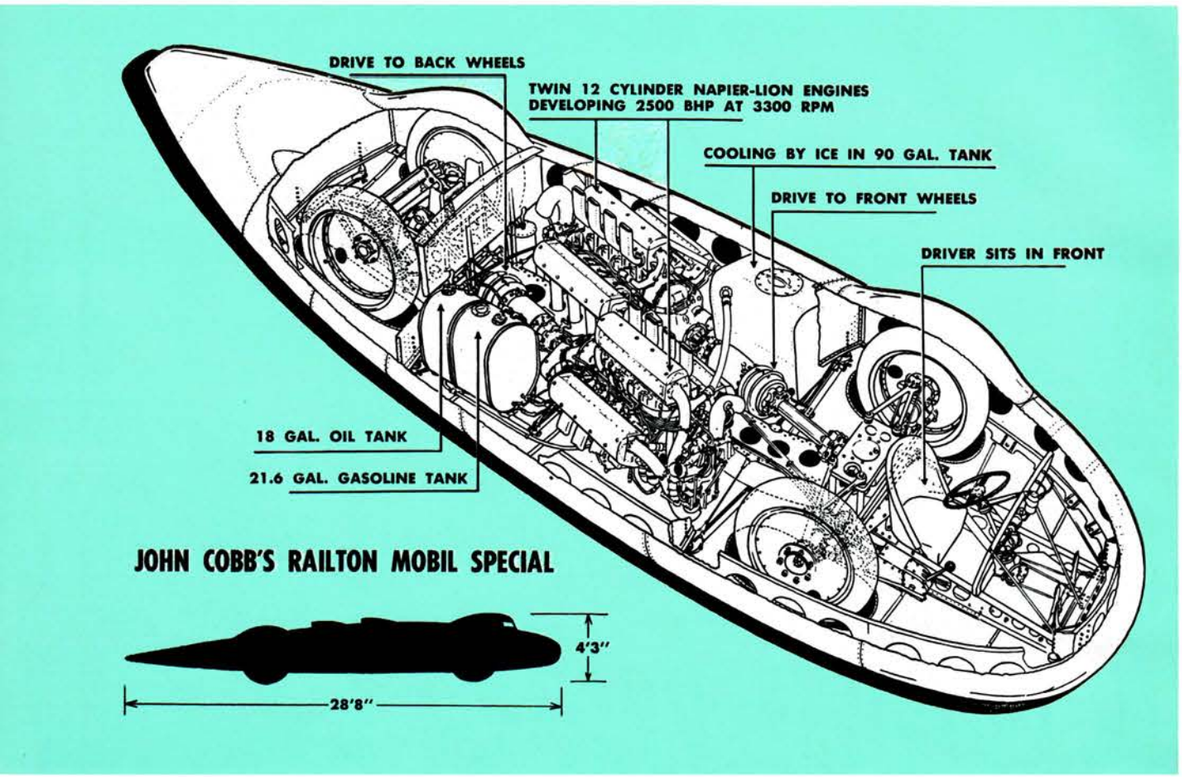


THE CAR THAT WENT 403 MPH AT BONNEVILLE

BY GRIFF BORGESON

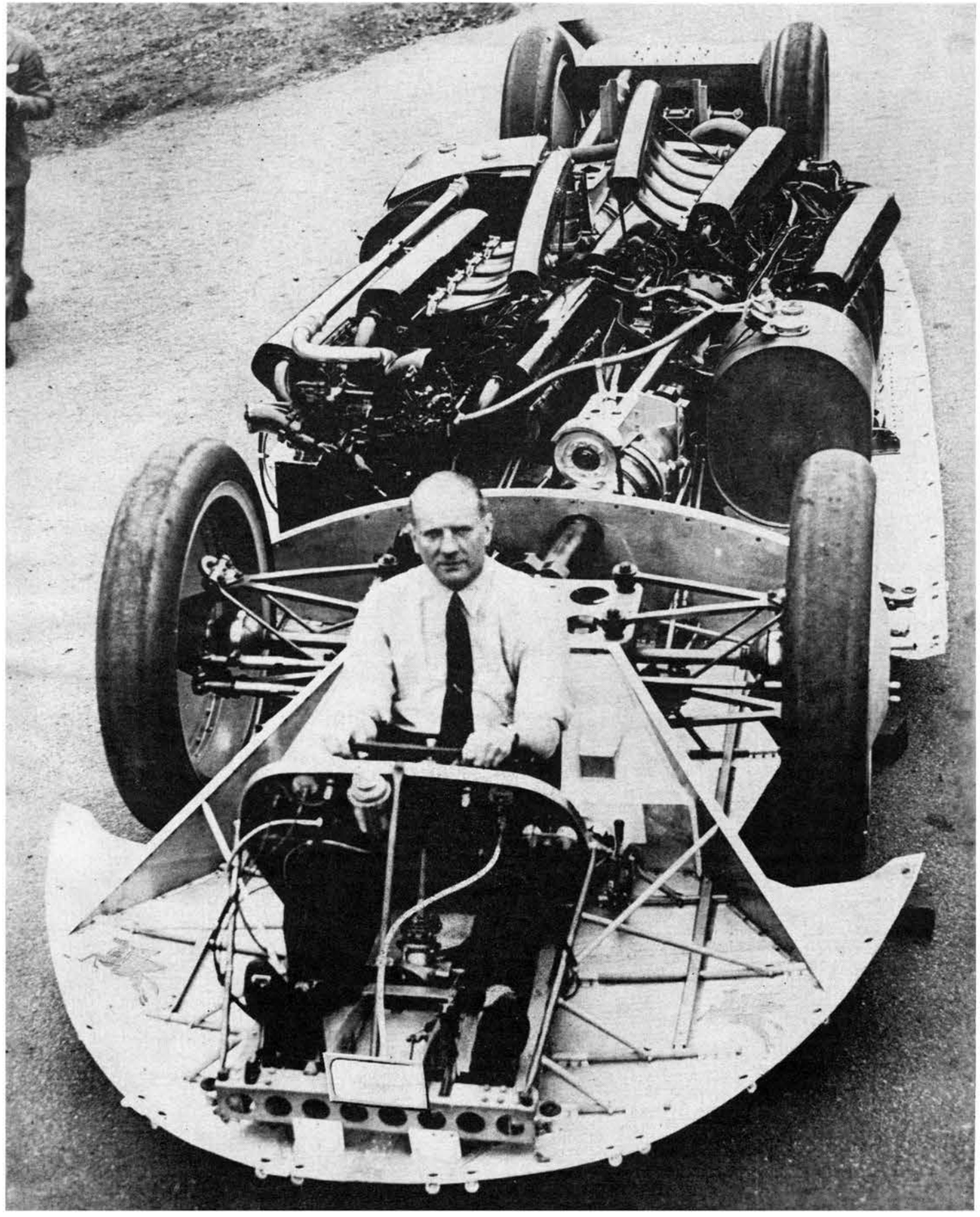
It has been the "world's fastest car" for 16 years. This is the complete story of what made it go

THE BONNEVILLE National Speed Trials have just taken place and now comes the heavy artillery. This year, as they have every year since '52, the streamliners that have proved their speed and stamina in the Trials can take an AAA-sanctioned crack at international records—the juiciest prestige plums of all. All displacement classes are open to challenge and anything can happen—even the topping of more Auto Union and Mercedes records by American cars and drivers.

But important and significant as these records are, all of them are stepping stones to the Big One, the world's land speed record, which for the last 16 years has been held by John Cobb's Railton-Mobil Special. With American challengers soaking up more record-speed know-how every season and with several designs for over-400 mph machines on the boards waiting to be financed, now is a good time to take a searching look at the machine that's still King of the Mountain.

The first thing you might decide when you start looking is that Cobb's car is so old that it ought to be easy to beat. It was already a hardened old warhorse when it set its most recent record, in 1947—the 403.135 mph one-way, 394.196 two-way average that still stands today. It was built way back in 1938, based on a design developed by Reid Railton in '35,

John Cobb demonstrates the seating position he occupied at 400 mph. Note light construction, particularly front suspension.



Cobb tire and wheel assembly, developed specially for the run in extensive tests.

Ice is dumped into the cooling water tank, mounting a light-alloy disk wheel. The centrifugal blower and air intake are visible at the center of this pre-run photo.

