Group 'B'	69	IS:226—1950	Structural Steel
4	IS: 8—1949	High Heat Duty Fireclay Refractories	70	IS:258—1950	Potash Alum, Technical
5	IS:16—1949	Shellac	71	IS:260—1950	Aluminium Sulphate, Non-Ferric
6	IS:34—1950	Dry Pigments and Extenders Paints	72	IS:261—1950	Copper Sulphate, Technical
7	IS:35—1950		73-75	IS:264 to 266—1950	Heavy Acids
8-14	IS:37 to 43—1950		76	IS:269—1951	Ordinary, Rapid-Hardening and Low Heat Portland Cement
15-21	IS:45 to 51—1950		77	IS:275—1951	Padlocks
22-24	IS:55 to 57—1950	Drying Oils for Paints	78	IS:276—1951	Plain Austenitic Manganese Steel Castings
25-28	IS:61 to 64—1950		79	IS:278—1951	Galvanized Steel Barbed Wire for Fencing
29	IS:66—1950	Thinners and Solvents for Paints	80	IS:280—1951	Mild Steel Wire
30-34	IS:75 to 79—1950		81	IS:281—1951	Sliding Door Bolts for Use with Padlocks
35	IS:81—1950	Oil Pastes for Paints	82	IS:283—1951	Porcelain Insulators for Telegraphs and Telephone Lines
36	IS:83—1950		83	IS:285—1951	Laundry Soap
37	IS:84—1950	Ready Mixed Paints and Enamels	84	IS:302—1951	General Requirements for Electrical Appliances for Domestic Use
38-41	IS:86 to 89—1950		85	IS:304—1952	High Tensile Brass Ingots and Castings
42-50	IS:91 to 96—1950		86	IS:305—1952	Aluminium Bronze Ingots and Castings
51	IS:102—1950		87-91	IS:311 to 315—1951	Lubricating Oils
52	IS:117—1950	Recommendations for Refractories for Railways	92	IS:316—1951	Oil, Cylinder, Compounded Filtered
53-60	IS:119 to 126—1950		93	IS:317—1951	Automotive Hydraulic Brake Fluid
61	IS:130—1950	Fireclay Mortar for Laying Fireclay Bricks	94	IS:325—1951	Threephase Induction Motors for Industrial Use, with Class 'A' Insulation
62	IS:170—1950		95	IS:380—1952	French Chalk, Technical
63	IS:194—1950	Leclanche Type Dry Cells and Batteries for Flash Lamps			
64	IS:195—1950				
65	IS:203—1950	Road Tar			
66	IS:215—1951				
67	IS:216—1951	Coal Tar Pitch			
68	IS:218—1952				
		Creosote and Anthracene Oil for Use as Wood Preservatives			

SURVEY FOR NEW LINES (I)

By A. H. Pearson

HAVE you ever read a serial story in a newspaper or magazine? Building a railway is very much like reading a serial story, as when you come to the end of each instalment, you will find the phrase "to be continued". So it is with a railway system. As each section of line is constructed, the needs of other parts of the country soon demand the construction of a railway to provide the means of transportation. A railway that started with about 50 miles of track about a century ago, expands instalment by instalment, until its vast network stretches far and wide, with 5000 to 6000 miles of track.

In a huge country like India, it may almost be impossible to provide rail transport to every little town or village, yet a time may come, when with the discovery of some mineral near a little village, or with the setting up of new industrial plants, the railway lines must reach out to that remote point to provide transport for the raw and finished materials to and from that particular section of the country.

But before the first rail is taken to the site where a new line is to start, a detailed survey must be made of the entire project. The survey is approached from two main aspects—the engineering and the commercial.

Let us take an example. A railway line is to connect two points which may already be rail-heads, but the country between is not served by a railway. The distance to be covered, if taken as a straight line on a map, may be only 40 to 50 miles, but it is not always possible to lay down a railway track as a straight line between two points. Ultimately, it may be found that to provide a rail link over that section, the actual track mileage may be double or more than double, even for a single line track. Now, this is where the railway engineering survey team comes into the picture.

The first thing this survey team will do is to study in detail large-scale maps of the terrain to be covered. From these maps they will get a general idea of the overall physical contour of that particular section—i. e. where the ground is flat, where there are hills, rivers, towns, villages, etc. But even this is not enough, and will not be enough to draw a tentative alignment of the rail tracks to be laid down.

The survey party must go over the entire section mile by mile. This is known as the field work. Man, even in a primitive state, when having to find a way from one part of the country to another, will beat out a path which offers the least obstacles and resistance, so that the distance traversed can be done in the least possible time. So, the engineers out in the field, when they come upon well-worn paths or even primitive roads, they consider whether the railway can follow a similar alignment.

During the field survey a detailed study is made of the territory. The survey team must note such factors as waterways, which may include large rivers and down to tiny trickling streams, or dry river-beds; whether the terrain is more or less flat, gently undulating, or with perhaps a range or so of low-lying hills. The countryside may be plotted out with cultivated fields, or the land may be dry and desert-like, or with plenty of forestation. The general nature of the soil and sub-soil is also important to the engineers. So mile by mile and section by section, the physical conformation of the territory is examined and studied, as in laying down railway lines, the cost has to be considered, and above all, the safety factor has to be kept constantly in mind.

Obviously, railway engineers would like to put down a rail track on flat country, with the least number of obstacles, but that would entail a long meandering line of 200 miles or more to connect two points only 50 miles apart as the crow flies. So, to make it shorter, it may be necessary to cross rivers and streams, and for these decisions have to be taken as to the type of structure that will be required to bridge the gaps and take the rails across. If the country is hilly it may be necessary to bore into a hill and take the track through a tunnel, or through a cutting between two hills. When thick forests are encountered a lot of tree-felling and clearing has to be done.

Apart from the foregoing, even though a tentative alignment of track has been plotted, it is not always accepted without further investigation. A geological expert is then asked to examine the terrain and to report on the sites for tunnels, viaducts, bridges, ghat sections etc., as to whether the structures to be constructed on those selected sites will be stable from the geological angle.

With this expert knowledge now available the survey team can go ahead to select station sites. Obviously, the large stations will be sited as near as possible to towns or villages with more populations, or where the new industries are springing up, or where special facilities of rail transport are needed. Some of these stations may require to be provided with yards to enable them to handle more than a passenger train or two, and for this, it will mean the acquisition of sufficient land for the yard layout.

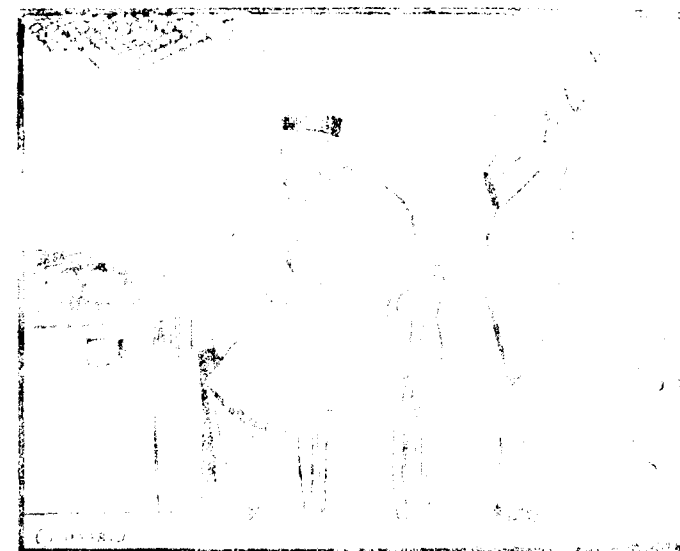
Land acquisition is often a ticklish problem, as the land required for railway purposes, may have to cut through cultivated fields, or disturb some tomb or sacred shrine. Often, it may be necessary to demolish buildings, or interfere with a military encampment and so on. The owners of the land over which a rail track has to go, can create quite a lot of difficulties by refusing to part with their property, or stand out for a cash compensation far above the actual market value of the land to be surrendered.

