



GRASSHOPPER LOCOMOTIVE

A letter which appeared lately in the *American Railroad Gazette*, from Mr. Benjamin H. Latrobe contains an interesting account of the locomotive which we illustrate above. The Baltimore and Ohio Railway Company having advertised in 1831 for an engine which would, upon a level grade, draw a gross load of fifteen tons at a speed of fifteen miles per hour upon their road as then constructed with a strap rail and frequent curves of 400ft. radius, upon which the successful experiments of the previous year with the Peter Cooper locomotive had satisfied them that steam power could be employed.

Four engines of various models, among them a rotary, entered into the competition; but the only one of the four which proved equal to this moderate performance was that of Davis and Gartner, two machinists of York, Pennsylvania. From their labours grew up about 1836 the finished "grasshopper engine," which we illustrate. It will be seen that a separate axle is placed on the frame which carried the pinion as well as the spur wheel, and they thus worked smoothly with each other; and, there being cranks on the end of the axle, and connecting rods coupling them with the driving wheel cranks, as shown, the difficulty encountered in the first engine, in which the spur wheel was on the driving axle, and so could not be kept properly in gear with the pinion was obviated altogether. A fan driven by the exhaust steam, which operated on vanes upon the same axle with the fan, inclosed in a distinct chamber, and constituting thus a species of rotary engine attached to the back of the boiler, served to maintain the draught.

The pressure of steam was ordinarily 50lbs. to the square inch, about the same as that used in English locomotives at that time, which was sufficient to slip the driving wheels when adhesion was one-eighth of the weight upon them. The valves were worked by a cam so shaped as to cut off the steam at about two-thirds of the stroke. The daily expense of the

round trip of eighty miles was 16 dols., which included one ton of anthracite coal, at 8 dols.; engineer, fireman and labourer, 3 dols. 50 cents, oil and packing, 50 cents; estimated wear and tear and interest on cost, 3 dols.; water station expenses, 1 dol. The engine did the work of forty-two horses, the daily expense of which was estimated at 33 dols., so that the cost of conveying passengers by steam, not including track repairs, was but half that of animal power, although the speed was nearly double. The first cost of the engine is not stated in the reports, but is believed to have been about 4,500 dols., at that period of low prices of labour.

The boiler requires little description. It was of the well-known vertical tube type, and it is worth notice that instead of deposit setting on the tubes, they became polished by the action of the water on them. This was no doubt due in a small degree to the jumping up and down of the engine at high speed, the length of wheel base being but 4ft. The cylinders were 12in. diameter, 22in. stroke; the weight about 1½ tons; the gross load was about 11½ tons up grades of 20ft. to the mile, at ten miles an hour.

PROGRESS OF THE HOOSAC TUNNEL IN APRIL, 1873.—Heading from east advanced westward, 163 feet; heading from west advanced eastward, 136 feet; total penetration during April, 299 feet. Length opened from east end westward, 13,798 feet, length opened from west end eastward, 9,294 feet. Total length opened to May 1st, 23,092 feet. Length of the tunnel 23,031 feet. Leaving rock to be perforated, 1,939 feet, being 179 feet more than ¼ mile.

PATENTS have been taken out by Mons. Thuillier, of Desvres, near Boulogne, and Mons. Emile Gerard, engineer, of Boulogne, for a series of machines, jointly invented by them, for the manufacture of every description of cask and barrel by machinery.