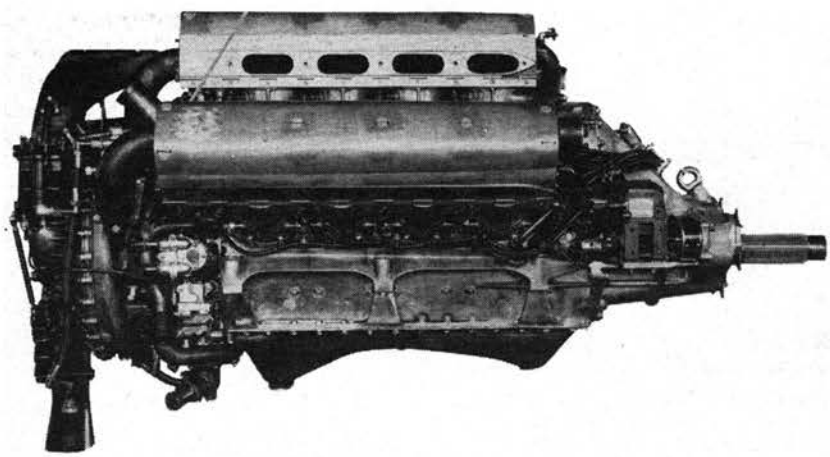
and powered by engines of 1929 vintage. But as ancient as this may seem when you think of all the engineering advances since then, the Cobb car was so well designed and so carefully engineered that it would be tough to beat even now.

John Cobb, a London furrier of ample means, reportedly invested $100,000 in the record-car project. Just as important, he invested most of his passion for speed—and this, as his life and his death both prove, was of epic proportions. He died in his boots at Loch Ness on Sept. 29, 1952, when his water-speed record contender disintegrated at 240 mph. Long before then, throughout the 'thirties, he was a big-time "gentleman driver" in British sports car racing. Around that time he set his sights on the land speed record.

The car that held the record at the moment was a roaring juggernaut called the Thunderbolt. It was owned by Captain George Eyston, who once summed up his philosophy of record-machine design in four terse words, "Big speed. Big car." The Thunderbolt was the all-time ultimate of the big-car concept. It weighed about 14,000 pounds. Though its wheelbase was a modest 12 feet, nine inches, it measured 34 feet, nine inches, from nose to tail. Its immense weight rode on ten big tires. The combined output of its two V-12 Rolls Royce aircraft engines was at least a screaming 4600 bhp, and some sources say it was as high as 7000 bhp! With a pounds-per-hp figure of around 2.5 to 1 the Thunderbolt was a formidable machine. The obvious way to beat it, it would seem, would be with a car that was bigger in every way.

But this, for one reason or another, was not Cobb's way. One writer refers to his dedication to the scientific approach, rather than to the brute force of sheer size. But Cobb himself, writing of the engines he used in the record machine, calls them "the old-fashioned Napier Lion aero engines, which were all I could get." Whatever the reason, the two engines Cobb used had a total piston displacement of "only" 2,921 cubic inches, compared with the Thunderbolt's massive 4,925 cubic inches.

Like the R-R engines in the Thunderbolt, the old Napiers were 12-cylinder aircraft power plants. But instead of having two banks of six cylinders each, arranged in a V, the Napiers had three banks of four cylinders each, in Y formation. They were fine, full-race engines with the authority that comes from two camshafts per cylinder bank, four valves per cylinder, integral cylinder heads, and five roller-bearing mains for each engine's four-throw crankshaft. Design-wise the Napiers were about as antiquated and about as advanced as the American Offy engine, which is to say that they were approximately as perfect as an internal combustion engine can be. Like the Thunderbolt's engines, the Napiers had low-pressure supercharge from one centrifugal blower per engine. They were tuned to give between 1250 and



RAILTON MOBIL SPECIAL TECHNICAL DATA

Engines: Two three-bank, 12-cylinder Napiers
Bore and stroke: 5½ x 5⅛ in.
Displacement (combined): 2921 cu. in. or 23,936 cc.
Horsepower (combined): 2500 bhp at 3300 rpm
Valve arrangement: Four inclined valves per cylinder; two overhead camshafts per bank
Ignition: Dual magnetos
Rod bearings: Plain
Main bearings: Roller
Axle ratio: 1.30 to one
Transmission: Three speeds forward. No reverse gear, no clutch
Tire size: 7.00 x 31. Tire diameter: 44 in.
Suspension, front: Independent, by coil springs and A-arms
Suspension, rear: Solid axle and coil springs
Fuel tank: 21.6 U.S. gals.
Oil tank: 18.0 U.S. gals.
Water tank: 90 U.S. gals.
Wheelbase: 13 ft., 6 in.
Tread: 5 ft., 6 in. front/3 ft., 6 in. rear
Length: 28 ft., 8 in.
Width: 8 ft.
Height: 4 ft., 3 in.
Dry weight: About 7000 lbs.
Pounds per bhp: About 2.8
Maximum speed: 150 mph in low/250 mph in second

