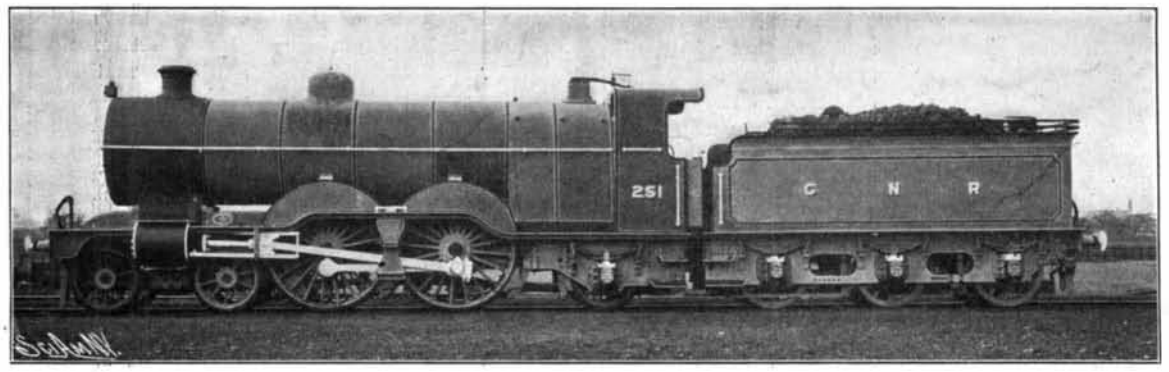
SOME POWERFUL ENGLISH EXPRESS LOCOMOTIVES.

Although the awakening of the British locomotive builder to the necessity of turning out more powerful engines has come rather late, there is no denying that a remarkable and very radical change is taking place in this respect in locomotive practice in Great Britain. During the past two decades the weight of trains in Great Britain has increased very much faster than the size and power of the engines. This is proved by the fact that the most important express trains are in many cases hauled by two engines, a practice which for many reasons is not desirable.

Now that the locomotive superintendents have set about the work of introducing larger engines, they are turning out some of the most powerful and handsome locomotives that are to be found in any country. Seeing that America was the pioneer in the development of the big engine, it is natural that the new English locomotives should correspond in general design to those which have proved their efficiency in hauling heavy trains at high speed on this side of the water.

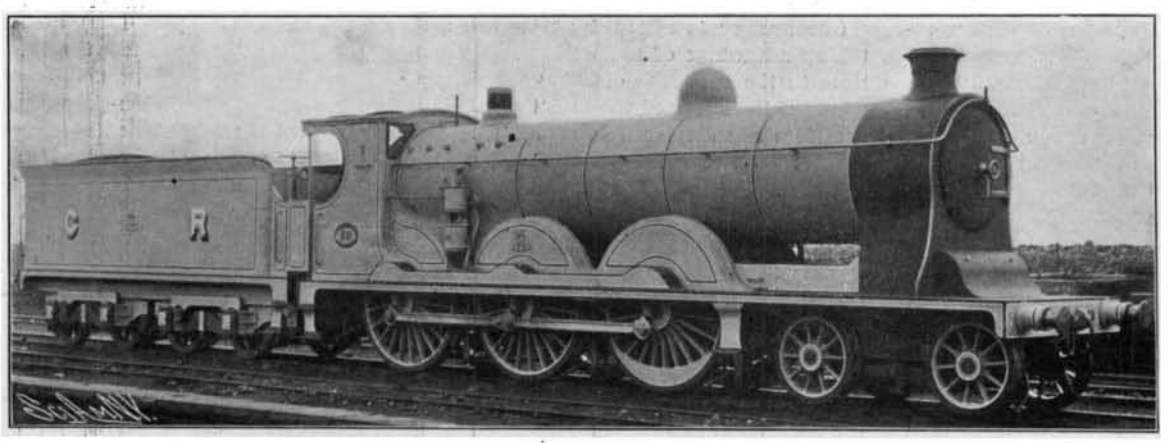
We present illustrations of two of the largest and most powerful of these engines; one, a four-coupled express engine designed by Mr. H. A. Ivatt, the locomotive superintendent of the Great Northern Railway, and the other a six-coupled express engine designed by Mr. John F. McIntosh, the locomotive superintendent of the Caledonian Railway. The Great Northern engine is the latest of a class of which many are now being built for hauling the long and heavy express trains that run from London to the north by the East Coast route. It is of what is known in this country as the Atlantic type, the engine being carried upon ten wheels, namely, a four-wheeled truck, four coupled drivers, and a pair of trailers beneath the firebox. The weight is distributed as follows: 19 tons on the truck, 36 tons on the drivers, and 14 tons on the trailers, making a total of 69 tons for the engine. The tender, which is carried on three axles, has a capacity of 5 tons of coal and 3,600 gallons of water. It is provided with a scoop for taking up water from the troughs between the rails. The total weight of the engine and tender, when fully loaded, is 118 tons. The most marked development in current English locomotive practice is the tendency to greatly increase the size and heating surface of the boilers. Thus, the present boiler, which is 5 feet 6 inches in diameter in the barrel, and carries a wide firebox extending beyond the frames, has a grate area of 31 square feet, and a total heating surface of 2,500 square feet. This should be compared with the well-known Sterling engines, many of which are still running on this road, which, with single drivers of 8 feet diameter, carried a boiler with scarcely half as much heating surface, or a trifle less than 1,200 square feet. The cylinders are 19 inches in diameter by 24 inches stroke, and the driving wheels 6 feet 8 inches in diameter, the steam pressure being 175 pounds to the square inch. The total wheel base of the engine is 26 feet 6 inches, of which only 6 feet 10 inches is actually rigid, for the reason that the front end of the engine is carried on a swing-link truck, and provision is made for lateral play of the pair of carrying wheels under the firebox.

