

THE TRAMWAY WORKSHOPS AT RANDWICK.

For some time past the efficient working of our complicated tramway system has been seriously hindered by the lack of proper facilities for the maintenance and repair of the tramcars and motors, the accommodation hitherto provided at Randwick having been totally inadequate for the purpose. The drawback was a very serious one, and its effect upon the working of the tramways may be judged from the fact that in October last there were no less than 35 tramway motors and 25 boilers waiting for repair at Randwick. The withdrawal of this large amount of rolling-stock from the service of course meant a serious loss, and the attention of the authorities having been directed to the matter, certain improvements in the works at Randwick were commenced, under the supervision of Mr. Middleton, the tramway locomotive engineer, which it is hoped will have the effect, when the arrangements proposed are completed, of rendering the works equal to the heavy demands made upon them. All the heavy repairs required by the tramway rolling-stock are done at Randwick, only a small portion of the lighter repairs being effected at Randwick, and thus the efficiency of the service depends, to a large extent, upon the capability of these works to execute repairs or renewals as quickly as possible. Owing principally to the bad condition of the streets through which the tramways run, the wear and tear of the rolling-stock is abnormally large. It has up to the present been found impossible to keep the dirt and grit from getting into the working parts of the motors, and, as every engineer will be aware, this has a most rapid and destructive effect on their efficiency. Brass bearings and other working parts of the motors are to be seen at Randwick, which have been, owing to the action of the grit, worn entirely through in a very short space of time, and in the yard are a number of condemned axles, the bearing surfaces of which have been reduced by one inch in diameter after only 12 months' wear. The excessive vibration caused by the rough state of the lines has also a very injurious effect on both motors and cars, the continued shaking tending to loosen and weaken every joint in them. The only remedy for this state of affairs appears to be in a proper construction of the streets, by means of which the water and mud, instead of lodging as at present, on the tramlines, will be carried away from them to the outer portion of the streets. The rails should also be laid on a more solid foundation, so as to avoid the present unevenness of the lines, to which the excessive vibration is largely due. The average life of a tram motor is only nine years, and it is estimated that the average time during which a motor will run without extensive repairs is only nine months. As the repairs usually take about two months, it follows that each motor only runs about 10 months out of each year. It must be remembered, however, that the tram motors run over an unusually large mileage, the average number of miles run yearly by each motor being 27,500. This is a larger number of miles than is run by any of the locomotives on our main lines of railway, and will compare favourably with the work done on any railway line. The tramcars are still more frequently in need of repairs, the whole of the carriages being turned over three times in the course of the year. This means that each carriage needs repairs about three times a year, and thus spends about three months of each year at the workshops, the other nine months being spent in active service. Of course the necessity for repairs to the rolling-stock is largely increased through the collisions which are continually occurring in the streets, with cabs, carts, &c., and by which the carriages and motors are often seriously damaged. In 1886 the average number of motors in use was 52, and the average total number of motors 96, giving the average number of motors under repair 44. The total cost of repairing motors during 1886 was £34,953, and the total cost of repairing the carriages, £10, 00. At present there are about 40 motors and 11 carriages undergoing repairs, and about 325 men are employed at the works.

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The improvements which have recently been effected at the workshops do not include the erection of new sheds, but comprise the alteration and re-arrangement of the existing sheds, and the erection of a quantity of new iron and wood-working machinery, much of which has been lying idle at the works for some time. It was proposed a short time ago, to erect a new shed at a cost of £9000, but this expenditure has been found to be unnecessary, as the existing accommodation, if properly availed of, is quite sufficient for all present purposes.

