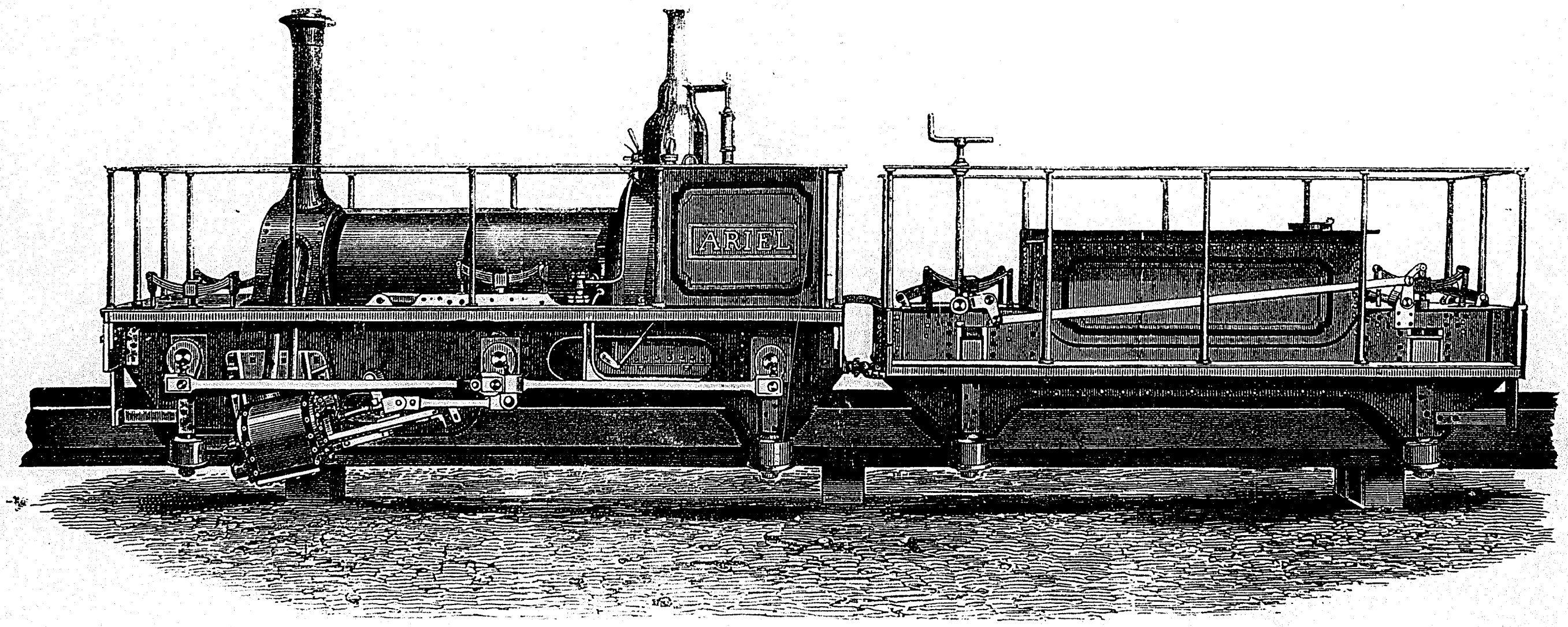

THE FELL NARROW GAUGE MILITARY FIELD RAILWAY.—THE LOCOMOTIVE.

FELL'S NARROW GAUGE RAILWAY.

This line of railway, on a novel plan, was constructed last year at Aldershot by Mr. J. B. Fell, who is well-known in the world of engineering for his successful mechanical contrivance adopted on the Mont Cenis Summit Railway. It is of 18 in. gauge, and upon the "suspension" principle, and is specially intended to meet military requirements. It can be made and worked at a much less cost than any other form of railway, and is capable of carrying the whole of the traffic of branch or mineral lines. The railway is one mile in length, running between the Field Stores Depôt and the Barrack Stores. About two-thirds is laid on curves of from three chains to seven chains radius, and there is a gradient of 1 in 50 for a length of 770 ft. upon a viaduct of from 20 ft. to 25 ft. in height. It has been especially laid out without any desire to avoid natural difficulties. It has just been run in the most direct available way from point to point, as a body of engineers would lay out a line in time of war, without being very nice in the selection of the ground.

