

WEIGHT AS A FACTOR IN CONSTRUCTION

Chalmers Consulting Engineer Says Sufficient Weight to Guarantee Safety and Stability

Prominent among these points most generally discussed during the present season, regarding the different phases of automobile construction, has been weight. That weight in a motor car is not a mere matter of opinion, but one that should be scientifically determined according to the work to be done by each part, is the opinion of Geo. W. Dunham, Consulting Engineer of the Chalmers Motor Company.

As the designer of the famous Chalmers "Sixes" Mr. Dunham is recognized as one of the foremost automobile engineers. While he is conservative, cars of his design have always been leaders in important improvements, and noted for their good sound quality, simplicity and durability.

Mr. Dunham was the first engineer regularly to equip a car selling under \$2000.00 with efficient self-starter. He was the first to design an efficient six-cylinder car to sell at a medium price. He was the man who introduced the flush side streamline body, and the molded, full oval fender to America. He is one of the few designers of the medium priced cars who look upon the various questions involved from the user's view-point and not from the angle of the manufacturer.

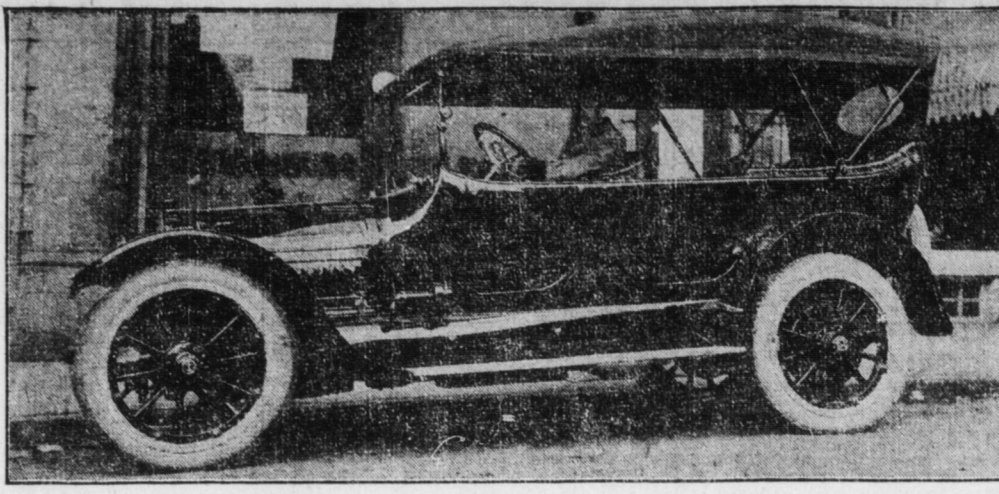
"There is no doubt but what some of the builders have followed the lure of light weight too far," said Mr. Dunham in recent interview. "The elimination of superfluous weight is undoubtedly a good thing, but in the struggle to secure mere lightness, many designers have gone to extremes, reducing the factors of endurance and beyond all reason."

It seems foolish to suppose that any manufacturer puts extra weight into his car when he can avoid it. In the first place, the cost of material is the main item in producing an automobile. Excessive use of fine steels, bronze, brass and aluminum simply as raw materials alone brings up the manufacturing cost of a car much more than one would realize. From the other view-point, it seems to me preposterous to suppose that any manufacturer would willfully increase the gasoline consumption of his car or raise the cost of tire maintenance for his users by adding unnecessary weight, especially when any extra weight means an unnecessary increase of cost to the user.

"We all realize that the user's endorsement is the strongest selling point which can be made for any car and the builder who does not do everything consistent with efficient manufacturing to satisfy his consumers is simply committing business suicide. It has been argued that heavier construction allows the use of cheaper materials of lesser quality, but where this has been attempted, the producer speedily found himself in so embarrassing a position, that he was only glad to adopt the best grade of materials obtainable, if he was not forced out of business altogether. It was recognized long ago that the severe usage to which the automobile is put requires the best materials to be found.

