

water and, when fully loaded, weighs 47 American tons. When in working order, the total weight of the engine and tender is 125 American tons. On a gradient of 1 in 66 combined with a curve of 10 chains radius, the engine will haul a load of 624 tons (exclusive of weight of engine and tender) at a speed of 8 miles per hour with 75 per cent cut-off.

RESULTS OF THE HILL-CLIMBING CONTEST AT MOUNT WASHINGTON.

During the stay of the Glidden tourists at Bretton Woods, N. H., the second hill-climbing contest up the 8-mile road on Mount Washington was held. The rough character of this road, and the sharp turns encountered upon it, are noticeable in the accompanying photographs, which show the winning 60-horse-power Napier car (time, 20 minutes, 58 2-5 seconds), the 3-horse-power Indian motor bicycle (which required only 45 second more in which to make the ascent), and the 8-horse-power double-opposed cylinder Maxwell runabout with bevel gear drive, which took second place in the class for cars weighing 851 to 1,462 pounds. The time of this machine was 51 minutes, 41 3-5 seconds, the only car in its class to beat it being a 15-horse-power Stanley steamer, which reached the top in 27 minutes, 17 2-5 seconds. A 16-horse-power, four-cylinder, air-cooled Marion car reached the summit in 1:10:57 4-5, and gained third place in this class.

In the free-for-all contest a four-cylinder, 60-horse-power Napier car, driven by W. H. Hilliard, won in 20 minutes, 58 2-5 seconds. This was 3 minutes, 41 1-5 seconds better time than that made last year by Harry Harkness on his 60-horse-power Mercedes; and the new record was made despite the fact that the car stopped at least half a minute on the way up, because of a broken battery wire. The most sensational performance of all, however,

10 4-5 seconds and 1 hour, 20 3-5 seconds respectively.

In the class for cars listing at from \$1,000 to \$2,000, a Reo won in 52 minutes, 35 2-5 seconds; a Maxwell was second in 1 hour, 27 seconds; and a Columbia third in 1 hour, 7 minutes, and 14 seconds.

In the \$3,000 to \$4,500 class, a 45-horse-power Pope-Toledo was first in 29 minutes, 37 2-5 seconds; a Pierce second in 38 minutes, 45 seconds; and a White steamer third in 41 minutes, 35 4-5 seconds.

A 50-horse-power Richard-Brazier car made the time of 26 minutes, 38 2-5 seconds; and a 20-horse-power double-opposed cylinder Buick, 36 minutes, 25 seconds.

The day after the conclusion of the hill climb, which was held on July 17 and 18, the tourists for the Glidden trophy ran to Concord, N. H., a distance of 103 miles. Heavy thunder showers were encountered, and twice the Packard truck skidded off the road. All the machines reached Concord safely. The following day a run of 99 miles was made to Worcester, Mass., where

Fast Long-Distance Trains in Great Britain.

Owing to the great success that attended the development of fast long-distance express trains by the various railroads of Great Britain last year, these services are considerably extended for this season. The feature of these trains is not only great acceleration in speed, but the absence of intermediate stops upon long distances. The most important of these new services is the introduction of non-stop expresses upon the London and North-Western Railroad between London and Liverpool, which are to cover the distance of 192 miles in 208 minutes, equivalent to a speed of 55.307 miles per hour. The distance of 196 miles between London and Leeds is to be accomplished by certain of the Midland Company's trains without any intermediate stoppage in 225 minutes—52.22 miles per hour; and 210 minutes required by the expresses of the Great Northern Railroad between the same two cities, a speed of 56 miles per hour. The Great Western Railroad is maintaining the non-stop expresses between London and Plymouth, which it successfully introduced last year. In this case the distance is 245 3/4 miles, and is covered in 265 minutes, which is equal to 55.64 miles an hour. This is the longest non-stop run in the world, and in view of the many difficult gradients on the road, the average speed is a creditable one. The fastest speeds, however, are being recorded upon the Great Central Railroad between London and Sheffield, 164 3/4 miles in 170 minutes, 58.14 miles per hour. As, however, for a distance of 38 miles this Great Central runs over the track of the Metropolitan Railroad, speed has to be limited; but between Aylesbury, where the Great Central road commences, and Sheffield, a distance of 126 3/4 miles, the journey is covered in 120 minutes, which represents a speed of 63.37 miles per hour. In point of distance this is the fastest express



An 8-Horse-Power Maxwell Runabout Making a Turn on the Way up the Mountain.

