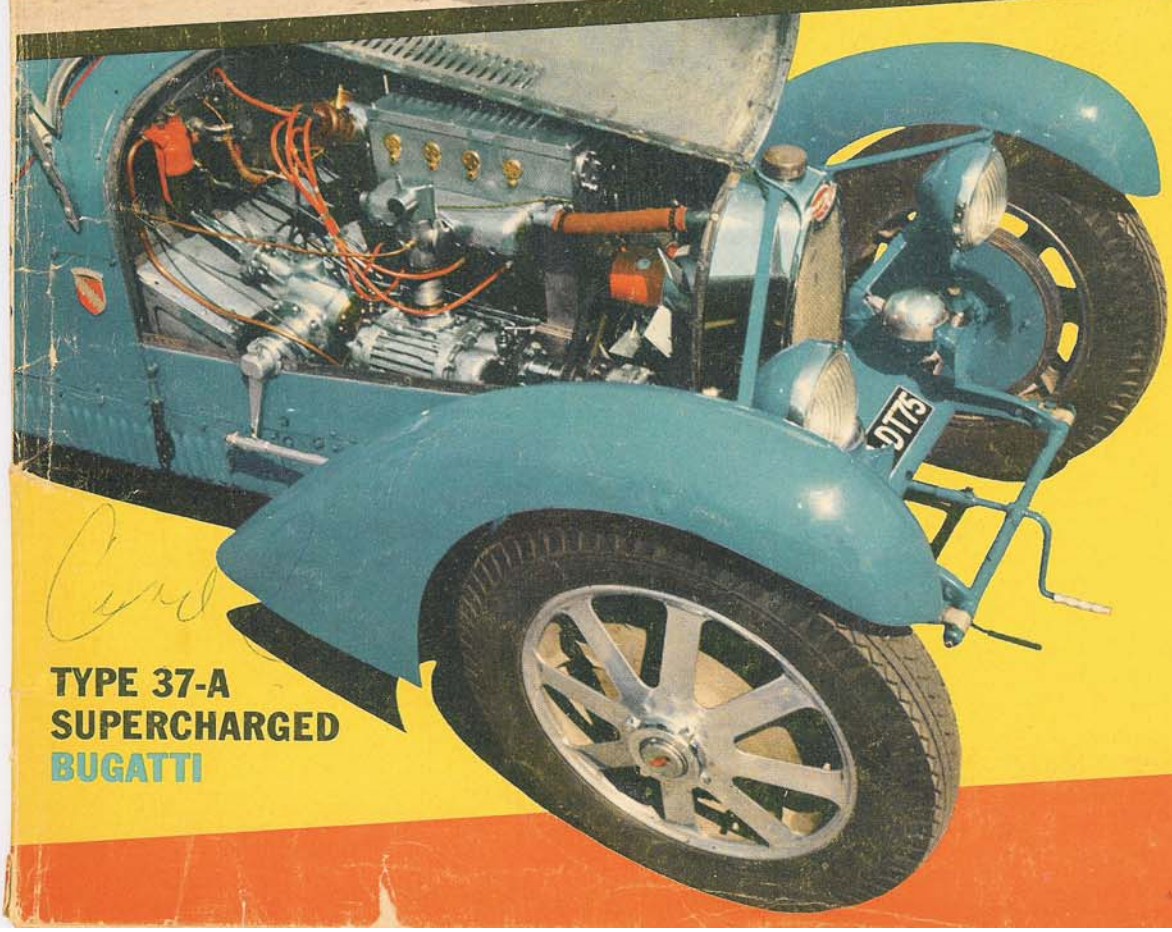
CUSTOM CAR CONTEST See page 36

JULY 1957 25c

MOTOR TREND

'38 DELAGE
CONVERTIBLE SPEEDSTER



TYPE 37-A
SUPERCHARGED
BUGATTI

RIDING ON AIR IN '58

What It'll Be Like

Beat the Heat!

AIR CONDITIONING
IS NOT A LUXURY

BROUGHAM at right may reflect line styling for 1958.

