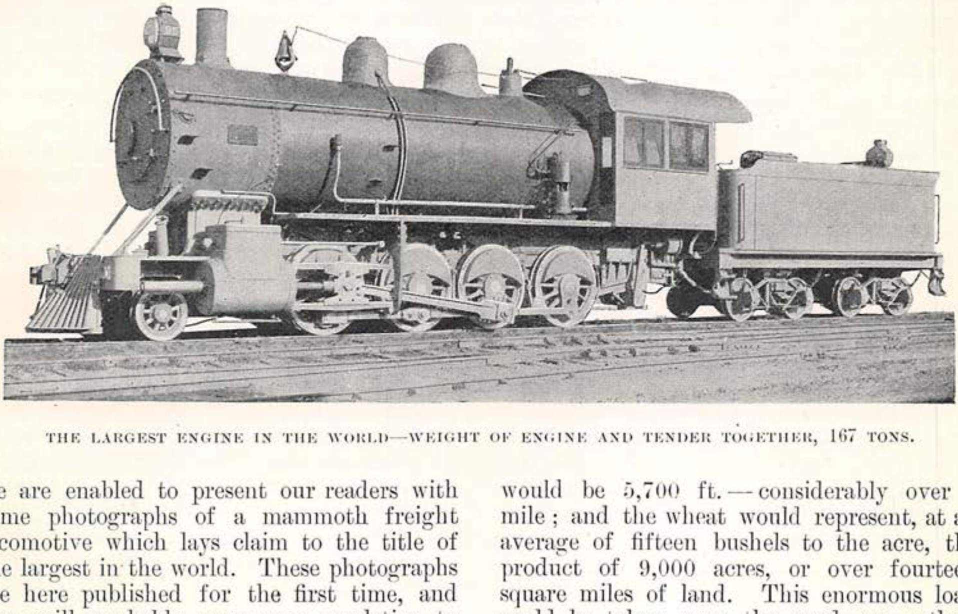
THE BIGGEST ENGINE IN THE WORLD.

By Herbert C. Fyfe.

ONE is not at all surprised to learn that the largest locomotive in the world hails from the United States. America is the land of big things; and when a writer in a transatlantic paper claimed the other day that his country eclipsed all others in the number of its structures, both in civil and mechanical engineering, that could claim the distinction of being "the biggest in the world," he was probably not far wrong in his assertion.

By the kindness of Mr. D. A. Wightman, the general manager of the Pittsburgh Locomotive and Car Works in Pennsylvania, we are enabled to present our readers with some photographs of a mammoth freight locomotive which lays claim to the title of the largest in the world. These photographs are here published for the first time, and they will probably come as a revelation to English readers who are not accustomed to the sight of the enormous engines which are so common in the United States. We are also indebted to Mr. Wightman for some interesting facts about the engine.

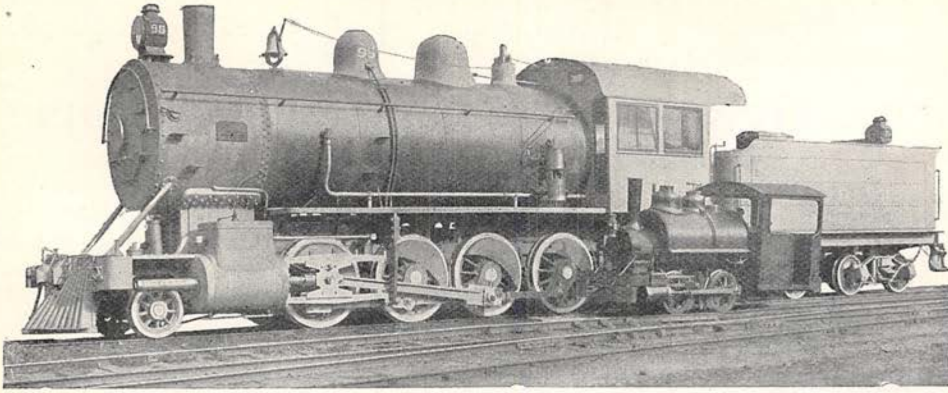
This locomotive is unquestionably the most powerful ever constructed. It has been built quite recently by the Pittsburgh Locomotive and Car Works for the Union Railroad Company, of Pittsburgh, and is now at work on a short stretch of line between Munhall and North Bessemer, Pa., which forms part of the Carnegie system and connects the Duquesne Furnaces, Homestead Steel Works, and the Edgar Thomson Steel Works. Four miles of the line are built on a grade of 70 ft. to the mile, and another stretch of the road (about 2,000 ft.) is built on the unusually heavy grade of 2·7 per cent. The estimated tractive force of the 115-ton Pittsburgh locomotive is 53,280 lb., and the estimated hauling capacity on a practically level track is about 6,650 tons. The hauling capacity on a level of 6,650 tons represents a train of 166 box-cars loaded with wheat. The total length of such a train would be 5,700 ft.—considerably over a mile; and the wheat would represent, at an average of fifteen bushels to the acre, the product of 9,000 acres, or over fourteen square miles of land. This enormous load could be taken over the road—or, rather, the level portion of it—at a comfortable speed of ten miles an hour.