This little two-cylinder car made the best time of any gasoline machine in the 851-1,462 pound class. It obtained second place in 51 minutes, 41 3/5 seconds, being beaten only by a 15-horse-power Stanley steam machine.



Kellogg on His Indian Motor Cycle Making the Climb in 20 Minutes, 59 1-5 Seconds.

This remarkable performance, which was accomplished in only 1/2 of a second more time than that required by the 60-horse power Napier car, was made by a 3-horse-power two-cylinder motor bicycle having the cylinders placed like a letter V.



Hilliard's 60-Horse-Power Napier Ascending the Mountain in 20 Minutes, 58 2-5 Seconds.

This record, which is 3 minutes 41 1/5 seconds better than that of last year, was made despite a stop to repair a broken battery wire.

RESULTS OF THE SECOND "CLIMB TO THE CLOUDS" UP MOUNT WASHINGTON.

and the one which caused the greatest surprise, was the dash up the mountain of the 3-horse-power Indian motor bicycle mounted by Stanley F. Kellogg. The rider did not dismount from start to finish. Nearly 3 miles from the summit he ran into a dense fog, which made the ride all the more dangerous. But in spite of all difficulties, he reached the top of the mountain in the remarkable time of 20 minutes, 59 1-5 seconds. A second Indian machine of the same power also made the climb in 22 minutes, 42 seconds. A Stanley steamer driven by F. E. Stanley made the second best time in 22 minutes and 17 seconds.

In the light-weight class, for cars weighing from 557 to 851 pounds, the Stanley steamer was again first in 30 minutes, 34 3-5 seconds; while a 16-horse-power, four-cylinder air-cooled Cameron machine was second in 1:03:24 2-5, and a 10-horse-power Crawford car third in 1:11:35 2-5.

In the contest for runabouts selling for \$650 or less, two Oldsmobiles made the climb in 56 minutes,

some excitement was caused by the arrest of eight of the tourists for exceeding a local speed limit of 12 miles an hour on the outskirts of the town of Leicester when on their way to the White Mountains the week before. Two constables claimed that they timed the cars for a distance of 300 feet at the foot of a hill just before they made the ascent of another one. No warning was given that speed should be reduced, and the constables took advantage of the contestants' lack of knowledge of the local ordinance to mulct them \$17 apiece. Such treatment of tourists in the State of Massachusetts, especially when they were making a reliability run under the auspices of the American Automobile Association, only goes to prove the mistake of legislators when they frame laws making possible a different speed limit for every hamlet, village, or town. The abolishment of the speed limit altogether, and the making of arrest possible only for furious or dangerous driving, is the only proper way of curbing the men with scorching propensities.

in Great Britain. Notwithstanding the speed of these expresses, extraordinary precaution is taken to insure the safety of passengers. Some idea of the extent of these precautions may be gathered from the fact that on the round trip between London and Liverpool, a train is controlled by over three hundred semaphores.

The earlier wooden and iron bridges were built very much in the same manner as the ancient Roman bridges, in accordance with empirical rules, by practical men who had no accurate knowledge of the strains produced on the various members of a structure by the exterior forces, but who were men of unusual constructive ability and sound judgment, who had to depend upon their own resources and natural instinct, experimenting with models and profiting by previous failures. Practice always preceded the science, thus the structural systems were invented before their theory was developed.