Through every stage of a survey the engineers must keep in close touch with the local civil authorities, as there are so many ways in which the civil officer on the spot can be of valuable aid to the survey team, as it progresses from section to section.

When an agreement on the course of alignment of the track to be laid has been reached, the engineers are now required to go into more details in the matter of construction. Vast quantities of earthwork will have to be done; the gauge and type of track has to be decided upon so as to take the heaviest axle load of the nature of potential traffic to be moved; details of the types of bridges and culverts to be used; types of station buildings and offices; layouts of yards; construction of cabins, signalling and interlocking problems to be tackled. Where steam traction is used the engineers have to ensure a sufficient and all-the-year-round supply of water at watering stations for

filling up locomotive tenders of the trains that will pass over the section each day.

The survey party, apart from studying the various factors of rivers, forests, hills, tunnels, land acquisition and so on, are also preparing estimates of every item of engineering material and stores that will be required to construct the new line. This will comprise thousands of items of permanent way and structural and building materials and stores. In addition, the cost of the supervisory, skilled and unskilled personnel to be employed for the construction work, must also be computed.



"This is our new Office Superintendent—it looks as though he carries the whole of the Divisional Office in his stomach."

While the engineers are doing the engineering part of the survey, Traffic officers are also doing their part of the job, known as "The Traffic Survey." It is this latter survey that completes the picture by giving an indication of the revenue likely to be earned by opening up the new line. Some idea of how the traffic survey is done will be given in the next article.

?

- Have you examined that the goods are securely packed, labelled and marked?
- Have you seen that they are loaded in a correct wagon and despatched with the least possible delay?
- Have you verified the wagons are sealed, riveted and necessary card labels provided?
- Have you seen that on arrival the goods are properly stored, the consignee is informed and delivery is effected promptly?

CORROSION ON STEEL-COACHES

Cause and its Remedy

By *W. P. Niyogi, C.I.Loco.E., (Lond.), M.I.I.S., (B'ham),*

Member, *A.A.R. (Chicago), A.R.E.A. (Chicago), and V.D.I. (Germany)*

AT the present age almost all the countries in the world have concentrated on building metal coaches and most of which are of steel. But the biggest snag in the steel coaches is its periodical corrosion, specially after it is swept over by the annual monsoon in a country like India. Now the headache of the engineers as well as of the scientists of the world is to find out the cause of corrosion on steel and its remedy. For this reason, The British Iron and Steel Research Association has formed a Corrosion Committee to investigate into the matter and they have found out some of the reasons why rust forms on iron and I would like to describe some of those collected from them.

WHAT IS RUST?

The natural tendency of every metal on the earth surface is to return to its original state from which it was obtained. Similarly, iron or steel tends to revert to the crude form of its ore from which man's craft has wrested it. This happens when the metal combines with the oxygen present in the atmosphere and forms oxide. Thus when iron or steel forms its oxide, it is known as rust.

HOW STEEL RUSTS?

The rusting on steel can effect from air, from water or from soil. If the weather is damp i. e. the atmosphere contains moisture, the oxygen of the moisture has a great affinity towards steel to form its oxide. This happens if there is some projection on the surface of steel to arrest dust and moisture. If the surface is very smooth it rusts in a much lesser quantity.

Surface condensation can take place due to the difference of temperature between the inside and outside of the steel panels.

The water rusting is still more severe on steel and it corrodes the metal with a very rapid speed. This corrosion is accelerated by the combination of copper with galvanised steel. The traces of copper dissolved in water deposit on the zinc-coated steel causing a very highly dangerous corrosion cell. Another big enemy for

corrosion is the presence of wood in contact with steel as wood has a special tendency of collecting water and keeping the surface of contact with metal damp, to cause rusting of the metal.

Soil is another cause of corrosion on steel if it is kept buried for a long period. In the absence of air in the soil, the oxygen needed for the corrosion is derived from the reduction by bacteria of sulphates present in the soil. This, sometimes, completely removes the iron in the metal, leaving a matrix of brittle carbon, liable to be shattered by any shock. This is known as graphitisation.

However, the causes of corrosion on steel-coaches may be attributed to the first two, as very seldom a coach comes in contact with bare soil. The main reasons for such corruptions are the presence of the external attachments to the carriage shell such as the ventilators, the weater strips, the rain water gutters and so on. The projected portions of such fittings tend to arrest dust and moisture from the atmosphere and cause rusting. Also the non-flushed finish of the outside panels may cause arrest of moisture and dust. It has also been noticed that rusts originate from the existence of projected screw or rivet heads and from projected seams of welding on the panel body. Another cause of corrosion on steel is its contact with non-ferrous material such as wooden packings, brass window channels, brass screws and so on. Though brass itself is non-corrosive but the presence of copper in brass helps towards corrosion of iron.

HOW TO STOP CORROSION?

Here comes the most important portion of discussion. There are many aspects one has got to take care of to stop corrosion. Firstly, I must admit that there is nothing in this world which can completely stop corrosion; because it is a natural phenomenon of every earthly substance to decay. Human power only can decelerate the rate of corrosion and save some expenditure in renewing it, which, of course, is the urge behind this investigation.

Firstly, the composition of steel counts a lot towards the stoppage of its corrosion. Then it is followed by the

pre-treatment of the metal, the design of the structure of carriage shell and finally, the protective coating to be given on the finished surface.

COMPOSITION OF STEEL

Various experiments all over the world has confirmed that the rate of rusting of bare mild steel depends considerably on the relative humidity of the atmosphere. In a vast country like India, whose length and breadth cover several thousands of square miles, the humidity in atmosphere varies appreciably between different parts of the country. On the desert of Rajasthan, where the humidity lies below 70%, the rusting is negligible, whereas, in the states of Bengal or Bombay, where the atmosphere is fully humid and polluted with smoke and salt from sea-water, the rusting is well over 5 mils per year.

This rate of corrosion can be decreased by alloying the bare steel. It is found that chromium-nickel steel is virtually incorrodible in normal atmosphere. By the addition of low-percentages of chromium and copper, the corrosion resistance in steel is increased by nearly 3 times. The presence of chromium helps to build up a self-healing protective oxide film on its surface which contains iron and is highly compact and impermeable and stop further rusting of the metal. It is also noticed that the addition of say 0.2 to 0.3 per cent of copper alone would increase the durability of unpainted roof sheets.

PRE-TREATMENT OF METAL

This is the most vital operation in the industries of steel products. In it depends the real prevention to steel corrosion and a good prevention will always minimise the necessities of curing it. Pre-treatment of metal may be of various ways, of which chromating or phosphating of steel is important. They have been given different patent names by different industrialists such as:— Parkerizing, Bonderizing, Walterising and Granodising. Practically all these different ways of treatment has the same effect on steel viz: a phosphate coating of iron is formed on the surface which resists further oxidation of the metal and the rough porous surface gives a better adhesion or bond to paint.

The important operation before phosphating is degreasing or cleaning of the metal. This cleaning may be done by many means such as wire brushing, shot

blasting, wiping with white spirit, caustic bath or acid bath. The cleaning of the metal does not mean merely the removal of oil, grease, dirt or any other foreign

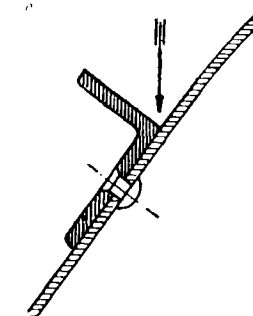


Fig. A

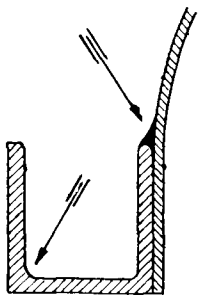


Fig. B

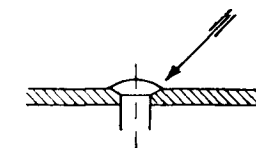


Fig. C



Fig. D

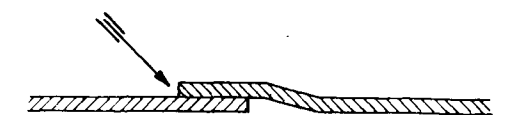


Fig. E

residues. The primary function of this operation is derusting or descaling. This can be done either mechanically, or chemically, but definitely the latter method is more effective. So, generally the metal is acid pickled and the acid used is either sulphuric acid or hydrochloric acid; but these require washing off and neutralising after pickling. In recent years phosphoric acid has been used for pickling as the pickled surface has no harmful or corrosive chemicals requiring washing off as well as the advantage is the formation of a thin phosphate coating on the surface.

