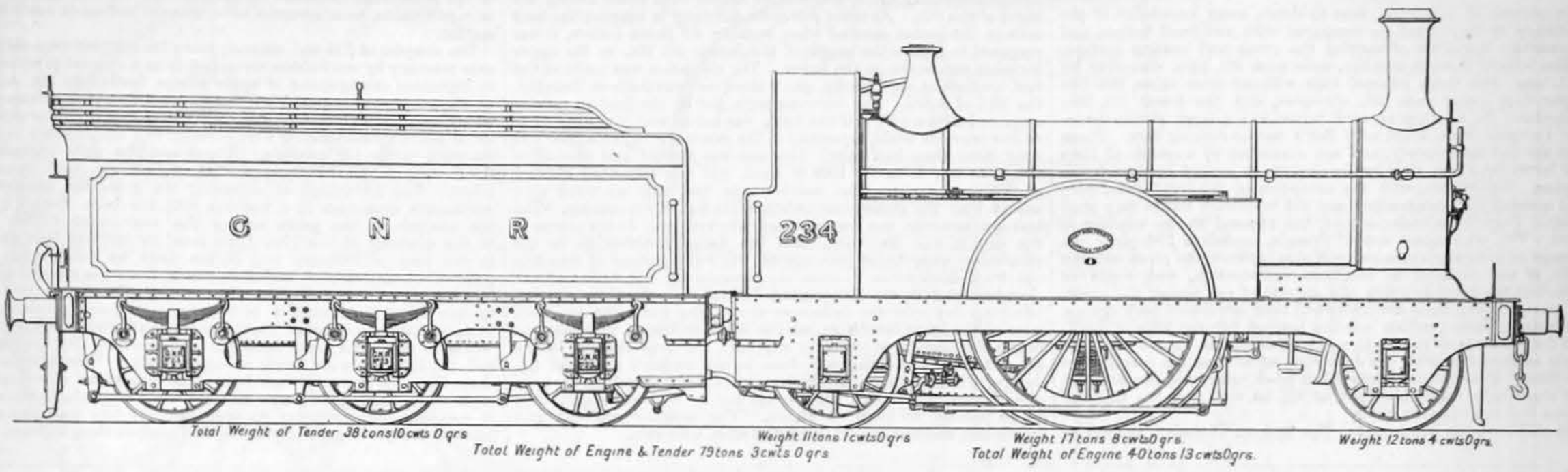
EXPRESS LOCOMOTIVE, GREAT NORTHERN RAILWAY

MR. PATRICK STIRLING, DONCASTER, ENGINEER



engine-room, within easy reach of the electrician in charge of the station. The car depôt is lighted throughout by incandescent lamps, operated from the tramway circuit; is a substantially built brick building, containing four tracks, with accommodation for twelve tram-cars. It is entered by four doors, sufficiently high to permit of easy entrance to cars with outside seats. The entire width of the building at the end farthest from the doors is taken up by a pit 30ft. by 40ft., accommodating four cars at one time for purposes of inspection and cleaning. This car depôt was built for the Highways and Tramways Committee from designs prepared by the borough engineer.

The equipment.—The present equipment consists of six motor cars of elegant design and finish, lettered and painted in such a manner as to clearly designate the route taken by each. These cars are each equipped with two single reduction Thomson-Houston motors of 15-horse power each, geared to either axle, and giving a total of 30 effective horse-power to each car. The motors are noiseless, and the gears run in oil. On the top of each car is mounted the trolley bar, which is a strongly-built rod upon an universal joint, and actuated by springs tending to keep it in a perpendicular position. This trolley bar carries a small grooved gun-metal trolley wheel at its top end, which runs against the under side of the trolley wire, and collects the electric current from the trolley wire, and conveys it by suitable wires to the motors, from whence it passes through the wheels of the cars to the rails and return wire, through which it passes to the dynamo at the station, thus completing the circuit.

Those who had the pleasure of riding on the cars on the 29th ult. cannot fail to have admired their design and build and finish, and we must admit that, though the American roadways cannot compare with our English ones, their tramcars have much in them we should do well to follow. We hope shortly to be able to give details of the Roundhay cars. In the meantime we may draw attention to the elegant way in which they were lighted by incandescent lamps. The fittings were fit for a drawing-room, and therefore perhaps a little too fanciful for an everyday working tramcar. The brake arrangement was a simple and apparently effective one. How far it has been wise to make the wheel base 6ft. 6in. centres remains to be seen. Fortunately there are no sharp curves on the working portion of the Roundhay line, or we should predict frequent mishaps. It must be borne in mind that running a tramcar on our English grooved rail is different from running upon the type of rail used in the States.