"A little analysis will show why there is more weight in some cars than in others. In the endeavor to reduce the weight of what is known as the large size light cars, every piece in the car has been cut to the limit, re-

NEW CADILLAC EIGHT-CYLINDER



Of special interest this week in local automobile circles was the arrival of the new eight-cylinder Cadillac at the sales rooms of the Crispin Motor Car Company. Although the greater part of the week the new 1915 model was obliged to be on exhibition in the display room, in order to accommodate the many who came to see the car, nevertheless the car has been thoroughly tested on the hills of this vicinity that are considered excep-

tionally severe trials of a car's ability. With five passengers in the car C. C. Crispin tried all the demonstrating stunts of the Derry street hill and the Hammelstown grade. In speaking of his impression of the eight-cylinder advantage, Mr. Crispin said: "When the announcement of the eight-cylinder car was made, I gave due allowance for the enthusiastic expressions of the car's possibilities by the factory engineers and advertising writers, but I have found that the new model is far better than I ever anticipated and hardly think it is possible to exaggerate when it comes to describing the remarkable engineering achievement when one considers the exceptional smoothness of operation, perfect control, range of speed and great power."

The above picture shows the body lines and one-man top, with C. C. Crispin at the wheel. The body sag and wrinkle. After a few thousand miles you will find that the too light car has loose, sagging doors, cracked paint and so on. All of these deficiencies are the results of too light weight.

"The third factor in considering weight in comfort. Weight is saved on some cars by the use of small inadequate fenders for instance, which do not properly protect the occupants of the car from flying dirt. Very frequently the size of the wind shield is cut down so that a small standard size of glass can be used, saving both weight and expense but also giving less protection to those in the car.

In the auxiliary seats many designers, probably to the detriment of passengers, are seldom used, reduce their size until they are positively uncomfortable. "And so it is throughout the car. Your extremely light car lacks that solidity, that feeling of firmness beneath you, which means comfort.

In building a car which is best suited to the policy of building a maximum car, it is not very difficult to decide which course to follow. The best car for the purpose, means that it must possess some definite qualities: first, maximum safety; second, comfort; and third, stability. These in turn mean a car of fair weight. For this additional weight, as it is termed by some advocates of light design, means a car which is safe, which feels solid beneath one's feet, which does not need constant repair, which is built to stand up for thousands upon thousands of miles of rigorous work.

On several occasions, Maxwell touring cars have been converted into racers and have made a very creditable showing. These instances are a flattering testimony of the sturdy construction of the car and the powerful engine of the Maxwell.

ducing the thickness of the metal sheets, cutting down the diameter of the rods, reducing the sections of the forgings and levers, even going so far as to cut the section of the wheel spokes and felloes and reducing the bracing in the body to the narrowest limit.

"The manufacturer of any article, if honest with himself, realizes that there is always certain percentage of trouble experienced with his output, and that this percentage of trouble can be reduced only to the absolute minimum but never wholly eliminated. With the Chalmers Company, when three cases of a specific trouble have been reported, even though there are only thousands of thousands of cars in service, thorough investigations are started immediately and often thousands of dollars are spent to insure that there will not be a continuation of this trouble, and that this happening was only due to chance or what is known in manufacturing as 'percentage of error.'

"In deciding the type, design and construction by any product, it is necessary first, to decide how close you are going to hold the percentage of troubles. Shall it be the absolute minimum, as is the policy of the Chalmers Company or again can we afford to take a chance on a certain part giving trouble; a very slight possibility perhaps, but still a chance. If this trouble does come, how can we take care of it in the quickest possible way, and at the least possible expense? Or is it something that is liable to crop up, that we will not have to take care of at all, something that the owner himself will take care of without expense to the company? There are points that must be decided upon, just as surely as the price of the car. It is obvious that the more the margin the safety throughout the car is reduced, the greater the percentage of troubles is bound to be. It is also obvious that the lighter the construction, the lower the factor of safety must be.

"Two other points must also be considered in determining weight. One, if a trouble should occur, will it endanger the life of the occupants, or will it merely deteriorate the quality of the car? For instance if a wheel breaks, some one is liable to be hurt, whereas, if the bearings in the parts supporting the springs are so small that they will wear readily and rattle soon, this is a feature that will lessen the quality of the car, but not endanger the occupants.

"Second, how far shall the comfort of the passengers be considered? "The first point—safety—is by far the more important. The Chalmers steering gear could be made considerably lighter, as is found in some cars, about the same size and price, but we consider it would be cutting too close to the danger point. Our wheels could be cut down to thinner spoke sections, and lighter felloes. Here again, we would fear a percentage of broken wheels. Our axles could be lighter considerably, but we would not want to take the responsibility of the danger which might result from breakage.