The most effective solvent which may be recommended for this purpose is an emulsion produced by the Imperial Chemical Industries known as "Deoxidine". This "Deoxidine" solution may be applied either by hand brush or by dipping. It is suggested that small iron components should be dipped in a bath of lead-lined tank containing a solution of 2 parts of water with

one part of Deoxidine. The time of immersion depends on the amount of rust to be removed. When all rust has been removed the job should be thoroughly cleansed with cold water and finally rinsed with hot water to allow a quick drying. The Deoxidine should not be allowed to dry on the metal before it is washed with water.

After cleaning of the metal it should be quickly transferred for phosphating as much loss of time may cause

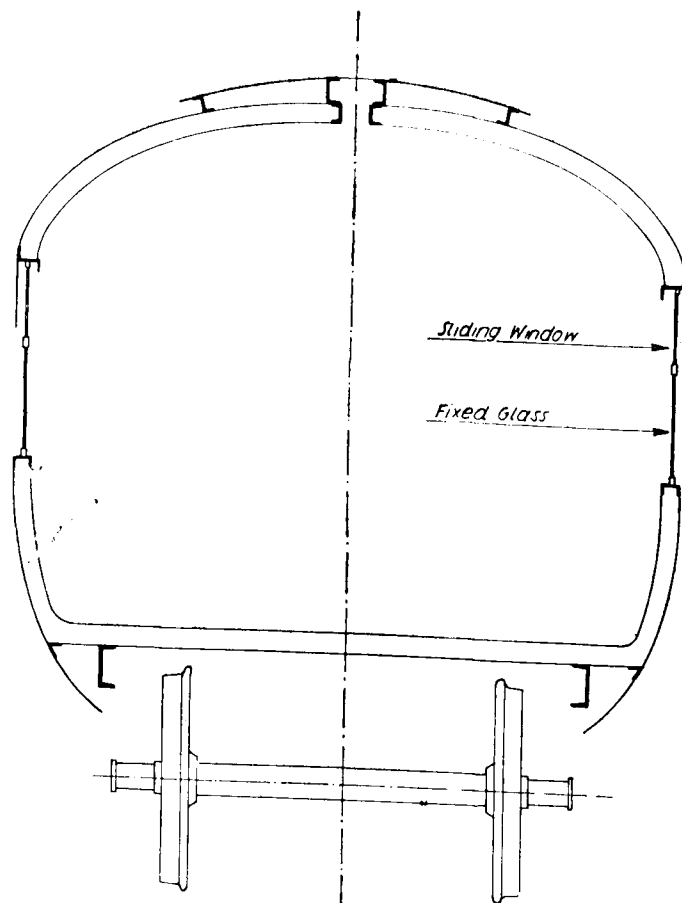


Fig. F.

the metal to start rusting again. For this purpose another I. C. I. product may be recommended which is known as Granodine solution and the operation called Granodizing. The plant consists of a 100 gallon tank of stainless steel or of heavy mild steel, a cold water rinse tank and a hot water rinse tank. The Granodizing solution of 100 gallons capacity is made up of the following chemicals with water:—

Granodine starter—2 gallons.

Granodine "H"—4½ gallons.

Toner Crystals—½ lb.

The sequence of operations is (a) immersion in 'Granodine' solution from 2 to 5 minutes at 160° F. to 170° F., (b) rinsing in cold running water and (c) immersion in hot acidulated water rinse to assist in quick drying. The hot water is acidulated with a very weak solution of "Deoxylyte" mixed in the ratio of ½ pint to 100 gallons of water. The acid solution is used to counteract any alkaline material present after rinsing.

It should be remembered that these phosphate coatings are not rust proof in themselves and so the metal should be painted without any loss of time to give a permanent protection from rusting.

In cases of large work such as coach shells, underframes or sub-assembled roof structure, where it is not possible to dip them in any Deoxidine or Granodizing bath, only brush application of Deoxidine is suggested. A solution of Deoxidine and water in equal parts should be applied very generously, flowing in on like varnish by a long handled brush. After leaving it wet for a few minutes this solution is to be washed down with water before it turns sticky. As soon as it is thoroughly dry, which may be done by rinsing with hot water, the surface should be covered with some protective paint without much loss of time. Unnecessary delay may start rusting again.

Another suggestion in this respect may be made of using metallic soap. Lead soap formed from linseed oil may, in the presence of water and oxygen, yield a solution which is non-corrosive to steel.

DESIGN OF THE COACH SHELL

Before designing the shell we should try again to remember the different causes of corrosion. We know that the projected portions outside the shell have a tendency to collect dust and moisture and start corrosion. The figures A and B give the cross-sections of mild steel angle weather strip and mild steel channel rain water gutter used on railway coaches and arrow marks will clearly show where the dust and water collect and real corrosion originates.

So, my suggestion would be to avoid those fittings altogether and allow the rain water to flow down washing the dust and dirt along with it. Now, let us come to the joints and the figures C, D and E will show how

rivet heads, welding seams and lap joints help in starting corrosion.

I suggest not to have any lap joints on the outer shell at all and the rivet heads and welding seams should be thoroughly ground and polished to make them flush with the panel. In that case no foreign particle would be able to settle, the surface being very smooth.

The figure F is a cross-sectional sketch of the outer shell of a railway carriage and this would be my suggestion for designing a carriage body. Of course, the inside structure has not got much to do with corrosion. It will be noticed that the outer shell has been made as smooth as practicable, reducing the outside obstructions to minimum. The Weather stripe and rain water gutters have been completely avoided and the roof and the bodyside panels are overhanging the bodyside windows and underframe solebars respectively. The roof will stop the rain water coming in the compartment even if the sliding window is open for ventilation. The ventilators have been replaced by a third roof running along the full span, attached to the roof with small lengths of channel and Z sections. The cant rails and waist rails are also made of simple Z and channel sections respectively.

PROTECTIVE COATINGS

The application of protective coatings is though a secondary operation after the pre-treatment of metals, it, is in no way less important than any other and should not be neglected. It may be any paint or a metallic coating. Any coating of non-ferrous metal will prevent rusting of steel. Different tests and experiments have revealed that zinc is the most valuable metal in this respect and a zinc coating 3 mils thick will keep the steel safe for at least 5 years in an industrial atmosphere. Recently another metal coming to importance is aluminium. A sprayed aluminium coating about 4 mils thick (0.8 oz. per sq. ft.) would be equally effective. These metal sprays may be safely recommended for application on coach roof, which has to stand the maximum effect of atmosphere.

The most important point to be considered for paint coatings is the selection of priming coat. It is the priming coat which gives the protection to the metal and helps in building the finishing coat. Any zinc rich paint may be suggested for this purpose as zinc dust remain so compact that they are in continuous electrical contact and give a very good adhesion to outer paint. Any other paint containing lead is also equally useful.

Another new product called Cementiferous paint is also very good protective on steel surface. This paint contains zinc dust mixed with a solution of chloride, phosphate or other suitable compound in water. When brushed on a steel surface, even if it is wet one, the mixture sets quickly to a hard, adherent and protective cementlike mass. Cementiferous paint has valuable properties particularly as primers under ordinary oil paint and is highly suitable for application on the underframes and other under-carriage parts.

The application of sprayed limpet asbestos insulation on the inside of the panels stop condensation on the surface and is a very good protective against corrosion. This may be further recommended for the Indian coaches as an insulation against heat, which is very essential.

The application of liquid plastic on the finished outer surface will give a very good protection against any action of moisture on the panel. The liquid when thoroughly dried up will leave a very hard thin glossy layer of synthetic resin which is fully impregnable by any chemical substance. This can be applied either by hand brush or by spray gun. This is highly suitable for exterior use in tropical countries.