The working of the Roundhay line will be watched with considerable interest. The excessive sparking that took place on the opening day between the wheels and the rails might with a little forethought and care have been considerably lessened, if not altogether avoided, but how far the flashing that occurs when the trolley passes the attachment to the span wires will be lessened by daily wear remains to be seen. Admitting the system to be right, one would have thought that this detail could have been made to work as well on the first day as any subsequent one; further, the trolleys would persist in leaving the "wire" when taking and leaving a pass-bye, involving an attention on the part of the conductor to replace them which it is hoped a little time will render unnecessary. At the request of one of the passengers, a car was stopped on the steepest grade—1 in 28—and started again, apparently, without any difficulty, proving that the motors are well up to their work, but, inasmuch as there was nothing to show how much electric energy was expended during the starting, it was impossible to form any opinion as to the efficiency. It is to be hoped that such instruments will be added to the car as to enable those interested in the subject to take correct readings, for upon the ratio between the electric energy sent into the line and the mechanical work accomplished by the cars depends the all-important item of cost of working. It would be obviously unfair to draw any conclusions from the working on the opening day, when all things were new.

We must again compliment the Leeds Town Council upon being the first to sanction a trial of overhead conductors in this country, and the Thomson-Houston Company for the manner in which they have carried out their work.

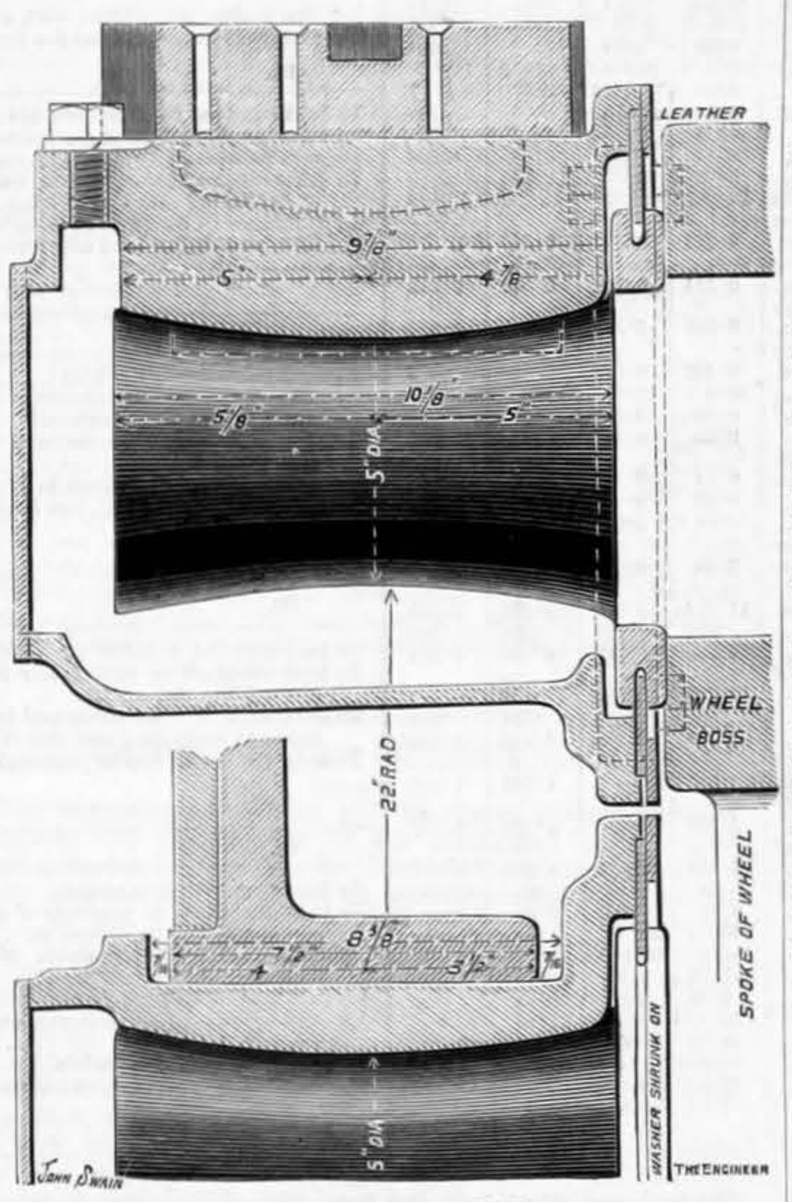
EXPRESS ENGINE, GREAT NORTHERN RAILWAY.