The other illustration is of a six-coupled express engine, designed for heavy work over the Caledonian Railway, which forms the last link of what is known as the West Coast route to the north from London. This is considerably the largest express engine in Great Britain, and it was designed to enable a single engine to take heavy express trains from Carlisle to the north over heavy grades which include 10 miles of upgrade over the Brattock summit, where there are 10 miles of 1 in 73 and 1 in 75. When it is considered that the trains are from 340 to 400 tons in weight, it can be understood that in doing away with the double-header, it is necessary to design a locomotive of exceptional weight and power. The engine has six wheels coupled and is inside-connected. The cylinders, which are 21 inches in diameter by 26 inches stroke, are located between the frames underneath the smokebox and connect to the leading axle. The boiler has a firebox 8 feet 6 inches in length and contains over 2,400 square feet of heating surface, although, had the tubes been packed as closely as is customary, the heating surface would have been about 3,000 square feet. But in order to provide ample space for the generation of steam the diameter of the tubing was graduated, the largest sizes being placed at the bottom of the boiler. The result has been very satisfactory, the boiler supplying sufficient steam for the heaviest demands of the 21-inch cylinders. The driving wheels are 6 feet 6 inches in diameter, and they carry a total load of 61½ tons. The total weight of the engine is 83 tons. The tender, which is carried upon two four-wheeled trucks, has a capacity of 6 tons of coal and 5,000 gallons of water. The total weight of the engine and tender when in working order is about 160 tons.



Cylinders, 19 by 24; driving wheels, 6 feet 8 inches diameter; steam pressure, 175 pounds; heating surface, 2,500 square feet.

NEW ATLANTIC TYPE EXPRESS ENGINE FOR THE GREAT NORTHERN RAILWAY, ENGLAND.



Cylinders, 21 by 26; driving wheels, 6 feet 6 inches diameter: heating surface, 2,400 square feet.

