EXPRESS PASSENGER ENGINE, NORTHEASTERN RAILWAY ENGLAND.

We are indebted to the courtesy of Mr. Wilson Worsdell, Locomotive Superintendent of the Northeastern Railway, England, for a photograph and details of the locomotive shown in the accompanying illustration. No. 1870 is the second locomotive of its class to be turned out of the company's shops, and it may be taken to represent the latest English ideas on the question of designing powerful locomotives to haul heavy trains at high speed.

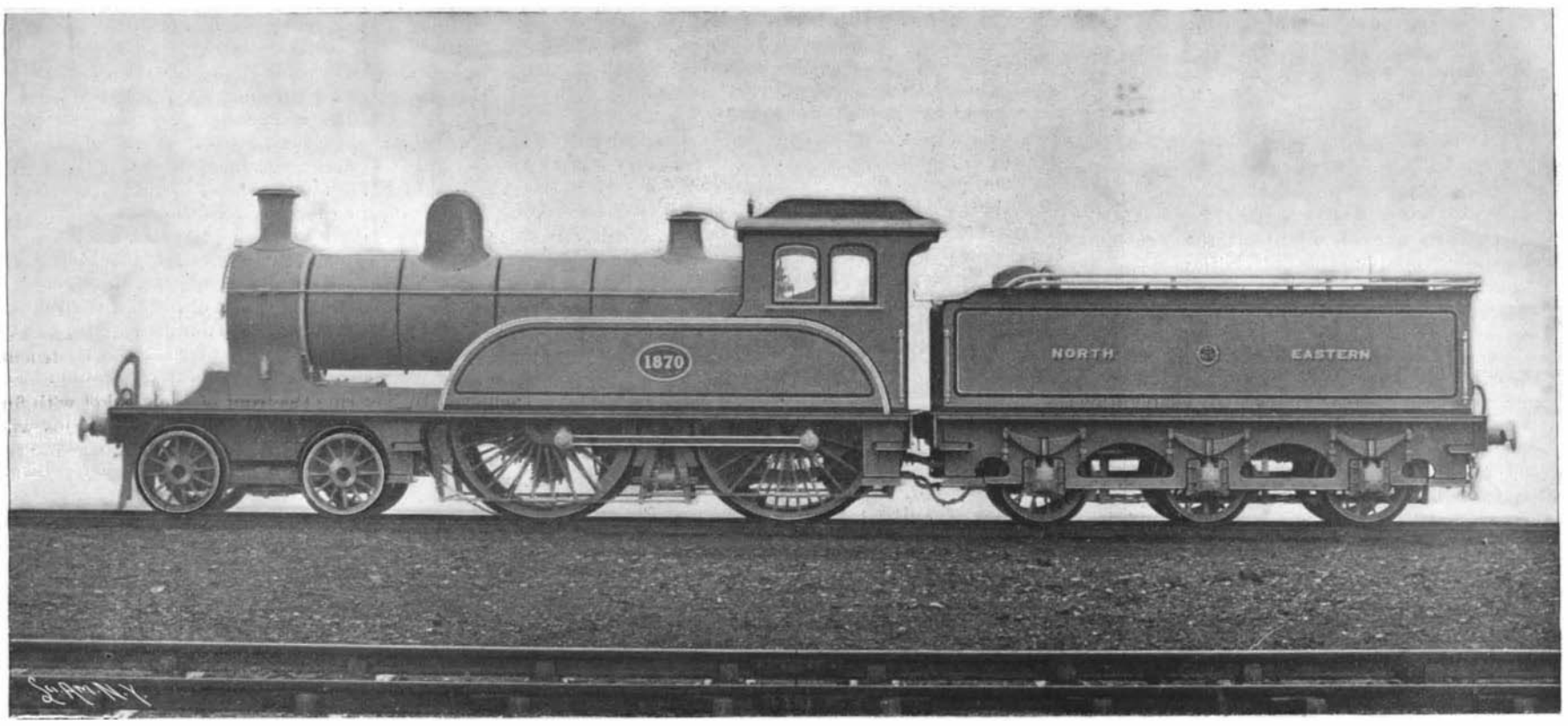
It must be admitted that within the limitations imposed by the English custom of placing the cylinders inside the frame, and hiding the working parts from view, which to American eyes always appears to rob a locomotive of much of its charm, this is a very handsome and well-proportioned machine, the general contour being harmonious and agreeable to the mechanical eye. A familiar feature will be recognized in the roomy cab, and particularly in the clerestory ventilator. Mr. Worsdell was the first English engineer to place a cab that was worthy the name upon his locomotives, and they have proved so popular that the engine drivers upon other lines are agitating to have the same common sense article placed upon their locomotives.