RECORDS HELD BY THE RAILTON MOBIL SPECIAL
DRIVEN BY JOHN COBB

Flying kilometer	270.4 mph	Aug. 27, 1939
Flying mile	393.8 mph	Sept. 16, 1947
Flying 5 kilometers	394.2 mph	Sept. 16, 1947
Flying 5 miles	326.7 mph	Aug. 27, 1939
Flying 10 kilometers	302.2 mph	Aug. 27, 1939
Flying 10 miles	283.0 mph	Aug. 27, 1939

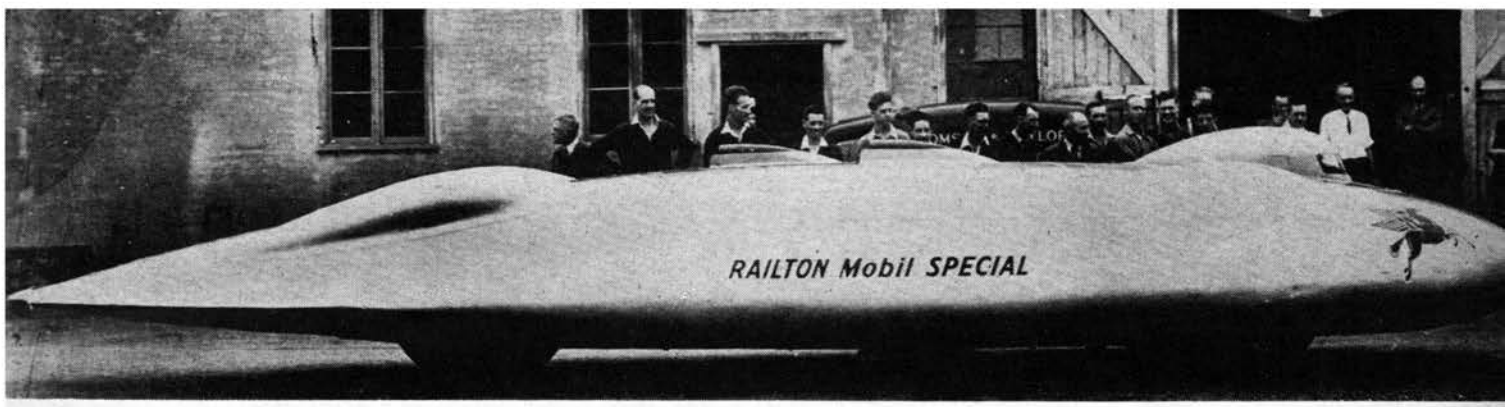
1300 bhp at Bonneville's 4200-foot altitude—roughly half the Thunderbolt's shattering output. The problem was, then, to blow off the fastest land vehicle on earth with what amounted to an overwhelming handicap. To paraphrase Eyston, "Big speed. One-half the car."

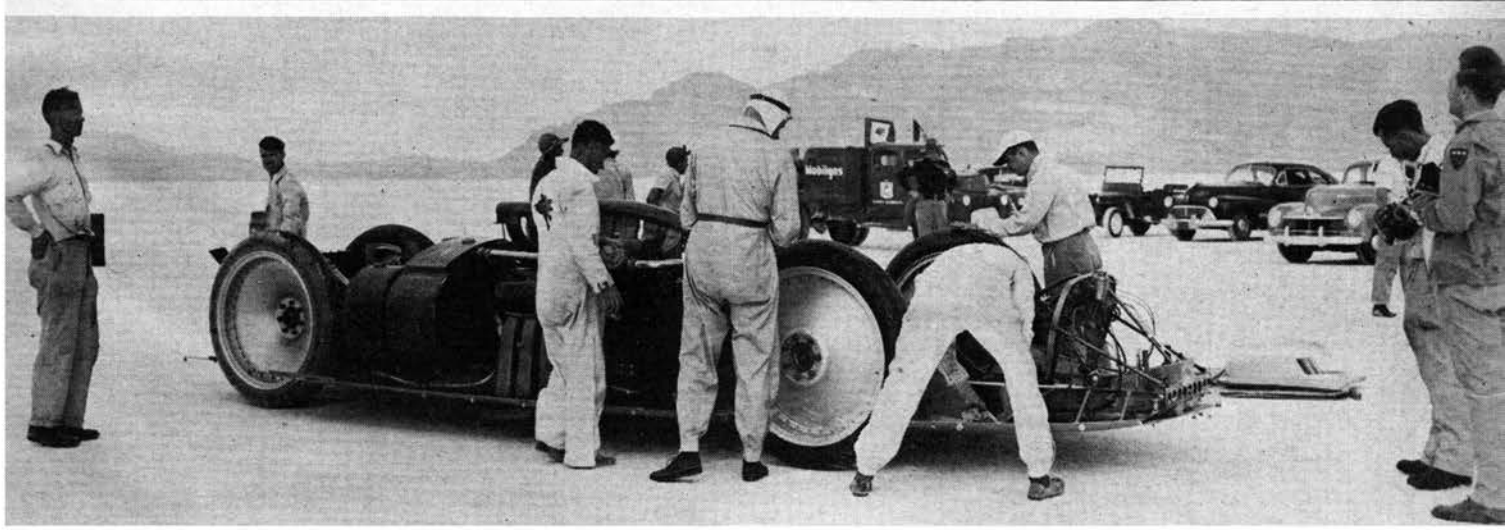
Cobb took the problem to Reid Railton, author of many brilliant automotive designs including Sir Malcolm Campbell's record-breaking Bluebird. The new machine, he told Railton, would call for radical departures in design, for hair-splitting calculation of the dimensions of every part. The car would have to weigh about one-half the Thunderbolt's tonnage, but there could be no sacrifice of reliability, no possibility of failure under stress. It was a fitting challenge for an engineer who has often been called a genius—even by his clients, which is the acid test. Railton took on the job.