THE LARGEST ENGINE IN THE WORLD—WEIGHT OF ENGINE AND TENDER TOGETHER, 167 TONS.

As an American contemporary has remarked, he would have seemed a bold prophet to our forefathers who would have dared to foretell that at the close of this century we should have steam horses that could cart away the product of fourteen square miles of the countryside at a load, and do it at a gait faster than that of the local mail coach.

The unique photograph which is repro-



THE MAMMOTH LOCOMOTIVE COMPARED WITH THE YARD ENGINE.

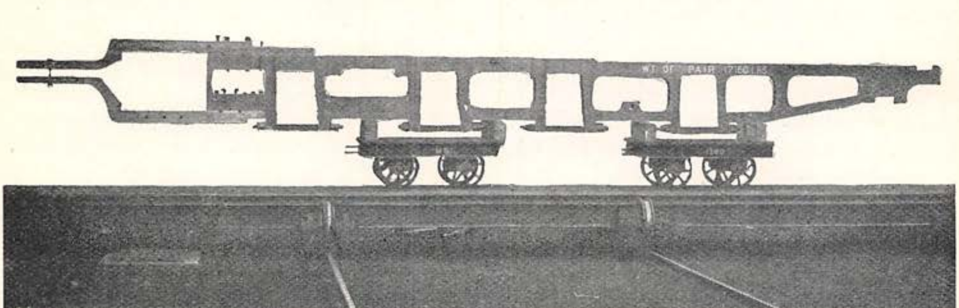
duced on page 171 was specially taken in order to give an idea of the immense size of the parts of the locomotive. It shows the little yard engine mounted on the cylinders of the mammoth Pittsburgh engine. The small engine was lifted to its perch by the shop crane. It is standing on the cylinder casting, which weighs $8\frac{3}{4}$ tons as against a weight of $6\frac{1}{4}$ tons for the yard engine. The cylinders of the latter are 6 in. by 10 in.; its gauge is 24 in.; the diameter of the boiler 24 in.; driving wheels $26\frac{1}{2}$ in.; tractive force 1,883 lb.

The cylinders of the mammoth locomotive, which are 23 in. in diameter, are only 1 in. less than the diameter of the yard engine boiler (24 in.). Its drivers are 54 in. in diameter; its steam pressure is 200 lb.; its tractive power $26\frac{1}{2}$ tons; its heating surface is 3,322 sq. ft.; and its hauling capacity on the level 6,650 tons.