It is not to be supposed that the Great Northern express traffic is worked entirely by the outside-cylinder engines, which have already been illustrated in our pages, albeit Mr. Stirling's engines with 8ft. drivers have earned a world-wide reputation. For many years inside-cylinder engines have played an important part on the line, and Mr. Stirling has found it worth while to perpetuate this type. Our supplement this week illustrates, through the courtesy of Mr. Stirling, one of these engines. This particular locomotive illustrated was built in 1885, but precisely similar engines are being built and put to work now as the traffic demands them. We give above a smaller view, which shows the engine and tender together.

The wheel base of these engines is long, but they work a road which is free from sharp curves, and the traverse of the leading axle, and the play of the flanges, are found to give all the required freedom. We give a section of one of the leading boxes, which explains itself. The principal dimensions of these fine engines are as follows:—

Diameter of cylinders	18½in.
Stroke	26in.
Diameter of driving wheel	7ft. 7½in.
Diameter of boiler (telescopic)	4ft. 2in. & 4ft. outside.
Boiler pressure	160 lb per sq. in.
Length of barrel	11ft. 5in.
Length of fire-box casing	6ft. 2in.
Number of tubes	186
Diameter of tubes	1¾in.
Heating surface in tubes	1001 sq ft.
Heating surface in fire-box	108·7 sq. ft.
Grate area	18·4 sq. ft.
Weight on leading wheels	12 tons 4 cwt.
Weight on driving wheels	17 tons 8 cwt.
Weight on trailing wheels	11 tons 1 cwt.
Total weight	40 tons 13 cwt.
Total weight of tender	38 tons 10 cwt.
Total weight of engine and tender	79 tons 3 cwt.

During a recent trial, to ascertain the exact consumption of fuel, when hauling some of the quickest trains, it was



LEADING AXLE BOX

found that it consumed 30·6 lb. of best South Yorkshire coal per mile run, and four pints of oil per 100 miles run. The average weight of the trains hauled was 177·6 tons. The booked speed of these trains is considerably over fifty miles an hour; so this performance is remarkably excellent.

AMERICAN WORKSHOPS.

The paper read before the Manchester Association of Engineers by Mr. Hans Renold, on "American Workshops," of which we gave a short abstract last week, came in for some pretty severe criticism at an adjourned meeting of the Association held on Saturday. Mr. John Craven remarked that although Mr. Renold had gone over a wide field of subjects, he had practically confined his remarks to Messrs. Brown and Sharp's establishment, and while he (Mr. Craven) was ready to admit that so far as high class work and sanitary arrangements were concerned, Messrs. Brown and Sharp's works were a model, they could not be put forward as representative of American establishments generally. As a matter of fact, many of the American workshops were not as good as a large number of similar workshops in Manchester. Mr. Renold had referred to the extensive use of gear cutters in the United States, but he might point out that it was in Manchester the milling machine was first made. Mr. Samuel Dixon said he had certainly come to the conclusion that no better work was done in America than could be and was being done in this country; whilst as regards the enormous production of milling cutters, that was simply an example of what could be done where large firms devoted themselves to the production of one speciality. With regard to the statement made by Mr. Renold that the American thread was preferable to the Whitworth thread, he might say he entirely disagreed with such a conclusion, and he might add that after visiting a variety of continental and American workshops he should certainly not, if he were called upon to award the palm of superiority in workmanship, go across the Atlantic for that purpose. Mr. J. Nasmith remarked that whether English engineers were the inventors of the milling machine or not, it must be admitted that it was through this type of cutter being taken up by the Americans that milling had become the success it was at the present time. English engineers were very conservative, and it was only through the pressure of circumstances that milling machines came into general use in this country. When American inventions were brought to England they were generally improved to the highest degree, but he thought the chief fault of both American and continental engineers was what one might call "over-refinement;" there was such a thing as over-finishing an object and over-doing it. If, however, American machinery was so much superior to what we had in this country, as asserted by the reader of the paper, how was it that cotton machinery, with all its intricacies, could be sent to the United States, in the face of American manufacturers, even though the cost was increased from 40 to 60 per cent. At the present time it was possible for English machinists to secure contracts for the whole of the machinery in an American mill, and inclusive of freight charges and high tariff, deliver and erect it in America at a lower cost than American engineers with all the advantages of their immeasurably superior tools were able to do. Another speaker, Mr. Barstow, ridiculed the idea that the Americans could be so pre-eminent in the manufacture of emery wheels as might be inferred from Mr. Renold, when they had before them the fact that from the neighbourhood of Manchester thousands of emery wheels were every year exported to the United States.