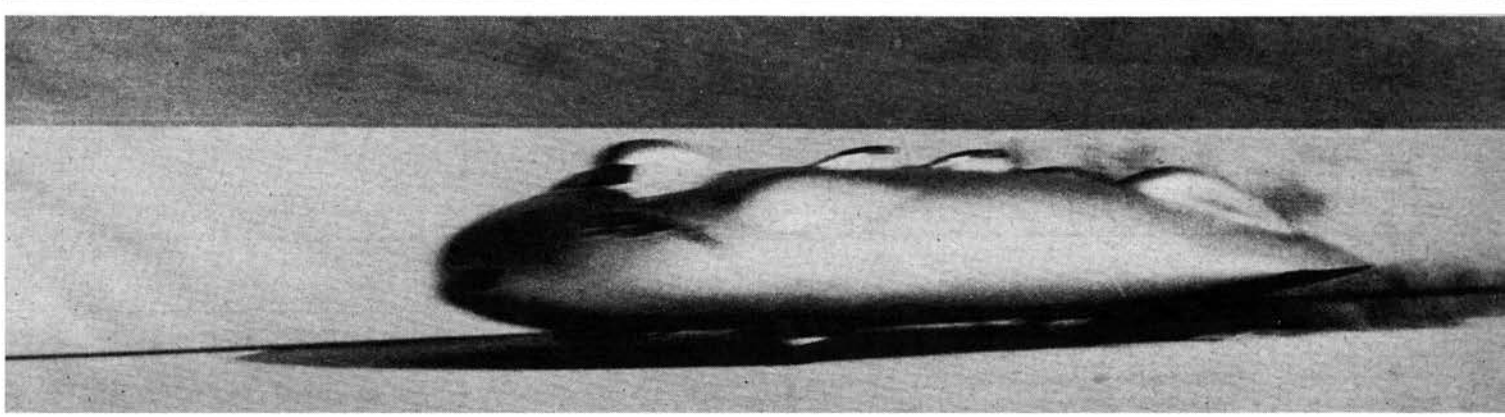
A "small" car it had to be, then. And light. If it were light enough, four wheels would be enough to carry it; and four wheels instead of ten would save even more weight. But were there any tires in the world that could take the concentrated punishment? Cobb and Railton didn't know, so they took their question to the Dunlop Rubber Company, a speed-conscious firm with a long tradition of saying "yes." Dunlop's tire designer Harry Fletcher admitted that it wouldn't be easy. He pointed out that while an average passenger car tire is subjected to a centrifugal load of about 1½ tons at 50 mph, the same force would increase to about 150 tons at 400 mph! However, he agreed to try. They decided on 31-inch wheels, and Fletcher and his team proceeded to design the wheels and 7.00x 31 tires to fit them. In the process of building and testing them, Dunlop ac-

(*Continued on page 66*)

Three steps to speed: top—car leaves Brooklands, where it was built; center—early morning on the salt, preparing for the big run; below—Cobb and car fly over the salt. Railton reportedly hated the "conning tower," necessary for the packaging of the driver, because it broke up teardrop lines and reduced the car's top speed potential an estimated 20 mph.