The cylinders of the Pittsburgh locomotive are of the half-saddle type, made heavy, and have great depth longitudinally. A steel plate $1\frac{3}{8}$ in., and of the same width as the bottom of the saddle, extends across, and is bolted to the lower frames, and to the plate as well as to the frames. The cylinders are securely fastened. Heavy bolts passing through the top frame-bars at the front and back of the saddle form additional transverse ties and relieve the saddle casting from all tensile strains. Its longitudinal strains, usually transmitted to cylinders through frames, are largely absorbed by the use of a casting extended from the buffer-beam well up to the saddle and securely bolted to the top and bottom frames. This casting also acts as a guide for the bolster-pin of the truck. The above method of relieving cylinders of longitudinal stress was introduced by the Pittsburgh Locomotive Works nearly two years ago, and has proved, in practical use on a large number of locomotives, to be of great value in reducing the breakage of saddle castings. The frames are $4\frac{1}{2}$ in. wide. They were cut from rolled steel slabs made by the Carnegie Steel Company, and weigh $8\frac{1}{2}$ tons per pair when finished.

America has always been famous for her huge locomotives, and in recent years several of these monsters have been turned out in the different yards. Mention may be made of—

1. The Decapod Tank Locomotive, specially constructed for the St. Clair Tunnel.



THE FRAME OF THE MAMMOTH LOCOMOTIVE.

2. The Twelve-Wheel Locomotive, constructed for the Northern Pacific Railroad Company.

3. The Decapod Erie Locomotive.

4. The Pennsylvania, Class H, No. 5, Consolidation Locomotive.

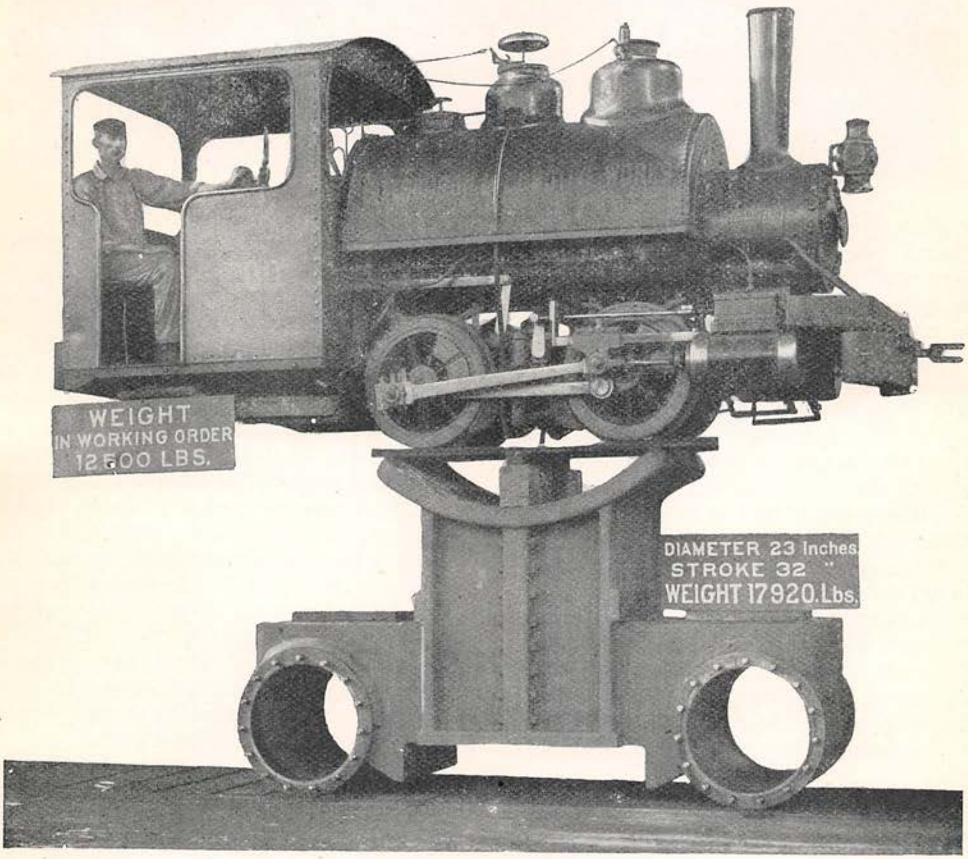
5. The Twelve-Wheel Locomotive, constructed for the Great Northern Railroad Co.