The liquid plastic solution produced by the Saro Laminated Wood Products Limited is known as "Sar-Rez" finish and is composed of two parts. The part A contains high viscosity resins and the part B the acid catalyst which brings about the curing of the resins. They are to be mixed in the ratio of 4 parts of A to one part, of B and the mixture should not be allowed to remain more than two days before application. For brush application approximately 50% of No. 2 thinners is to be added and for spraying a viscosity of 30 seconds at a shop temperature of 68° F. is recommended, which can be obtained by the addition of 10% of No. 2 thinners. It is essential to use a non-metallic mixing pot.

After the coat of plastic thus applied by spray or brush is thoroughly dry, the surface should be flatted down with wet-or- dry silicon carbide paper. Then the surface is to be thoroughly burnished with Sar-Rez Burnishing Paste followed by Sar-Rez Polishing Compound. Burnishing may be carried out mechanically by power driven or pneumatic burnishing wheel and this will give a very highly glossy weather resisting surface. The liquid plastic has been found to be heat and fire proof.

Chemical Treatment of Locomotive Feed Water—Internal Treatment

By V. P. Shivdasani, B. Sc.

INTRODUCTION

LOCOMOTIVE availability—making the most use of given locomotives has always been an important matter to a Railway Engineer.

Locomotives have to be returned to home shed/workshop for:—

- (a) inspection, maintenance and overhaul of various components of the engine;
- (b) inspection, maintenance and overhaul of locomotive boiler which may comprise of descaling, retubing or other replacements due to damage from the water or a boiler wash-out to prevent high concentration of dissolved solids/suspended matter in the boiler water to prevent priming and carryover.

Recent advances in techniques of metallurgy and lubrication have enabled the frequency of the visits to Workshops for engine repairs to the minimum and the aim of the correct water treatment, therefore, should be to increase the periods between washouts to coincide with the visits to workshops/sheds for reasons given under (a) to obtain the maximum availability of the locomotives.

VARIOUS METHODS OF TREATMENT

The treatment of locomotive feed water may be divided in three classes viz.

- (a) External treatment involving the installation of softening plant at water columns.
- (b) Way side treatment involving installation of simple apportioning equipment at each watering point.
- (c) Individual locomotive treatment.

This article deals with the individual locomotive method of treatment which is becoming increasingly

popular as it enables groups of locomotives to be put under treatment without interference with other links and minimises capital expenditure. In this method, the treatment which may be applied in the form of a mixture of chemicals dissolved in water to make a concentrated solution or in the form of briquettes may either be injected directly to the boiler or allowed to be mixed in the tender/tank water.

SOME METHODS OF APPLICATION

I. Direct Injection.

This method is used when a chemical solution is the best form of treatment or when it is preferred to use mixed powders and make them into a solution rather than use the equivalent formula in the briquette form. The chemical solution is added to the reservoir of a proportioning pump driven by some moving part of the locomotive, such as the crosshead. By means of this arrangement the chemical is injected into the boiler in direct proportion to the distance travelled by the locomotive, and if the quantity and quality of water taken by the locomotive for a given trip are known, the distance travelled by the locomotive, and hence the amount of chemical injected into the boiler, can be correlated to the water consumption.

II. Feeding Chemicals to Tender Tank.

(i) Powders.

If powders are used, these may be dissolved in a tank with a suitable apportioning device fitted to the locomotive. The apportioning gear must feed a predetermined portion of chemical to the water in the tender tank.

(ii) Briquettes.

The method of application of the treatment can be simplified if the required chemicals are added in the form of briquettes.

HOW TO RESERVE ACCOMMODATION

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

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

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

Tickets will be issued only if accommodation is available.

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

• *Reservation fee is not refundable.*

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

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

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

*(Inserted in the interests of Travelling Public by the Public Relations Officer,
Southern Railways Magazine)*

In this method the various chemicals are manufactured as small cylindrical briquettes which are placed in a tube feeder installed on the tender or tank.

The tube feeder itself is merely a tube some 7-10" diameter and about 3-4" long filled with briquettes; its dimensions depending upon the required capacity (see sketch on page 23).

The feeder is inserted into the water in the Tender through a suitable opening made in the Tender top plate (see sketch on page 23). From the sketch it will be seen that the tube feeder can be raised or lowered in the tender and its depth of immersion varied by the set screws which hold it in position. The lower portion of the feeder acts as an ordinary continuously replenished reservoir of chemical treatment in which upper layer of briquettes slowly dissolve to form a saturated solution which gradually but evenly dispenses away over a period of several days. The tests on the device have shown that it can operate satisfactorily for a period of at least 3 days. If a locomotive fitted with a tube feeder moves to another "Link" the depth of immersion of the liquid level retained can be very quickly varied to suit the new conditions by raising or lowering the tube and by raising or lowering the liquid level by means of the removable side plugs.

PRINCIPAL ADVANTAGES OF BRIQUETTE TUBE FEEDER

1. The feeder is very cheap to construct and fit to a locomotive.
2. It can be filled by unskilled labour and needs no other adjustment while running.
3. The tube feeder requires practically no maintenance to keep it in good order.
4. The system is flexible and can be applied to any grade of locomotive and can be used as a complete treatment for hard waters or merely as a conditioning treatment for partially softened feed waters.

CHEMICALS REQUIRED FOR INTERNAL TREATMENT

The mixture/briquettes used for Internal Treatment of Locomotive boiler must consist of:—

- (a) Alkali for precipitating permanent hardness of water and providing adequate alkalinity for inhibiting corrosion.
- (b) A suitable anti-incrustant for conditioning the precipitates in a free flowing state so that these are easily removed during the normal blowdown.
- (c) A suitable inhibitor to prevent feed line and injector deposits.
- (d) An Antifoam to inhibit priming and carryover.