These fine engines present many features of interest. They were built under the spur of the keen competition which takes place between the East and West Coast routes from London to Scotland for the summer and autumn travel. This year the East Coast route has placed a new train of eight cars in service, which is built on the American plan, the cars being about 70 feet long, and weighing some 40 tons, the whole weight of the train being about 320 tons. This, it will be seen, is a very heavy load, as things have been going lately in record-breaking runs, and called for a locomotive of exceptional power. The result is seen in No. 1870, which is the largest and most powerful machine of its kind in England, and one of the most powerful in the world to-day, as will be seen from the comparative table below:

Dimensions.	C., B. & Q. 590.	N. Y., N. H. & H. 403.	C., R. I. & P. 1101.	N. Y. C. 999.	N. E. R., England, 1870.
Total weight	138,000 pounds.	131,000 pounds.	123,000 pounds.	124,000 pounds.	113,792 pounds.
Cylinders	19x26 inches.	20x24 inches.	19½x26 inches.	19x24 inches.	20x26 inches.
Weight on drivers	81,000 pounds.	86,000 pounds.	82,000 pounds.	84,000 pounds.	77,056 pounds.
Boiler type	Straight.	Extended wagon top.	Wagon top.	Wagon top.	Straight.
Boiler pressure	200 pounds.	190 pounds.	190 pounds.	190 pounds.	180 pounds.
Boiler diameter	58¾ inches.	62⅜ inches.	61 inches.	58 inches.	52 inches.
Number of tubes	210	312	260	268	201
Heating surface—firebox	187·4 square feet.	167·52 square feet.	193·3 square feet.	232·92 square feet.	127 square feet.
Heating surface—tubes	1,392·7 square feet.	1,946·72 square feet.	1,795 square feet.	1,697·45 square feet.	1,089 square feet.
Heating surface—total	1,580·1 square feet.	2,114·24 square feet.	1,988·3 square feet.	1,930·37 square feet.	1,216 square feet.
Grate area	44·47 square feet.	30·22 square feet.	24·5 square feet.	30·7 square feet.	20·7 square feet.
Maximum travel of valve	6 inches.	6 inches.	6 inches.	5½ inches.	4⅝ inches.
Lap—outside	½ inch.	1⅛ inches.	1¼ inches.	1 inch.	1⅞ inches.
Drivers—diameter	84¼ inches.	73 inches.	78 inches.	86 inches.	91¼ inches.
Driving wheel base	7 feet 6 inches.	8 feet 6 inches.	8 feet 6 inches.	8 feet 6 inches.	9 feet 6 inches.
Tender, water capacity	4,000 gallons.	4,500 gallons.	4,300 gallons.	3,587 gallons.	4,000 gallons.
Tender—coal capacity	7 tons.	8½ tons.	7 tons.	6½ tons.	5¾ tons.

The comparison of No. 1870 is made with American in preference to English locomotives for the reason that this is the home of powerful express locomotives, and there is only one English express engine, the Great Northern single driver, which can compare with it in cylinder power. This has cylinders 19½ inch diameter by 28 inch stroke and an eight foot driving wheel. It is a noteworthy fact that in his latest design, Mr. Worsdell has forsaken the compound for the simple engine, and the single driver in favor of the four coupled. The latter type seems to have re-established itself as the best for hauling heavy loads at express speed, and we believe the powerful compounds of the Queen Empress type, designed by F. W. Webb, for the West Coast route, were seldom placed in front of the racing trains during last year's competition.