6. The Pittsburgh Consolidation Mammoth Locomotive, the "largest in the world," with which we are dealing in this article.

In the following table we give a comparison of these big freight locomotives with one another.

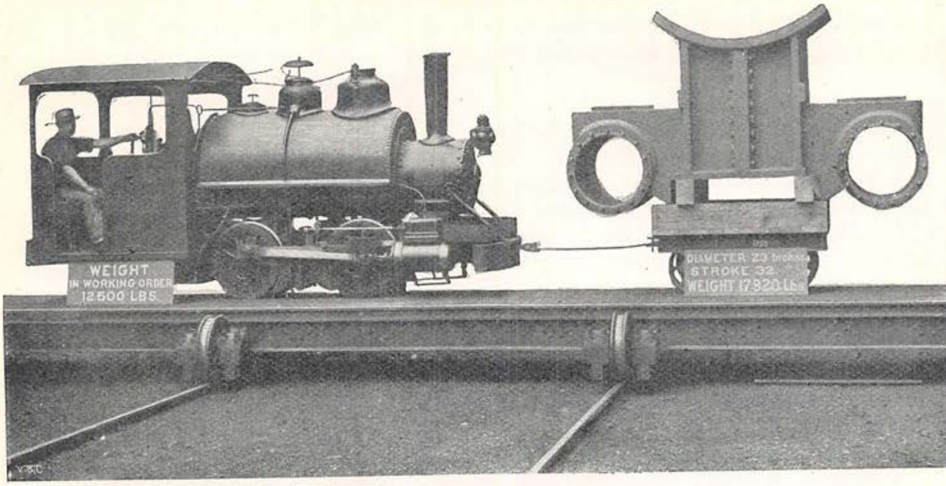
	Total weight.	Total heating surface.	Diam. of cylinders.	Stroke of cylinders.
No. 1	180,000 lb.	2,411·8 sq. ft.	22 in.	28 in.
,, 2	186,000 ,,	2,943·4 ,,	23 ,,	30 ,,
,, 3	195,000 ,,	2,443·1 ,,	16 ,,	28 ,,
,, 4	198,000 ,,	2,917 ,,	23 ,,	28 ,,
,, 5	212,750 ,,	3,280 ,,	21 ,,	34 ,,
,, 6	230,000 ,,	3,322 ,,	23 ,,	32 ,,

The tender is of the standard type and weighs when loaded 52 tons, so that the weight of the engine and tender in working order is 167 tons. The total length over all of engine and tender is 63 ft. $3\frac{1}{2}$ in. The centre of the boiler is 9 ft. $3\frac{3}{8}$ in. above the rails, the top of the boiler is 13 ft., and the smokestack $15\frac{1}{2}$ ft., above the rails. The driving-axle journals are 9 in. by 12 in., and the main crank-pieces 7 in. by 7 in. The steam-ports are $1\frac{3}{8}$ in. wide by 20 in. long, while the exhaust-ports are $3\frac{1}{4}$ in. by 20 in. The tender has a capacity of 5,000 gallons of water and 10 tons of coal.



THE SMALL YARD ENGINE MOUNTED ON THE CYLINDERS OF THE MAMMOTH LOCOMOTIVE.

American engineers indignantly deny that in the construction of the "biggest in the world" they are influenced by a desire to build big things for the mere sake of their bigness, and to pander to the curiosity of the public, who are naturally interested in knowing that such and such a piece of engineering has "beaten the record." The U.S. engineer will tell you that huge machines like the Pittsburgh locomotive are big because it has been found that it pays to make them big. "The Pittsburgh Consolidation Engine," writes one of these engineers,



THE SMALL YARD ENGINE HAULING THE CYLINDERS OF THE MAMMOTH LOCOMOTIVE

"weighs nine tons more than the Great Northern Mountain Locomotive, not because the Carnegie Steel Company wished to 'beat the record' by possessing the biggest freight engine in the world, but for the very practical reasons that the Company wished to have their freight at the least possible cost per ton, and the clearances of the road on which it was to run, and the strength of the bridges it would have to cross, allowed a locomotive of this size and weight to be used."