Beck and Co. v. the War Office.—A reference lasting som days was recently held at the Royal Court Chambers, Outer Temple, Strand, London, in which Messrs. Beck and Co., engineers, Southwark, were the plaintiffs, and the Secretary of State for War the nominal defendant. Certain appliances connected with submarine mining had been supplied by plaintiffs and rejected at Woolwich, as not according to specification. Messrs. Beck and Co., considering themselves aggrieved, asked that the matter be submitted to the decision of an independent civilian engineer. This was agreed to, and Mr. Jeremiah Head, M. Inst. C.E., of Middlesbrough and London, was requested to act. His award, which has just been issued, is to the effect that the deviations complained of were not of sufficient importance to justify the rejection.

The Taxation of Machinery.—The proposed reassessment of the manufactories in the city and district of Gloucester is continuing to arouse the greatest interest among those affected. The committee appointed to carry out the appeals met on Monday at the offices of their solicitors, Messrs. Cooke and Son, Mr. Slater, managing director of the Gloucester Wagon Company, being in the chair. Mr. Humphreys Davies attended the committee at their request, and was appointed surveyor and valuer to the appellants, with instructions to make the necessary preparations for the hearing. A contribution was also laid on the members of the association to defray the preliminary costs of the appeal, which the committee will carry to the House of Lords if necessary. We understand that under the advice of Mr. Humphreys Davies the question will be raised in an entirely novel form. The great importance of the questions at issue may be judged from the fact that the increase in the assessments of those affected amounts to upwards of £12,000.

Liverpool Engineering Society.—The first ordinary meeting of the eighteenth session of this Society was held at the Royal Institution, Colquitt-street, on Wednesday evening, October 28th, a large number of members being present. After the usual routine business, Mr. John T. Wood delivered his inaugural address upon taking the chair as president for the session. After thanking the members for the honour they had conferred upon him, he proceeded to discuss the subject of his address, viz., "The Collection and Disposal of Sewage and the Pollution of Rivers." He said the question of sewage disposal broadly lay between irrigation and precipitation with filtration, and the first essential condition of a perfect system of sewerage for any centre of population was that the sewage should be collected in practically watertight sewers and drains so designed as to sizes and gradients that, being self cleansing, they would admit of its speedy removal to some convenient place for treatment. He then proceeded to point out the difficulties that lay in the path of the sanitary engineer who had advised the treatment of a certain sewage by broad irrigation, not the least of which, he said, was the difficulty of obtaining a sufficiently large area of land of a suitable quality in such a position and at such a price that the local authority would be justified in acquiring it. The speaker then dealt with the various characters of the soils met with, and their advantages in producing good results both in the shape of effluents and crops, and proceeded to discuss the question of the under-drainage of irrigation areas, and the objections taken to such areas on the plea of nuisance to the surrounding inhabitants, together with the quantity of land required in various cases. Estimates were then given showing the first cost and the annual cost of maintenance of a farm where the sewage was treated entirely upon the land, and of a similar farm where precipitation was first employed, and the sewage afterwards filtered through a much smaller area of land. From these estimates, he said, it appeared that alike on the merits of purification, and on the basis of annual cost, broad irrigation, when it is possible to conduct it under fairly good conditions, is the more preferable system. Mr. Wood concluded his address by making some remarks upon electrical processes of purification. A vote of thanks to the president terminated the proceedings.

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