This tabular comparison between the latest American and English practice presents some strange anomalies. In the first place the lightest locomotive (English) has the largest cylinder capacity, and its load on drivers is the lightest; though this is somewhat compensated by the large drivers, 7 feet 7¼ inches. More striking, however, is the disparity between heating surface and cylinder capacity. The No. 403 of the N. Y., N. H. and H. Railroad has 2,114 square feet of heating surface for 20 by 24 inch cylinders; whereas the English engine, with larger cylinders, 20 by 26 inch, has only 1,216 square feet of heating surface, or not much more than half the amount. This is an extraordinary difference, and shows how widely divergent the practice of the two countries is to-day on this question of boiler capacity. The difference is to be explained in part by the superior quality of the English coal and by the higher conductivity of the copper fire box and brass tubes with which No. 1870 is fitted, and, furthermore, by the larger size of her driving wheels, which does not necessitate so frequent filling of the cylinders. But after all these deductions have been made there yet remains a large surplus of steam-producing power in favor of the American locomotive. If one were to venture a prediction regarding the Northeastern engines, it would be that they will be found to be over-cylindered. The driving wheels, 7 feet 7 inches in diameter, are the largest set of four coupled wheels in the world, and were only exceeded by some 8 foot 3 inch six-coupled wheels tried on the Continent some years ago.



EXPRESS PASSENGER ENGINE, NORTHEASTERN RAILWAY, ENGLAND.

Cylinders, 20 × 26 inches; driving wheels, 7 feet 7¼ inches; steam pressure, 180 pounds.

Lord Kelvin and His Notebook.

Lord Kelvin's power of abstraction from all surroundings, becoming dead to what is near him and lost in intellectual processes, is quite extraordinary, says Good Words. He is never without his "tablets," in the shape of a well-known notebook of the kind used by reporters, and which he carries in his pocket and produces at the most unexpected times. I have seen him, when on a visit to a country house, in a crowded drawing room, with all the jabber of conversation going on in full flood, sitting with his notebook and filling page after page with intricate calculations, seeking the solution of some problem which awaited investigation.

Lord Kelvin can do this in railway carriages, and in a storm at sea, as calmly as in his library. He will get himself propped up in the corner of his cabin and set to work, and become so absorbed as to be unconscious that there has been a gale blowing while he was at work. And yet, if recalled to ordinary life by some passing questioner, his gentle face lights up with interest, when others, more self-conscious than he, would display irritation. Indeed, I never knew a man less self-conscious. He is absolutely without affectation or any thought of self-importance. He will converse with a nobody in a manner so respectful and attentive as to make that nobody imagine himself that he has been delightfully interesting and even informing to Lord Kelvin. This arises from the simplicity and sweetness of a great nature.

The New Japanese Cathedral.

When foreign architects visit Japan and see the cathedral of Buddhism the first time, they are generally astonished at the magnificent structure. It is executed in pure Oriental style, and is richly ornamented with carvings. H. Ioto, a famous builder, of Nagova City, designed it. The structure was commenced in 1878, and was completed last year. The cost has been estimated at seventeen million dollars. It would have greatly exceeded this amount had not numbers of Buddhists worked without any recompense. As the structure neared completion, the committee having the work in charge was much perplexed as to fire insurance. They found that no company would assume the risk on such a valuable wooden structure, the danger of destruction by fire being very great, and thus the premium would amount to an enormous sum of money. At last the committee decided on a design devised by Dr. Tanabe. Numbers of powerful fountains were constructed, both exterior and interior, which can be made to play on all parts of the structure at the same time. Usually only one great ornamental fountain is playing, rising to the great height of 157 feet. This is probably the largest artificial fountain in existence, emitting 82,080 gallons per hour. In case of fire, all the water pressure can be directed through numbers of exterior and interior fountains, thus every part of the structure, both inside and outside, could soon be drenched and any conflagration soon extinguished.—Cincinnati Commercial Gazette.

Coal Consumption.

An industrious trifler, writing in a French review, has been at the pains to ascertain what is the annual consumption of coal on the railways and steam companies of the country, and he has worked out a total of 3,782,850 tons. This, he tells us, would make a pyramid 516 feet high and 894 feet at the basis, or nearly 70 feet above the height of the Great Pyramid. Then he goes on to calculate that if all this coal were loaded in trucks the train would be 1,625 miles, or—as with a nice feeling for the Franco-Russian alliance he puts it—the distance between Paris and St. Petersburg. If this train had to travel at the rate of 18½ miles an hour, it would take between 3 and 4 days to pass a given point. The railways of the whole world consume, he asserts, on the faith of statistics which are doubtless fairly accurate, nearly 63,000,000 tons of coal, which would make 25 "Great Pyramids," but he does not draw any moral from these figures except that a great deal of carbonic acid is thus precipitated into the atmosphere.—Westminster Gazette.