403 MPH AT BONNEVILLE

(Continued from page 35)

tually had to design and erect an elaborate laboratory. The construction finally adopted for the tires had tread just twenty-thousandths of an inch thick. It tested out faultlessly up to 420 mph under full load and up to 560 mph with no load. Rubber was available for a new land speed record.

Now for the chassis. To save weight, Railton had to put all the machinery into the most compact possible space. Every mechanical organ of the car, with the exception of the steering gear and other controls, was ingeniously fitted within the car's 162-inch wheelbase.

While Eyston's record-holder used a heavy, conventional frame, Railton used a single-girder "backbone" type. It ran from front center to rear center, but had a zig-zag shape when viewed from above. Slung low on either side of this offset girder and parallel with it were the two engines. One was mounted just behind the right front wheel with its flywheel aft. It drove the rear wheels, and the other engine, mounted just ahead of the left rear wheel, had its flywheel end forward and drove the front wheels. This four-wheel drive arrangement was extremely compact and made for faster acceleration with reduced wheelspin. Furthermore, since the engines' crankshafts were rotating in opposite directions, their twisting effects cancelled out and the car was consequently very steady-handling.

Each power unit had its own three-speed transmission without reverse gear. Both could be shifted simultaneously by means of a single lever at the right of the driver's bucket seat. The transmission, built by David Brown, also included water-cooled contracting brakes for slowing the car. These, like the throttles for the two engines, were operated by a single lever.

The car had independent front suspension by A-arms and coil springs. The final drive bevel box for the front axles was mounted on the frame, and because the front wheels steered the car, it was provided with a differential. The front axles, of course, had inboard and outboard universal joints. The conventional rigid rear axle had no differential and was also suspended from coil springs. The final drive ratio was 1.30 to 1.

Even with all the lightness built into the chassis, Railton realized that if the new machine was to outperform Eyston's juggernaut it would have to take every conceivable advantage that streamlining could give it. Therefore he eliminated all body openings except those for the engine air intakes and exhausts and for the lower portions of the wheels. In order to avoid the opening required by a conventional engine-cooling system, he had a 75-gallon water and ice tank installed just behind the left front wheel. This took care of brake cooling as well as water cooling. The only way to get at the chassis—including the fuel, oil, and water tanks—was to pull the body off entirely. Fortunately for Cobb's crew, the light alloy body weighed just 400 pounds, and six mechanics could detach it and lift it clear of the chassis in a matter of minutes.

This body, even today, stands as *the* perfect example of the aerodynamically correct teardrop shape applied to the automobile. It amounted to a flattened teardrop, with very small wheel bumps. The only feature that detracted from its streamlined perfection was an unfortunately abrupt and angular "conning tower" which fitted the driver's head in the same way that a modern hood airscoop fits around the carburetor air cleaner. Railton later said that this projection probably cut as much as 20 mph off the car's potential speed, but it was just about the only way to package the driver. The Cobb car did not have the vertical tail fin that had become traditional for record machines. Railton felt—no doubt correctly—that directional stability could be maintained better with "transverse streamlining"—that is, with the sides of the vehicle rounded so that cross-currents of air could slip around the body instead of striking it squarely.

Railton's success in creating a David to overcome Eyston's Goliath is on the books. In 1938 Cobb drove his new car to a new record of 350.2 mph. Eyston took the record back one day later with a speed of 357.5. Cobb was sure that his machine was good for 400 mph, and he went back to the Salt in 1939 and recaptured the record at only 369.7 mph.

Eight years and a world war did nothing to shake Cobb's faith in the 400 mph potential of Railton's masterpiece. In 1947 the State of Utah invited him to come back and make another try. Cobb accepted. What he didn't know and what no one could predict was that he'd be working against a terrific handicap. The Salt had not been used or scraped since 1941. Since then there had been several exceptionally stormy winters, and the lake of brine that covered the Salt had been lashed by giant waves that made the surface irregular and bumpy in many places.

Nevertheless, when Cobb ran on it he topped 403 mph one way and averaged better than 394 in two directions. He was beaten to a mass of black-and-blue bruises by the jolting of the car on the bumpy Salt. The fact that he stayed on the course in spite of the vibration and the near-zero visibility is a key to his stubborn, bulldog character.

The Railton Mobil Special has had no challenger for 16 years. In fact, it could probably return to Bonneville today and break its own record. But chances are it will not. Most likely the American record machines running at Bonneville this month are the forerunners of the next holder of the land speed record. ●