"If, even with our heavier construction and the very best materials, and even with most careful inspection, some piece containing an invisible flaw still gets into a car sooner or later, how much greater must be the chance of trouble where the construction is cut down by the very limit.

"In some of the lighter cars, the torque tube has been eliminated, which effects a considerable saving in weight but throws the entire burden of the driving mechanism into the springs. Not only does this cause the car to be more unstable on the road but a broken spring, which is bound to come now and then regardless of the cost of the car, becomes dangerous. Here Chalmers Light Six is provided with a concentric torque tube like that found in many of the most costly cars. Its purpose is to hold the rear axle in the proper alignment into the springs. Not only does this cause the car to be more stable on the road but it is shown in most cases by a car dancing and hopping when going over rough roads, cobblestones and rutted roads. The use of a torque tube practically eliminates chattering or jumping of the rear axle, when pulling in heavy sand, mud or snow.

"Here is a good example of how misleading selling arguments often become. According to the average salesman, additional weight means a reduction in the number of miles per gallon of gasoline. By eliminating the torque tube a saving of approximately forty pounds weight would be made. But its elimination would mean an increase in the use of fuel, because the holding of the rear axle in proper alignment, this smooth, steady rolling of the car, the absence of that jumpy action mentioned above, shows by actual test, a greater number of miles per gallon, than with the lighter construction.

"In considering the second kind of trouble resulting from too light weight—that which reduces the efficiency and quality of a car—there are many things to be considered. The lighter the construction, the more the weight of the excessively light cars the sheet metal used in the body, fenders, dust shield, bonnet, etc., is cut to the limit. The result is a finish which is wavy and rough, which extremely light material it is possible to keep the paint on the bodies and the enamel on the metal work gives trouble. Another bad result of too light materials is that they soon loosen and rattle. Quite often body bracings or frame members are so lined that the panels of

the body sag and wrinkle. After a few thousand miles you will find that the too light car has loose, sagging doors, cracked paint and so on. All of these deficiencies are the results of too light weight.

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Streamline Originated From Boat Hull Design

"The term 'streamline' as applied to automobile bodies has been taken from marine designs," declares Geo. F. McFarland, of the Harrisburg Auto Co., distributors, in this territory for the Haynes America's First Car. "A boat must have 'stream lines' to offer as little resistance to the motion of the boat as possible. In order to reduce the friction between the water and the surface of the boat hull, such curves and lines must be embodied in the boat as would be continuous from the bow to the stern. If there is the slightest curve outward in the reverse direction from the general curvature, there is the tendency to set up little whirlpools and eddies.

"This is really the true test of perfect stream lines and it can be applied to automobile bodies as well as to boats, by imagining the body as a swiftly moving current of water. If the curve at any point, especially between the hood and cowl and the front portion of the body have the slightest tendency to throw the imaginary current away from the body, which if continued would lead the eye out from the body, violates the stream line conception.

"Just because a cowl has replaced the antiquated straight dash, there is no license to call the body 'stream line.' Stream line bodies have a smooth tapering curve that starts at the front of the radiator and sweeps to the extreme rear in continuous, pleasing lines. Any abrupt curve at the cowl is distracting.

"The stream line body represents the ideal body toward which the tendency has been for the past three years, and the Haynes engineers have kept this thought in the foreground in designing the Haynes 'light six.' Everything that can be desired in a body is had in the streamline design. The lines are simple and refined. The body is low and consistent with safety. The stream line car has a dignity all of its own. The stream line car has a permanent distinguishing style that is not affected by the changing fashions of fancy. It is on this account that a car possessing a true streamline body represents the best automobile investment.

"It is the appearance of a car that causes its depreciation in the years following its purchase. A car that has the stream line type of body is one that will be recognized universally in the coming years as being of accepted design. There will not be the contrast two of three years from now, as there is now with the cars built a few years ago. Consequently, the depreciation will be less marked."

STOCK CARS AS RACERS.

Automobile racing is becoming a fact. It is not confined to professional drivers and racing cars. Other than James Lehart, Maxwell dealer in Greenville, Ohio, stripped a 1915 Maxwell touring car, took off the body and built a small drivers car. He then entered his car in some local races in Greenville. The Maxwell turned a mile in one minute and fifteen seconds. It covered five miles in six minutes, twenty seconds.

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