The whole railway consists of a continuous structure, formed of wood. A single row of pillars stand at regular intervals along the line, the lower ends of the pillars rest upon wood sleepers, and are steadied by transverse diagonal struts; holes are dug in the ground, the pillars placed in position, and the earth well rammed down. The length of the pillars varies according to the contour of the ground, for their upper ends must range with each other, so as to carry the superstructure. This is formed by two longitudinal beams of wood, placed side by side, with a space between them, bolted to, strutted from, and supported by, the pillars. The railway will thus be sometimes only 3 ft. above the surface, while in crossing valleys or ravines it may be from 20 ft. to 30 ft. high from the ground, and it may have curves and gradients as on any other railway. These longitudinal beams form continuous sleepers, and carry four rails—two on their upper surfaces, and two on their outer sides. The surface rails are of iron. These carry the train. The side rails are of wood, nailed along near the lower edges of the beams, so as to be below the level of the carrying rails. They are peculiar to this system, and act as guides for the horizontal wheels of the waggons and carriages. Where sidings occur, or shunting is required, the switches are formed by making a 20 ft. length of the railway to pivot on one end, while the other end, resting on a pair of rollers, travels from the main line to and from the siding. The carriages are suspended below the axles, by which arrangement the centre of gravity is brought very low, and they are furnished with horizontal wheels running against the guide rails above described, whereby the equilibrium of the carriage is maintained, and it is rendered almost impossible for it to leave the rails.

In all cases the permanent way at Aldershot is the same, the longitudinal timbers being 16 in. deep by 6 in. wide. The rails are of the flat-footed type, 2 in. deep and weighing 30 lb. to the yard.

To work this line a locomotive engine and tender—for an illustration of which we are indebted to the *Engineer*—have been specially designed and constructed by Messrs. Manning, Wardle & Co., of Leeds. The steam cylinders are 6½ in. diameter, with a stroke of 10 in., and are fixed obliquely outside extensions of the side frames, carried down below the level of the rails. The engine is carried upon six coupled wheels, with steel axles and steel tires, of 16 in. diameter. The wheel-base is 10 ft. 8 in., and the driving-wheels are made without flanges, so as to reduce the friction when passing round curves. The boiler is welded and flanged, no angle iron being used; the fire box is of copper, with a heating surface of 14 square feet; the tubes are of brass, twenty-two in number, 1⅞ in. outside diameter, with a surface of 62 ft.: this gives a total heating surface of 76 square feet, with a fire-grate area of about 3 square feet. The boiler is supplied by two injectors, and the engine is otherwise fitted with all the appliances of a first-class locomotive. The extreme dimensions are: Length, 13 ft. 2½ in.; width, 5 ft. 1 in.; and its weight, in working trim, is 4 tons 8½ cwt. The tender is carried upon four wheels, also of 16 in. diameter, with a base of 8 ft. 2 in., the brake acting upon all four wheels; the water tank holds 172 gallons, and there is space for 15 cubic feet of fuel. The length of the tender is 11 ft. 5 in., and its weight, when full of water and fuel, is 3 tons 15½ cwt. When the engine and tender are coupled together, their extreme length is 25 ft. 4 in. over the buffer beams, and their total gross weight of 8 tons 4 cwt. is distributed over a wheel-base of 22 ft. 5 in. Both engine and tender, of course, carry the horizontal guide wheels before referred to, and as they are considerably wider than the railway upon which they run, an iron platform with hand railing has been provided, so that the driver can walk all round the engine and tender without fear of falling off.

As regards the working of the road, nothing could be more satisfactory. During last fall a series of experiments were held before a committee of Royal Engineers, the results of which fully justified all that the inventor has stated respecting the scheme. The engine, loaded up to six tons, was run over the line with increasing trains of waggons, each loaded up to three tons. The loads were varied, some being of hay or straw, others of flour in sacks and pork in barrels, or of shot and shell; others carried a number of soldiers. The passenger-trains were run over the line at a speed of twenty miles an hour, mixed trains at a speed of fifteen miles an hour, and goods-trains at an average speed of ten miles an hour. The maximum attained with passengers only was thirty miles per hour, and the carriages ran as steadily as those of a railway of an ordinary gauge. There was no perceptible oscillation of the structure, and the vibration was no greater than is usual in iron or timber railway bridges. The weight of the goods-trains, exclusive of the engine and tender, was 20, 25, and 30 tons, though the proper load for the engine of 4½ tons weight may be considered to be 20 tons upon a gradient of 1 in 50. One of the waggons carried a load of one hundred tents, sufficient for the accommodation of 1,000 men. Upon gradients of 1 in 100, which are rarely exceeded on ordinary railways, a single train can carry provisions for one day for an army of 30,000 men, or forage for six regiments of cavalry of 420 horses each. With passing-places at intervals of two miles, a single line of railway would carry 1,000 tons, and a double line 3,000 tons, of war material and provisions per day.

In our next issue we propose giving a description of the rolling stock of this line.