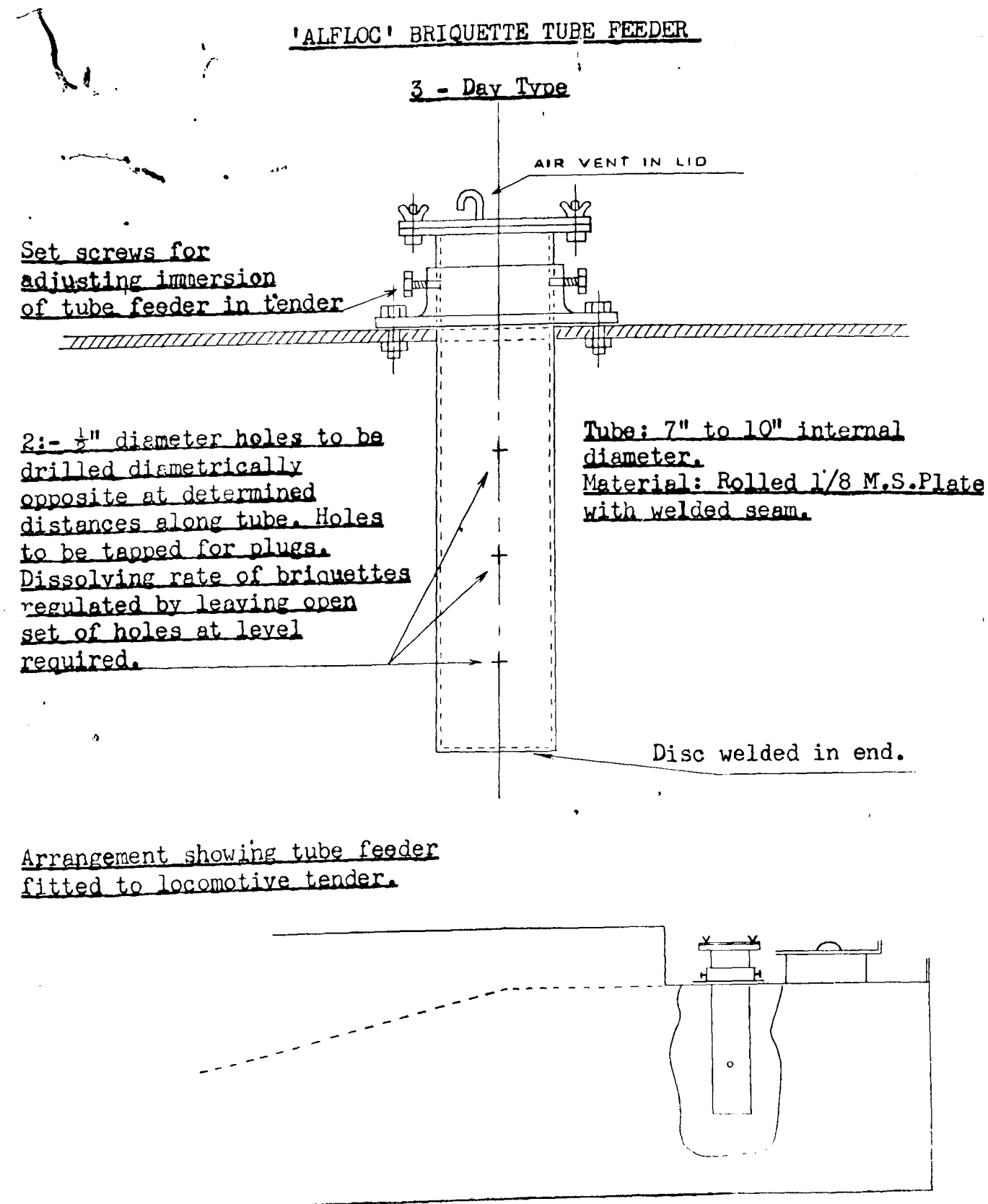
SCOPE OF THE METHOD

The treatment chemicals required and the quantities necessary are based on the composition of the so called average feed water which is the proportionate mixture of each separate water supply picked up by a locomotive during a given run.

Under the normal conditions an 'average feed water' of upto 20 parts per 100,000 in hardness can be dealt with by Internal Treatment, although satisfactory results have been obtained with full treatment of raw water upto 46 parts per 100,000 containing a high proportion of permanent hardness. Usually when the average feed water of any link is higher than 20 parts per 100,000 it is preferable to install softeners at watering stations where the hardness of the water is high and soften these waters partially or fully to bring down the average feed water to below 20 parts per 100,000 provided the volume of water taken at such point is sufficient to warrant the installation of a softener. This limits the amount of precipitates (sludge) produced in the boilers and lessens the need to blowdown mainly for sludge removal which can be a limiting factor in some cases. This is an important point to be considered now that Antifoams are used because this permits a much higher concentration of soluble salts and sludge in the boiler water than previously. The above factors are given for general guidance only and in practice careful survey of local conditions on each section should be made before prescribing the treatment.

In order to get the best results possible it is essential that:—

- (a) 100% water picked up on a given link is treated;



- (b) boilers are blown at regular intervals to keep the dissolved solids of the boiler water at optimum condition and to prevent undue accumulation of sludge. If the hardness of the average feed water is within the limits given above, blowdowns can conveniently be confined to sheds/terminals;
- (c) efficient washout at regular intervals;
- (d) adequate control of all phases of water treatment operation particularly of the condition of the water in the locomotive boiler.

BLOWDOWN

There are two methods of blowing down either or both may be used according to local conditions.

(a) Continuous Blowdown.

This may be operated from a point which is below the normal water level in the boiler and should operate on an automatic valve so that blowdown functions only when the locomotive is in motion. The continuous blowdown may be discharged into ash-pit under the boiler to prevent damage to the permanent way. The advantage of continuous blowdown is that it enables the rate of deconcentration of the dissolved solids and free flowing suspended solids to be controlled in balance with the rate at which they concentrate. Experience has, however, shown that the sludge removal is not efficient with this system.

(b) Intermittent Blowdown.

Intermittent blowdown is usually a manual operation and should be done preferably in a suitably designed pit in the locomotive running shed at the end of day's work. The advantage of intermittent blowdown is that since a pick up pipe of a large diameter is invariably located over the foundation ring it removes an appreciable amount of sludge with a relatively small amount of blowdown water. In some cases when the hardness of the feed water is high it may be necessary to operate the intermittent blowdown on the track to prevent accumulation of large volume of sludge.

It would be appreciated from the foregoing that whereas the intermittent blowdown is based for removing

accumulated sludge continuous blowdown enables concentration of dissolved solids to be readily controlled. The two types of blowdowns may, therefore, in certain cases, be complimentary i. e. the continuous blowdown used during normal running is supplemented with intermittent blowdown e. g. on returning to the Works sheds on the end of day's run.

With the development of Antifoams, it is possible to carry much higher concentration than it was possible before. With a suitable 'Antifoam' the concentration of dissolved solids in the boiler water can safely be raised to 1,500/2,000 parts per 100,000 before priming and carryover may take place.

With Internal Treatment the sludge formed in the boiler may set the limit on the permissible concentration. Experience has, however, shown that if the hardness of the average feed water is not more than 30 parts per 100,000, the blowdown can conveniently be confined to sheds/terminals.

CONTROL

The control system needed is simple, but requires continuous effective operation to obtain correct results. This should consist of unified central control, a proper stocking and supply procedure, regular maintenance of equipment and continuous testing and control of the composition of water in the locomotive boilers. The keynote of the control system is maintaining the correct values of the water in the locomotive boiler. In the initial stages the boiler water will require testing each day for hardness, alkalinity and dissolved solids by simple and rapid field methods but later on the frequency of the water testing may be reduced to 2/3 times a week.

A suitable recording method which ensures prompt action is also an essential part of the scheme. A suitable procedure for a given link should be drawn up depending on the local conditions.

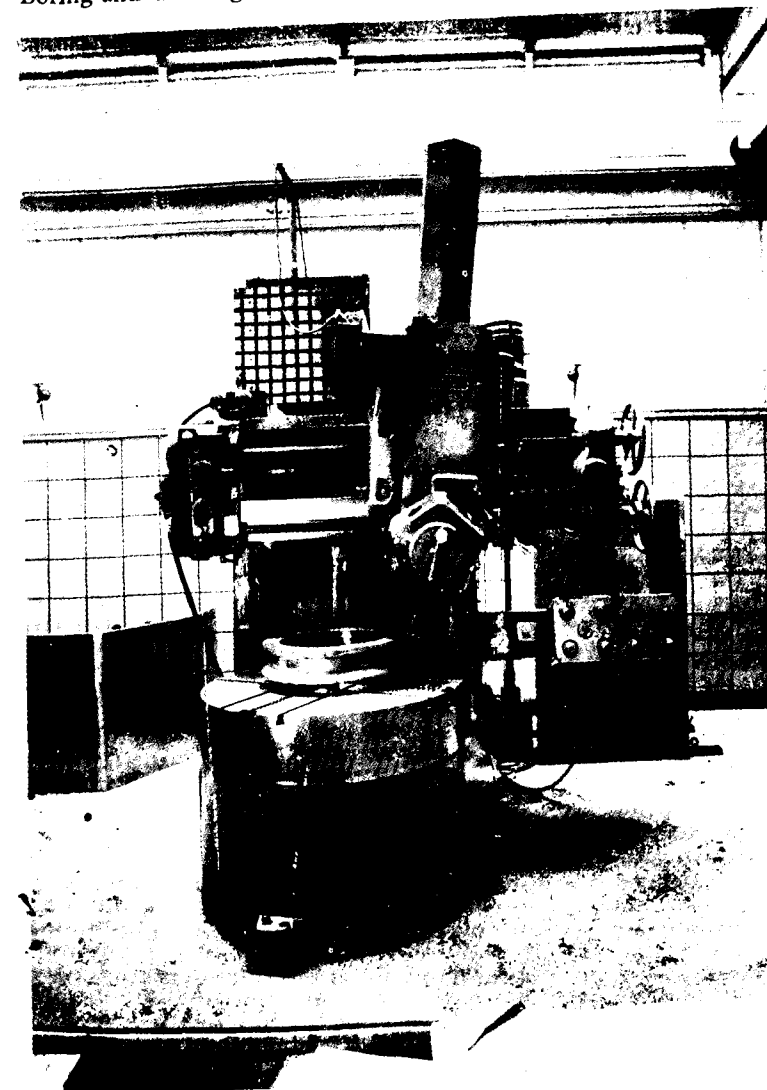
RESULTS ANTICIPATED

Experience has shown that if the Internal Treatment as described above is correctly operated within its defined limits it is capable of entirely preventing the scale formation, corrosion, undue accumulation of sludge, foaming in the boilers, and greatly extending the periods between boilers, and greatly extending the periods between boiler washouts.