CADILLAC Eldorado Brougham

HOW IT FEELS TO RIDE IN A $13,500 CAR

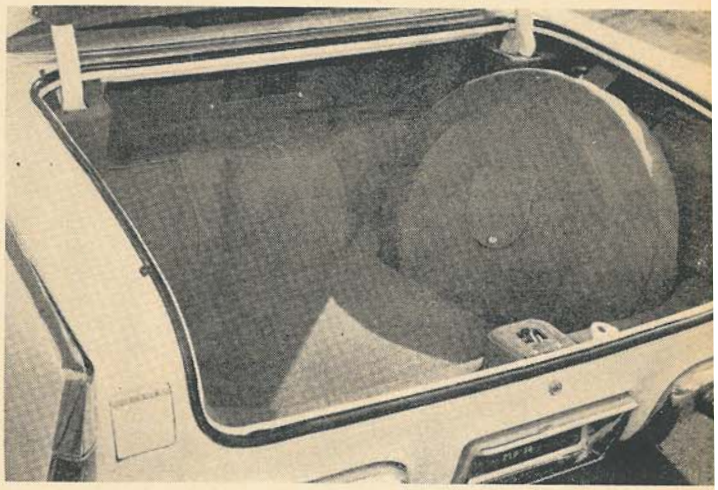
Photo Story by Joe Wherry

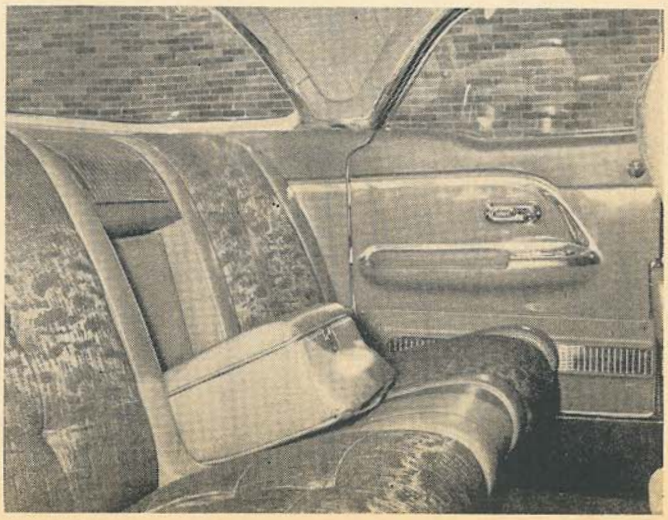
CADILLAC, THE FOUNDER OF DETROIT, was of an era when supreme elegance in the matter of clothing was the order of the day. The car named after him, in its newest and most expensive version, reflects a similar elegance.

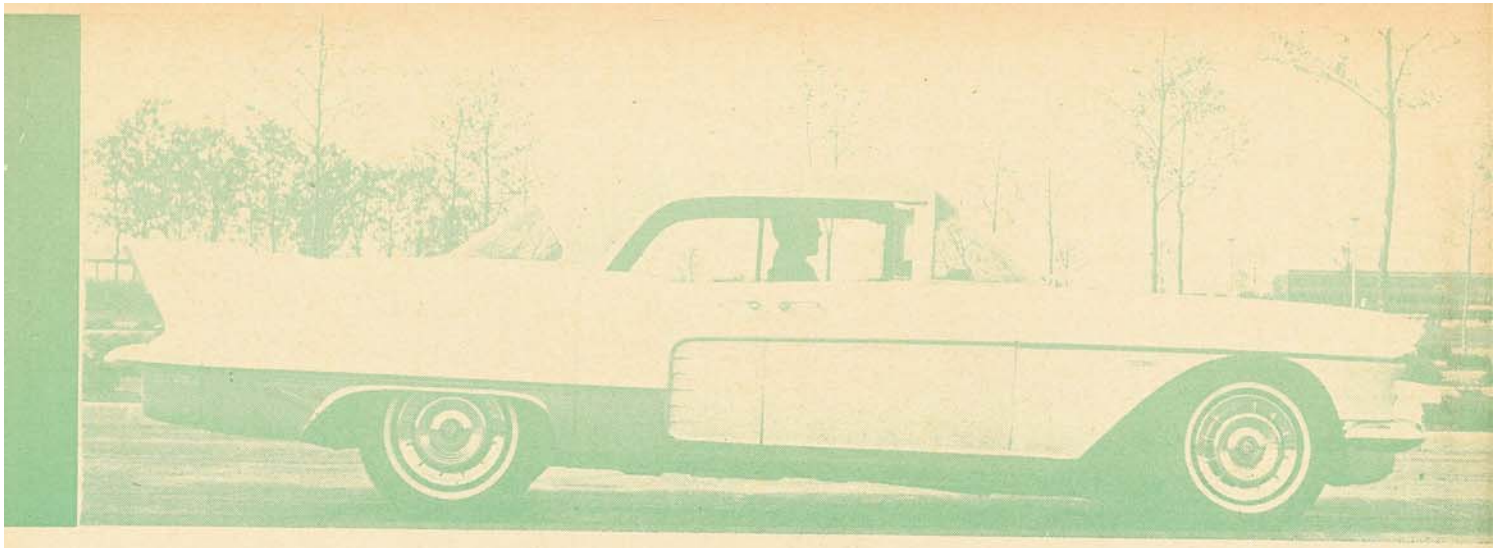
When you enter this semi-custom beauty, you find yourself enveloped in an aura of luxury. The deep, soft seats are upholstered in either glamorous tapestry-type fabrics or top grain cowhide. The interior is distinctive and luxurious beyond any production car made in this country. Interior hardware is beautifully finished and there are plush extras such as the fitted vanity case in the rear seat armrest.