Readers may perhaps be inclined to ask why it is that our English railway companies do not go in for such mammoth locomotives if the American companies find them so much more economical than smaller engines. It may be taken that the continually increasing size of American engines is due to the desire to secure the most economical results in operation. Anyone can readily understand that it is preferable to haul a heavy train with a single engine rather than two light trains with light engines. The working of the line is simplified and the number of men employed is less.

The reason we do not go in for a larger type of engine over here is because the restrictions to size on the English railroads, in the way of low bridges, narrow tunnels, and bridges of limited carrying power, are such as to prohibit the use of the huge express freight engines which are common in the United States.

And yet there are not wanting Americans who criticise adversely the tendency of locomotives to grow bigger and bigger. As a recent writer put it, "In the United States the question of the weight of locomotives is generally settled without paying much attention to the protests of the engineer in charge of the track, except to get his assurance that his bridges are strong enough to carry the increased weight. In Europe, however, and especially in England, the engineer in charge of the permanent way is almost invariably a much more important personage than the locomotive superintendent, and his veto is often successfully interposed where it is proposed to build engines heavier than he considers good for his tracks and road-bed. It is probably due to this wise conservatism that the tracks of the main line of the London and North-Western Railway are always in such magnificent condition with apparently but little effort. Thus the celebrated 'Lady of the Lake' class of locomotives, which have hauled the Irish and Scotch mail-trains for so many years, weighed in their original form only a little over 60,000 lb. in working order. These engines had single driving-wheels, 7½ ft. in diameter, with 16 in. by 24 in. cylinders. Even though some of them have been rebuilt during the past few years, they now weigh in working order only slightly over 65,000 lb., while the heaviest express passenger engine on the London and North-Western system weighs 101,920 lb." Compared with the weight of the Pittsburgh Mammoth Locomotive (230,000 lb.), this is, of course, very little indeed.

President Charles P. Clark, of the New York, New Haven, and Hartford Railroad, when asked what had impressed him most forcibly during his recent trip to Europe, replied that he came home with the conviction that both engines and trains in the United States were generally heavier than they need be, and that, so far as he was concerned, he would do his best to devise some plan of lightening the dead load of engines and trains on the railway with which he was connected. He felt sure that the advantage of such a reform, wherever practicable on American railways, in preserving the track in good condition, was too obvious to require comment.