Webster & Bennett Boring Mills

The firm of Webster & Bennett was founded in Coventry, England, in 1887 for the purpose of manufacturing Machine Tools. Even in those far off days many of the machines made were exported. In a few years exports to India alone included Screw Cutting Lathes, Two Spindle Drilling Machines, 24" Surface Boring Lathes, Horizontal Profile Milling Machines and 30" Chucking Machines.

Much valuable experience in machine tool manufacture was gained during these early formative years, and as time went on the firm followed a steady course of expansion closely linked with an equally steady policy of specialisation on one type of machine—the Vertical Boring and Turning Mill.



Webster & Bennett Vertical Boring and Turning Mill with 48" Chuck and Built-in Electronic Profile Turning Equipment, on Test in Demonstration Room.

This policy, pursued with much forethought and determination, has proved its worth and now, with many years of specialised knowledge backed by nearly 70 years of machine tool manufacturing experience, Webster & Bennett can look with justifiable pride on its place amongst the world's leaders of machine tool design and construction.

India has always been one of the firm's most highly esteemed customers. Conversely the Webster & Bennett Boring and Turning Mill has made a definite contribution to Indian industry, particularly to the smooth and efficient running of the Indian Railways. The machine has come to be regarded as a standard tool both in the Production and Maintenance shops of many Railway organisations because it is ideally suited to the machining of Railway Wheels and Tyres, Axle Boxes, and Piston Heads and Rings, all apart from the fact that it is a general purpose machine of a very high order.

The machine is built in 3 sizes, with a chuck diameter of 36", 48" and 60", and Duplex Mills are available in the 2 smaller sizes. It is of solid build, and consequently the best use of carbide tipped tools may be made resulting in heavy cuts being possible. It should not be forgotten however, that it is equally efficient and economical when employed in machining non-ferrous metals. All the main controls are hydraulically operated on the latest type of machine (the Series 'DH') giving the operator complete control of his machine whilst calling for the minimum amount of physical effort on his part.

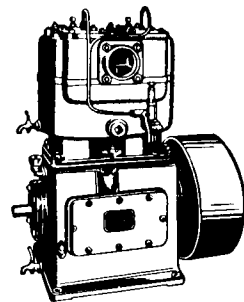
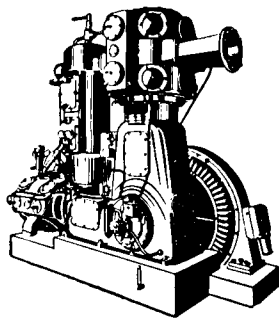
Various types of attachments can be supplied with the Boring Mill and include Screw Cutting, Taper Turning and Taper Generating Attachments, and two types of Profile Copy Beams.

These attachments have been in use for many years, but let it not be thought that the machine design is not constantly under review. A major step forward has recently been made in this sphere for, after several years of intensive research, Webster & Bennett now offer a Boring Mill with built-in

Atlas Diesel

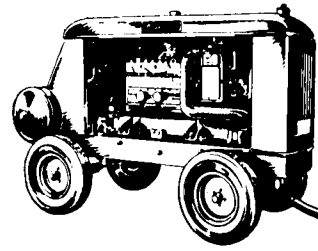
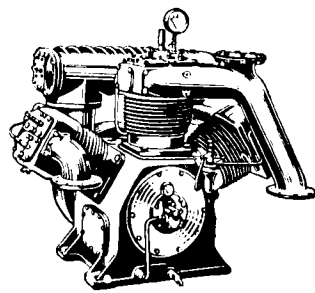
AIR COMPRESSORS AND VACUUM PUMPS OF UNEQUALLED ECONOMY

AR-Class, watercooled, 2 stage, extra Heavy Duty compressors for continuous shift-work. Unequalled in reliability and economy. Capacity 330-3220 CFM for working pressure up to 225 p.s.i.



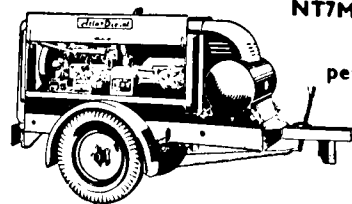
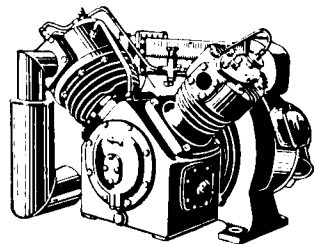
R2A6-Watercooled, stationary-one stage air compressors. Simple, reliable, low priced and cheap in upkeep. 117 CFM capacity 100 p.s.i. working pressure.

CR-CT Class, water and aircooled 2 stage stationary air compressor. Capacity 150-330 CFM for working pressure up to 125 p.s.i.



HR4V-FR4V-Portable, 2 stage all-watercooled diesel compressors with Atlas-Diesel "Polar" engine, extremely rugged and simple, cheap upkeep, economical, favourable prices, 250 and 160 CFM capacity.

NT-Class, aircooled, 2 stage air compressors. Compact units for direct flanging to electric motors and for Vee belt drive. 4 sizes, 35-110 CFM, working pressure up to 125 p.s.i.

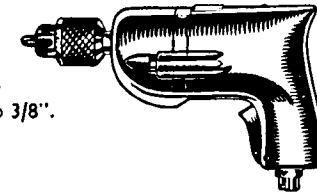


NT7MV-NT9MV-Portable 2 stage diesel and petrol driven compressors. Powered by Dorman, Armstrong or Standard engines. 60 and 110 CFM.

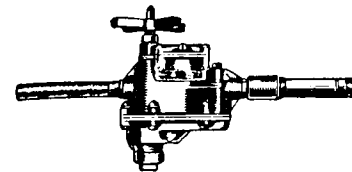
Atlas Diesel

PNEUMATIC TOOLS OF HIGH EFFICIENCY

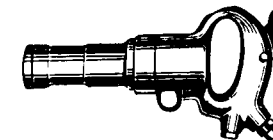
Pistol grip metal drills, up to 1/2". Pistol grip screwdrivers up to 1/4". Pistol grip tappers up to 3/8".



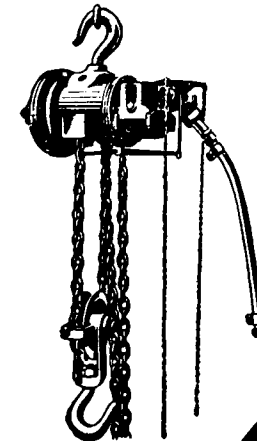
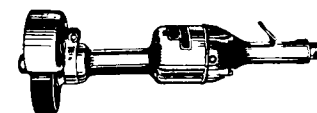
Heavy type drills max. 4".



Riveters, clipping hammers, Rivet Bursters.

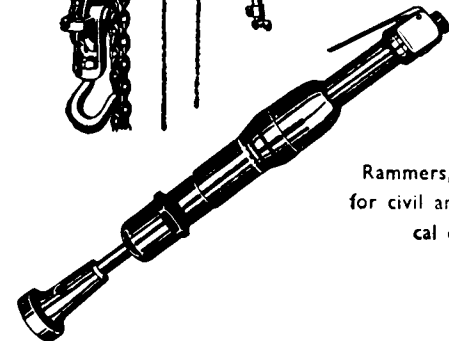


Grinders for all purposes from 1/2" to 8" wheels.