Not long after you have placed the car smoothly and almost silently in motion, you begin to realize that despite the fact you are guiding a 2½-ton vehicle, the handling qualities are very good. The power steering is close to being effortless but still gives you some road feel. We are told, however, that future models will have an extra half turn added to the steering wheel which may cancel all road feel to the dismay of some and the pleasure of others. The ride, as a result of the air-suspension system, is super-soft. It might be described as superb with minor reservations we have described on page 19.

One seeming incongruity in this flagship of the Cadillac fleet is the restricted rear seat legroom. When the front seat is moved far back, rear seat passengers find things a bit cramped. The car was obviously intended for only five passengers. The center armrest folds down nearly flush with the rear seat cushion but it is so hard and the differential-propeller shaft tunnel is so high that as a middle passenger you are relatively uncomfortable. We are of the opinion, however, that these are inconsequential distractions from the million-dollar feeling you acquire from a ride in the Brougham.







We drive the Cadillac Eldorado Brougham to see what

by Joe Wherry

THE IDEA OF AIR SUSPENSION for passenger carrying vehicles dates back farther than the automobile. In 1847 a Mr. John Lewis obtained patent letters on an early concept that was to have been used on wagons. Then in the early years of this century a Benjamin Bell did considerable work on sleeve-type air springs with pistons of various shapes—Bell, too, was granted a patent.

Twenty or more years ago several of our major rubber and tire manufacturing firms devoted much time to laboratory experiments directed toward the development of an economical, durable, and dependable method of smoothing out the bumps via air suspension. Indeed, one of the Big Four tire companies has a rolling example of a 1934 low-priced car with rubber air springs. Truth is that this semi-ancient experiment looks very little different from some of the current examples illustrated on these pages.

Before we checked with the tire "Big Four," we had a chance to drive the air-suspended Cadillac Eldorado Brougham. We enjoyed it, but found that only the most naive would subscribe to the idea that it gives a bump-free ride. Four air-spring assemblies replace conventional springs at each wheel. (*See Figs. 1, 2 and 3.*) These spring assemblies consist of a rubber bag open at top and bottom and looking not too unlike the familiar household gadget called the "plumber's friend." These open-end air bags fit into a bell-shaped receptacle which in turn is installed in the frame or chassis. The air springs are held in place by fairly ordinary retainers that, of course, are specially designed for this installation.

Three leveling valves, one at each rear wheel, and one at the front for both front air springs, meter the correct amount of air to each air spring. Actuated by a control rod which reacts to the upward or downward movement of each individual wheel, the leveling valves supply air to their respective air cells to keep the road clearance of the car at a constant height regardless of the load carried in the trunk or inside.

A solenoid package consisting of two pairs of valves is placed automatically in operation whenever a *door* is opened or the *ignition* key turned on. One pair of valves meters air flow for fast or slow leveling; the other pair of valves blocks off air flow for parking operations (or when the car traverses occasional bumps and dips) and whenever one needs to change a wheel. *Rapid* leveling occurs whenever the passenger or luggage trunk load changes; *slow* leveling takes place when the car is in motion.