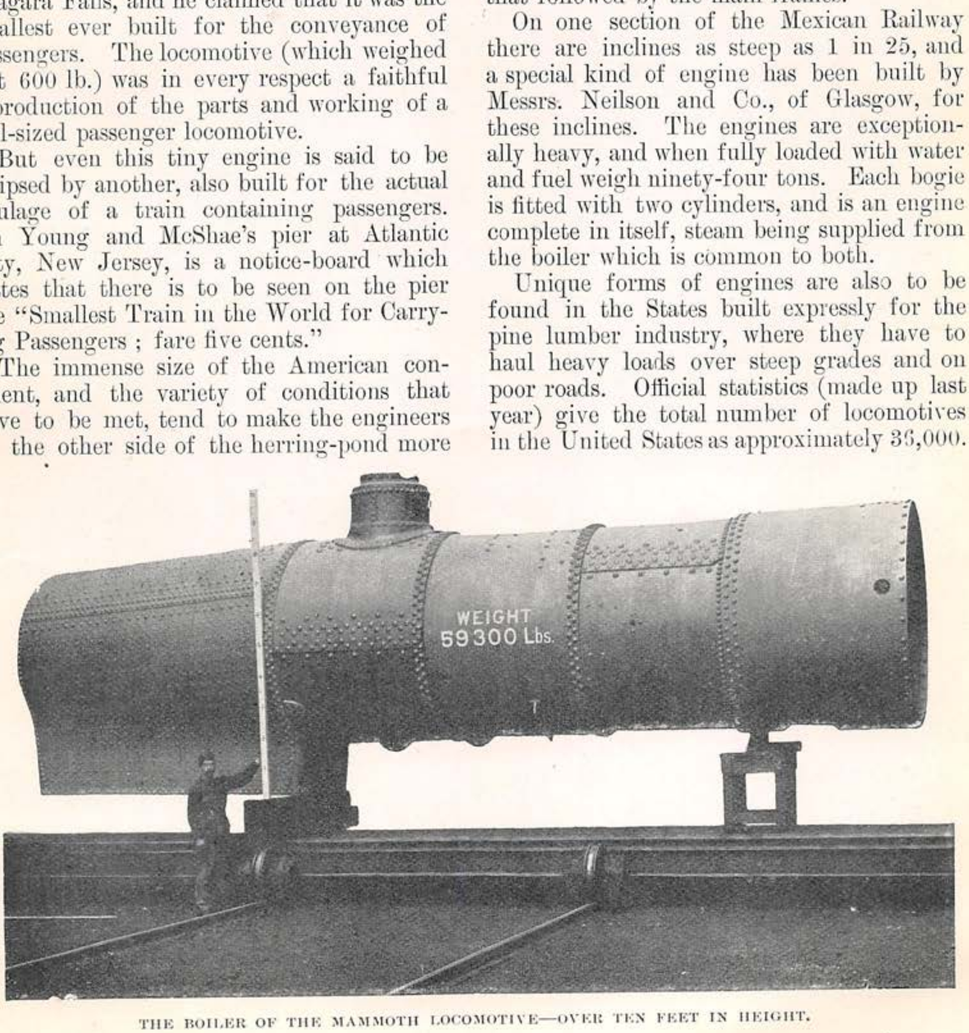
But if America is the land of big things, it is also the land of small things. As if to show his versatility, the American engineer boasts that he has constructed the smallest engine in the world. At the recent "Trans-Mississippi and International Exposition," at Omaha, one of the attractions was "The Smallest Passenger Train in the World." This diminutive train was constructed by Mr. Thomas E. McGarigh, of Niagara Falls, and he claimed that it was the smallest ever built for the conveyance of passengers. The locomotive (which weighed but 600 lb.) was in every respect a faithful reproduction of the parts and working of a full-sized passenger locomotive.

But even this tiny engine is said to be eclipsed by another, also built for the actual haulage of a train containing passengers. On Young and McShae's pier at Atlantic City, New Jersey, is a notice-board which states that there is to be seen on the pier the "Smallest Train in the World for Carrying Passengers ; fare five cents."

The immense size of the American continent, and the variety of conditions that have to be met, tend to make the engineers on the other side of the herring-pond more resourceful than those of the United Kingdom. Many unusual forms of locomotives are to be met with in the States, but each is designed for some specific purpose. On the Mexican Central Railway there is a very curious locomotive in operation. It was designed by Mr. F. W. Johnstone, superintendent of motive power of this railway, and was built by the Rhode Island Locomotive Works, at Providence. It was made for special service in drawing freight-trains over heavy grades and curves on certain parts of the road, and in appearance it is much like a couple of locomotives backed up together, with the two cabs joined. Flexibility sufficient to go round sharp curves with the least frictional resistance was gained by securing the driving-wheels in a truck which is free to move in a line different from that followed by the main frames.

On one section of the Mexican Railway there are inclines as steep as 1 in 25, and a special kind of engine has been built by Messrs. Neilson and Co., of Glasgow, for these inclines. The engines are exceptionally heavy, and when fully loaded with water and fuel weigh ninety-four tons. Each bogie is fitted with two cylinders, and is an engine complete in itself, steam being supplied from the boiler which is common to both.

Unique forms of engines are also to be found in the States built expressly for the pine lumber industry, where they have to haul heavy loads over steep grades and on poor roads. Official statistics (made up last year) give the total number of locomotives in the United States as approximately 36,000.



THE BOILER OF THE MAMMOTH LOCOMOTIVE—OVER TEN FEET IN HEIGHT.