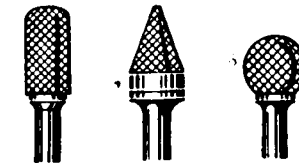


Air blocks, capacity 1000-11000 lbs.

Rammers, four types for civil and mechanical engineering.



Rotary files and cutters for use of tungsten carbide tools.



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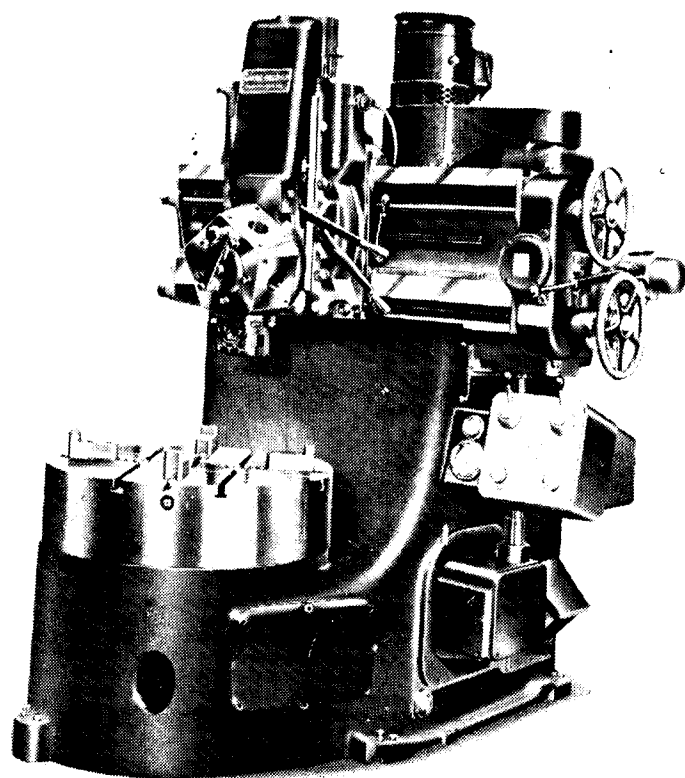
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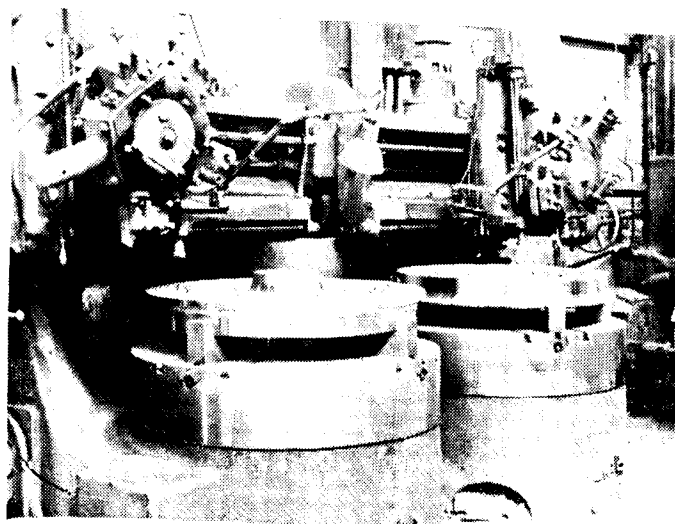
EVEREST



Webster & Bennett Standard Vertical Boring and Turning Mill with 60" Chuck.

Electronic Profile Turning Equipment. A number of orders for machines with this equipment have already been received, and the export market shows considerable interest in it.

The Electronic Profile Turning Equipment has been built not as an attachment, but as part of the machine



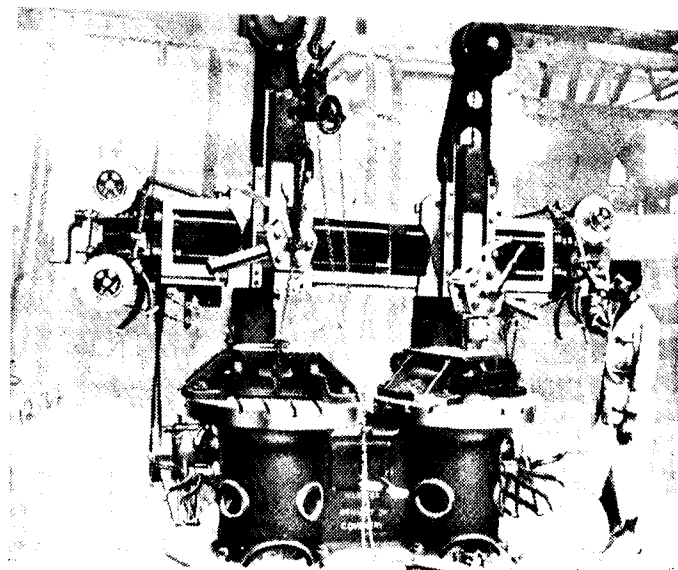
Solid Disc Wheels being Machined on a Duplex Mill.

thus allowing the machine to perform the dual role of a standard or tracing machine as required.

The design of this Equipment incorporates a patented automatic Bias Control and, as a result of this, any shape of template can be followed without any recourse to hand control. The only limitations of the shape which can be turned are those imposed by the cutting tool design.

The accuracy both of form and of repetition of size are of a very high order. Under ideal test conditions repetition of size within .00075" on diameter has been obtained, though this limit is not guaranteed since the nature of the work material, the depth of cut and the likelihood of tool wear have to be taken into account.

It will be thus seen that Webster & Bennett are keeping well abreast of modern trends of design, and this is no less true regarding production methods as well. Full advantage is taken of the fact that, because the range of manufacture is restricted to variations of a single basic type of machine, production can be rationalised and this in its turn results in relatively low



Webster & Bennett Vertical Turret Lathe 1920 Model.

manufacturing costs which are naturally reflected in sales prices.

Since November 1st 1954 all sales in India have been conducted through the agency of **Machine Tools (India) Ltd.**, with offices in Calcutta, Bombay and Bangalore.

Trichinopoly District Train Clerks Meeting

The Train Clerk is an important pivot in the wheel of Railway administration in this country. Any dissatisfaction or discontent among them would certainly lead to slackness and inefficiency around. We hope the railway administration will realise the importance of Train Clerks in maintaining the operating efficiency of this nationalised industry and would consider their demands favourably.

We are publishing below excerpts from the proceedings of the Trichinopoly District Train Clerks Meeting held at Trichinopoly Goodsyard early in October this year :—

A Meeting of the Train clerks of Trichinopoly District was convened and held at Trichinopoly Goods Yard on 3—10—54 to consider the future prospects of the train clerks, their grades of pay and duties, etc. The meeting was well represented with 22 Train Clerks from TPJ Control, TPGY and Tanjore, who took active part in the proceedings.

The Assistant Yard Masters, Sri V. Nataraja Iyer, Sri T. B. Menon, & Sri Ratnaswamy were also present and took part in the proceedings.

The Convener, while opening the meeting requested Sri V. Nataraja Iyer acting Senior AYM/TPGY, who is an active member of the Employees' Union, Trichinopoly, to preside over the meeting, which was seconded by Sri M. Jayaram of TPJ Control.

At the outset the President spoke and explained the responsibilities and difficulties of Train Clerks in the discharge of their duties both in the Yards and at the desk and stated that the salary fixed by the Pay Commission is a gross injustice done to the category especially when in the Private Company managed directors had fixed this category as more responsible and important staff and fixed in a better scale than any of the other clerical staff in the Railway and even than those of Junior ASMs. He appealed to all the Train Clerks to join one of the Trade Unions, whichever they may choose and put up a joint fight for their betterment.

Then, many other Train clerks present spoke about the importance and responsibilities of the Train Clerks and their plight while attending trains in all seasons exposed to sun, rain and wind during day and night and the gross neglect shown to them in the fixation of their initial salary as Rs. 55/- against Rs. 60/- given to other open line clerical staff of the Railway. They also pointed out the necessity for the supply of suitable lights, rain coats, umbrellas, torchlights etc., to the Train Clerks individually. They also added that the Train Clerks

must have preference over all other clerical staff regarding allotment of 'Rent-free' quarters.