An air accumulator (or reservoir) and the compressor sit atop the generator, can be held easily in the hand, and are actually the heart of the entire system since they maintain the required supply of air for a level attitude and constant height above the ground. Powered with a 12-volt, 15-ampere electric motor, the compressor also contains a pressure activated limit switch, which starts and stops the compressor. Internal pressure is constantly maintained at from 100 to 120 psi in the storage reservoir.

Open the door to enter and you immediately hear a low hum; sit in the driver's seat and as soon as the left side drops a shade, the levelizing valves go into action and the car regains its unladen attitude. The pistons in the air springs, shaped much like a bullet, press upward into the air bag whenever a load is imposed—this accounts for the springing action which is softer and absolutely without noise.

A rough, busted-up three miles of ancient concrete road provided a good place to drive both a conventionally suspended Cad 60 Special and the new airborne Brougham. There is no doubt that the ride is amazingly improved, but riders and driver too (through the entire structure) still feel shocks; the edge or sharpness of the bump and rebound is taken away.

Cornering under power produces as much heeling over as in a regular line Cadillac and more than in some current domestic cars with suspensions engineered specifically to maintain a level cornering attitude, regardless of the stresses imposed

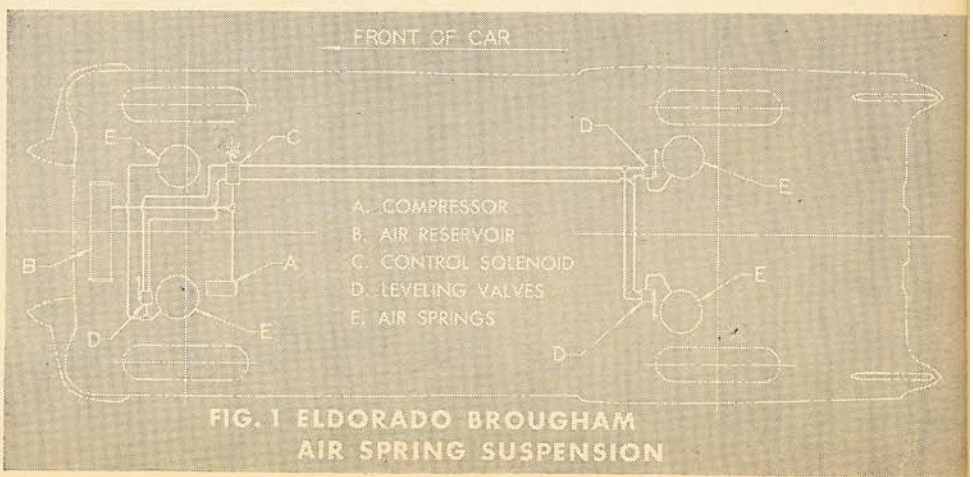


FIG. 1 ELDORADO BROUGHAM AIR SPRING SUSPENSION

RIDING ON AIR IN '58

it'll be like and study air springs by three major firms.

by the centrifugal action of a fast turn.

Nose dipping on fast stops is still present, as our accompanying photograph (taken at 1/500 second) shows. Of course the whole aim in the prestige car field is to give something not readily obtainable at modest prices, and a super-soft ride without the sharp hiccup effect of conventional steel springing has been the result.

When we try something new we naturally seek to compare it to the next best thing we have ever experienced. Hence, the ride of the Citroen DS-19 came to mind. The DS-19 has air-over-oil suspension, and we honestly believe it has every bit as good a ride as does the new Brougham. (*Other pictures of the Brougham are on page 68.—Editor*)

FIRESTONE'S "AIRIDE" SYSTEM. Soon after this issue reaches the reader, Firestone will begin producing rubber air springs in volume in their new factory in Noblesville, Ind. The trade name for the system will be *"Firestone Airide"* when marketed by the maker. If the material placed in our hands is any indication, Firestone probably will be the biggest supplier, initially at least, of air suspension components. Since Firestone begins mass production in July, it's obvious that some buyers of '58 cars will ride on "Firestone Airide" springs.