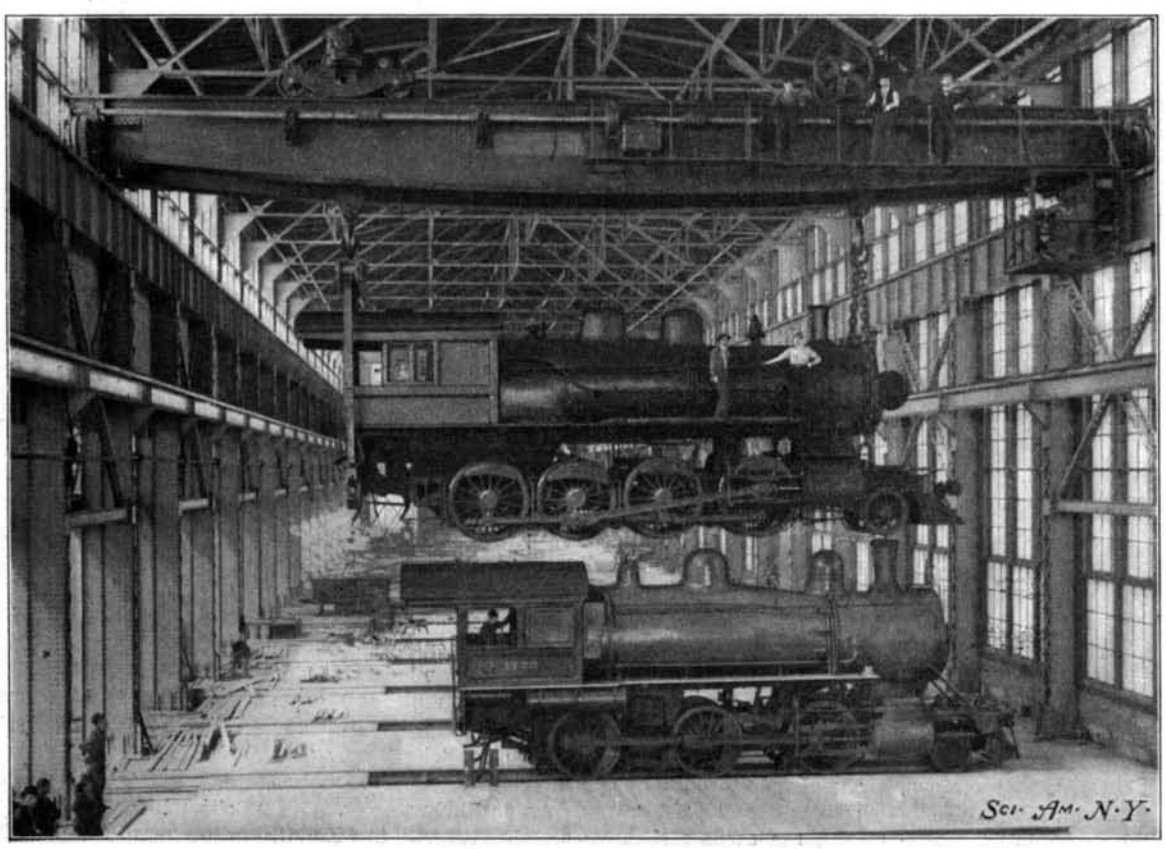
NEW SIX-COUPLED EXPRESS ENGINE FOR THE CALEDONIAN RAILWAY, ENGLAND.

The Manipulation of Liquid Gases.

In the course of a recent lecture on hydrogen at the Royal Institution, Prof. Dewar employed, for the first time in public, a new device which represents an important improvement in the manipulation of liquid gases, and which therefore he anticipates will soon be adopted in other low-temperature laboratories. Its purpose is the transference of such liquids, in particular of liquid hydrogen, from one vessel to another without loss by volatilization. It is a development of the Dewar vacuum vessels, and consists essentially of a vacuum-jacketed conduit, a narrow tube, which actually conveys the liquid, being inclosed in a larger tube, and the intervening space exhausted of air. This double tube is bent into a U-shape, and one end of it passes through an india-rubber stopper in the vessel from which the liquid is to be drawn off. So long as this end of the tube is above the level of the liquid, nothing issues from the orifice except a little hydrogen vapor, but if it is lowered into the liquid the evaporation of the hydrogen in the vessel affords sufficient pressure to force the liquid out along the tube, the flow being immediately stopped when the tube is lifted again. For the first time in public also, Prof. Dewar, by the aid of liquid hydrogen, showed fluorine liquefied and solidified, the element being seen first as a colorless gas, then as a yellow liquid, and finally as a white solid.

THE HANDLING OF LOCOMOTIVES.

This photograph, which was recently taken in the shops of the Lake Shore and Michigan Southern Railway Company at Collinwood, Ohio, strikingly illustrates the lifting power of the modern electric crane used in shop practice. The plant referred to includes in its machinery a 100-ton crane of the Niles-Bement-Pond pattern. The crane is operated by two 50-ton trolleys, and travels the length of the shop upon a steel track supported on girders built into the wall. It is equipped with two hoisting motors, each representing 45 horse power, and is sufficiently powerful to raise the heaviest load which can be attached to it, at a speed of 10 feet per minute. The crane can be moved along the building at the rate of 150 feet a minute with a load of 80 tons, and at an increased rate of speed with correspondingly lighter weight. The locomotive which is being handled in the picture is one of the large consolidation freight engines in use on the Lake Shore system, and represents a weight of about 80 tons. When the picture was taken, it was being moved at the rate of about 100 feet per minute.



LIFTING AN EIGHTY-TON LOCOMOTIVE WITH A TRAVELING CRANE.

The Post Office Department has prepared a ruling to the effect that cremated bodies should be classed as merchandise, and should pay the regular rate of one cent for four ounces. As a result of his decision, four air-tight tin canisters, containing the cremated remains of a family, shipped from New York to San Francisco, were forwarded from the Washington post office, where they had been held up pending a determination of the postage rates for the journey.