Later it was proposed to have this as the First meeting of the Trichinopoly District Train Clerks and to call this as 'Trichinopoly District Train Clerks' Association.'

The Office bearers were then elected :—

- | | |
|--|-------------|
| 1. Sri S. Gangathara Iyer, TPJ Control | President |
| 2. Sri A. P. V. Ramani, (TPGY) | Secretary |
| 3. Sri V. Sreenivasan TPJ Control | Assistant |
| 4. Sri C. Vythialingam, Tanjore | Secretaries |
| 5. Sri M. Jayaraman, TPJ Control | Treasurer |

The above Office bearers were proposed and elected unanimously by those present. Then the Election of Committee Members was suggested from the Train Clerks all over the District and the following were elected with powers to the Committee to co-opt more members, if necessary.

- | | | |
|------------------------|----|--------------|
| 1. Sri. L. Renganathan | .. | Tanjore |
| 2. „ K. Narayanswamy | .. | TPJ/Control |
| 3. „ A. N. Ramadoss | .. | TPGY |
| 4. „ T. V. Naganathan | .. | „ |
| 5. „ S. L. Srinivasan | .. | Trichinopoly |
| 6. „ R. Arumugam | .. | Tiruvarur |
| 7. „ M. Sambandam | .. | Mayavaram |
| 8. „ M. Pichai | .. | Manamadurai |
| 9. „ A. Subramanian | .. | Dhanushkodi |

On completing the election of office bearers the following resolutions were brought in and all passed unanimously without any alteration or modification.

The grade of Train Clerks by the Pay Commission—55—130; 80—160; and 100—185 :— The smart and

efficient Commercial clerks were chosen and recruited as Train Clerks prior to the implementation of the Pay Commission and were given better scales than other clerical staff but were placed at the bottom of the scale and efforts to reconsider about the refixation and provision of higher scales of pay, through all the Associations and Unions and by our conference at Perambur held in 1950 and at Podanur in 1953 and in the All India Train Clerks' Conference at Baroda and BZA as well as in N. W. Railway, have not yet been considered and we are still in the same plight.

This resolution be communicated to all Unions and A. I. R. F. Secretary for further move. The grade of Rs 100-5-185 now introduced to the Train Clerks branch which is quite disadvantageous to all senior clerks and this implementation has caused almost all the senior Train Clerks to refuse their promotions and to continue in 80-5-160 grade itself. Hence it is requested that the minimum of Rs 55/- be raised to Rs 80/- in the grade of 80-5-160 and suitable higher grades to be implemented to seniors. The grades of TPGY, VM, MDU and ED be raised to Rs 150/- against Rs 100/- in the grade of 100-5-185.

Rent Free quarters be allotted to Train Clerks at stations where quarters are available in preference. In this connection TPGY is a station which is secluded from all Passenger stations and when a Train Clerk comes for duty or breaks off he must walk at least one mile to reach the train or bus from where they should travel to their houses. Considering this, the quarters are being allotted to all Train Clerks and AYMs at TPGY and this privilege has been withdrawn due to many of the quarters being allotted to Goods shed clerks and Tranship shed clerks and Movement Office Coaching clerk. There are one Hd. TNC, 14 TNCs, 2RG/TNCs and 3 Quota ODCs. Upto the introduction of Trichinopoly Control one Hd. TNC and 13 TNCs were provided with quarters and 2 RVCs also to make them available on emergency cases. But now quarters are given to 7 TNCs only and much difficulties are experienced by the TNCs to come for several shifts i. e., to be brief the shift TNCs have to spend 2 weeks night duty for every 3 weeks as the TNCs on 20-4 and 4-12 hours duty are on night only. 4-12 hours TNCs have to come in the night itself as there are no convenient trains and it will be very difficult to get up in the midnight and go for duty. Due to frequent night duty and shifts i. e., 2 weeks for every 3 weeks, the TNCs get exhausted and their health shatters.

The Train Clerks are now supplied with 3 torch-lights and this is inadequate. The Hurricane lights supplied cannot withstand the wind and rain in yards. Hurricane lights of better quality as also Rain Coats and Umbrellas may be supplied. This should be the personal equipment of the Train Clerks.

There is no passage from Broad Gauge marshalling yard and main yard wherefrom trains are started and received at TPGY and the TNCs have to swim or struggle in the water to go and take numbers for the trains. Snakes are frequently moving in the yard and it will not be surprising if one of the yard staff or TNCs is hurt or bitten by poisonous insects while they move in the yard.

Considering this, the resolution may be forwarded to DTS/TPJ with copy to the DEN and REN/TPJ requesting them at least to provide a temporary pathway of about 3 or 4 ft. broad and elevated from the ground level for the staff to go and to take numbers and return to the station. In view of the ensuing rainy season, this may be given special attention and immediate action be taken.

This meeting proposed that the monthly subscription for the TNCs be fixed as 4 annas per month and the same may be collected and sent to the Treasurer by the 15th of every month commencing from October, 54.

The TNCs of this district will meet once in a month at least preferably during the third week of the month at Trichinopoly, the date being communicated then and there.

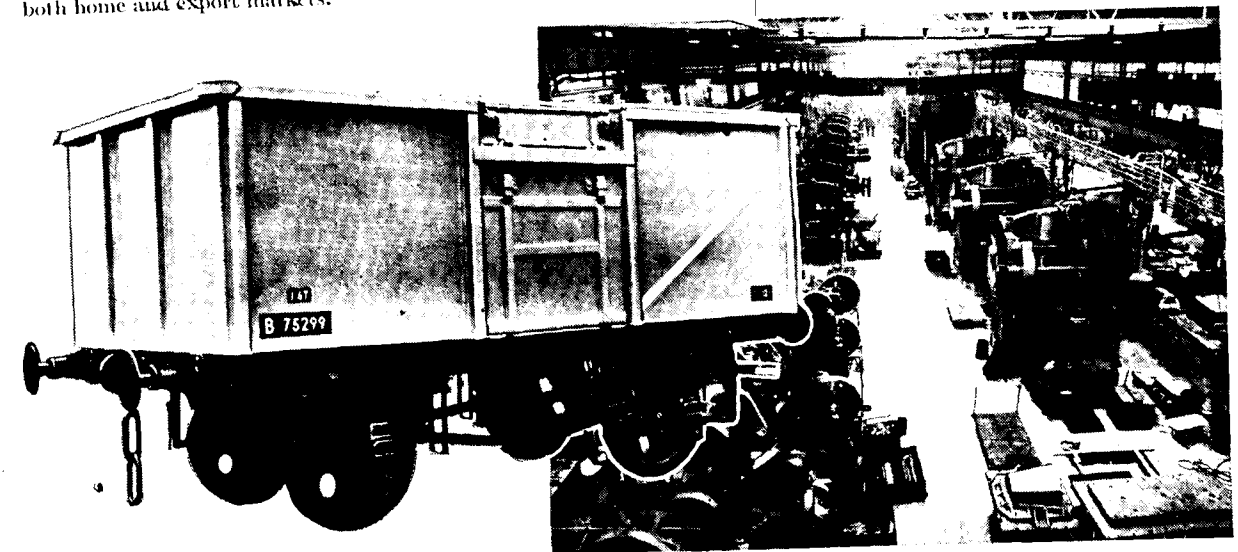
All the resolutions were passed unanimously by all those present.

Then the president concluded his remarks thanking all present for attending the meeting at a very short notice and for having selected him as president for the occasion. He wanted all TNCs to be agitating for their rights at the same time discharging their duties correctly.

Vote of thanks to the President and those present was proposed by the convener and the secretary.

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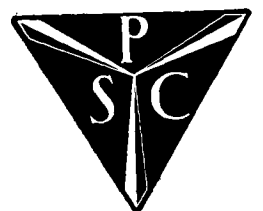
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By handing in the exact fare in good coins or currency you get the ticket easier and quicker, and save for yourself and the Booking Clerk time and trouble.

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

(Inserted in the interests of Travelling Public)