The works consist of a number of separate sheds, disposed at intervals around a large yard, through which branch lines run from the main line which passes close by the establishment. The first shed entered is the running shed, a large galvanised iron building measuring 300 feet by 50 feet, through which two lines of rails run. Cleaning pits under each line extend the whole length of the shed, affording easy access to the motors, either for the purpose of cleaning or repairs. A quantity of repairing work is still being done in this shed, but it is intended, as soon as the arrangements are completed, to entirely discontinue repairing in this building, and to reserve it only for running purposes. By this means a clear line will be obtained from end to end of the shed, and the traffic will be greatly facilitated. This building, as well as the other portions of the works, is lit by the electric light, the motive power for which is obtained from a 20-h.p. engine, situated in shed close by, which drives two powerful dynamos. Portable electric lights are also fitted in the cleaning pits, by means of which the lower parts of the motors can be lit up at night, and any part of the machinery examined. As a large amount of work is necessarily done during the night, these lamps prove very useful, and greatly facilitate the work. Close to the running shed is a small building used as a tinmith's shop, where a number of men are employed making and repairing lamps for the tramcars and motors.

The fitting and machine shop is a large structure similar to the one previously mentioned, and measuring 300 feet by 40 feet. It was originally used as a running shed, but is now being fitted up entirely for use as a machine shop. A large number of the latest and most improved iron-working machines have been erected, including several powerful lathes, shaping machines, &c., some of which are already at work. A complete line of shafting is being erected, extending the whole length of the building, the motive power being provided by a 20-h.p. engine in the shed. Two engines are at present being fitted with new boilers in this shed, as well as a number of others undergoing minor repairs, and last year 12 engines received new boilers. As the boilers of a motor only last from five to seven years, frequent renewals are necessary, and it is important that every facility should be provided for this work. A recently introduced improvement in this shed is an ingenious and simple traversing gear, by means of which motors can be moved across the shed from one line to the other, or placed on the line outside, thus enabling them to be moved to or from any part of the shed without shifting any of the other motors undergoing repairs.

The next shed contains the smiths' and boiler-making shops. The building is a new one, measuring 300 x 50 feet, and was erected last year. One-half of the shed is fitted up as a smith's shed, in which 12 fires are at present at work, as well as a spring furnace for the manufacture of springs, which are now being made on the premises. The furnaces are kept going by a powerful Sturtevant fan, driven by a donkey-engine, which is capable of keeping up a draught for 30 fires. A 500-cwt. steam-hammer is also in operation in this shop. The other half of the shed is fitted up for the purpose of boiler-making and repairing, all the requisite machinery for making boilers being provided. It is intended as soon as possible to start the manufacture of boilers for the motors on the premises, but up to the present the work has been confined to repairs. A number of large drilling machines are at work here for piercing the boiler-plates, &c. There is also a portable drilling machine of a new description in use, which is known as the Stowe Flexible Drill. This machine consists of a small portable drilling machine, which is affixed to any part of a boiler required to be pierced, the motive power being obtained through a flexible shaft connected of wire which is rotated by means of an

motive power being obtained through a flexible shaft constructed of wire, which is rotated by means of an ingenious arrangement of pulleys and ropes. The engineers declare that this little machine is indispensable, and effects an immense saving in labour, the work which it now performs with the utmost ease and speed having formerly been done by hand at great expense. A travelling crane runs across the roof of the shed, which is powerful enough to lift and move the heaviest boilers used in the department. Before leaving the shed all boilers are tested with warm water by a hydraulic machine up to a pressure of 180lb., after which they are tested by steam. A quantity of machinery is stored in the corner of the shed, which has not yet been erected, but which will be put in place as soon as time permits.

The carriage-repairing shop is in another large shed, measuring 300 x 50 feet, which is fitted up with the most modern wood-working machinery, including circular and band saws, planing, moulding, and mortising machines, &c. The motive power is obtained by a 12-h.p. engine in the shed. This machinery has only just been put to work, although it has been for some time in stock at the works. At present repairs only are being done here, but there is nothing to prevent the tram carriages from being entirely manufactured in the shop, as the most complete machinery for the purpose is provided. There are now eleven carriages under repair in the shop, some of which are being decorated and fitted up prior to being sent to Newcastle.

The works also include a small brass foundry and pattern shop, and the usual offices and auxiliary shops. A hydraulic press for forcing the wheels on to the axles is now at work, and a larger machine for this purpose, which has been lately imported, is about to be erected. Everything necessary for the rapid execution of works has been, or will shortly be, provided, and it will be seen that there is now nothing to prevent the works from keeping pace with the requirements of the tramway system.