According to Firestone officials, the "application of *Airide* springs to *new* passenger cars may be expected within the *next year or two.*" The *italics* are ours, but the word *next* almost certainly indicates '58. And about one year ago Mr. J. E. Trainer, Firestone's Executive Vice-President, announced, "It appears certain that the research and development work done in this field will culminate in the application of air springs to passenger automobiles in the very near future."

The development work alluded to by Mr. Trainer was, principally, in cooperation with Greyhound Bus Corp. and G.M.C. The former has been operating air-suspended cross-country buses for some time and the latter has already exhibited a new lightweight railroad train equipped with air springs. Many trucks, too, have used Firestone's system for several years. A significant virtue that air suspension will bring to the passenger car driver is decreased maintenance and repair costs. A major bus company, after experiencing over 300 million miles with

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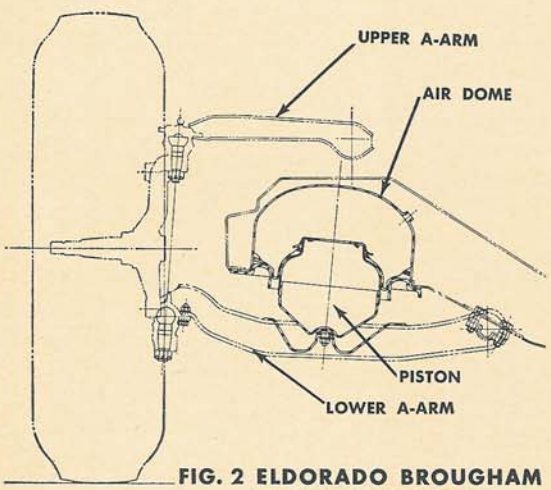


FIG. 2 ELDORADO BROUGHAM FRONT SUSPENSION

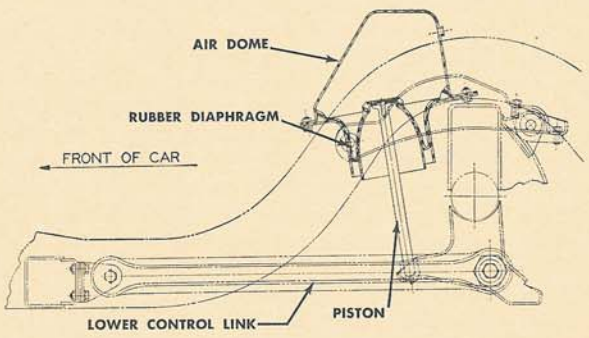


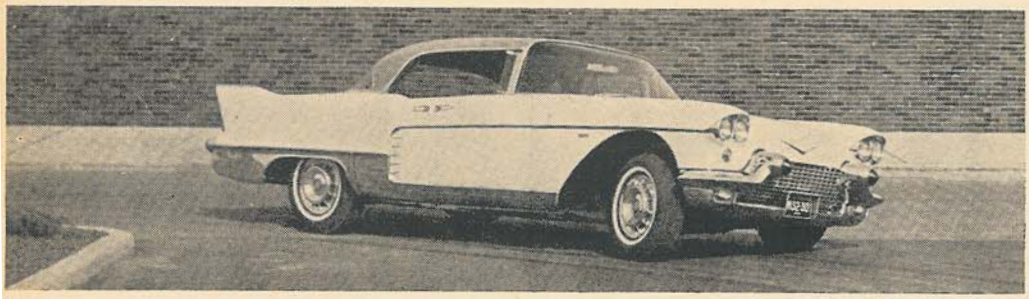
FIG. 3 ELDORADO BROUGHAM REAR SUSPENSION

"Riding on air in '58 will be like sleeping on a soft mattress in a slight earthquake . . ."

continued from preceding page

"Airide," has reported so few repairs and parts replacements that it "has stopped keeping replacement and repair cost records."

Here's how Firestone's Airide system works: A metal air tank, self-regulating valves, and the associated plumbing enclose a variable amount of air. The springs, one to each wheel, look something like a small rubber tire of the old "doughnut" variety popular back before the war. (*See Fig 4.*) Built around a drum from several plies of nylon fabric impregnated with rubber, the "spring" is vulcanized in a mold. Depending on the particular vehicle for which the spring is intended, one to three of the air bags are joined together to make a complete "Airide" spring. Installed at the ends of each axle (much in the same manner as are coil springs), these bellows are connected to the air tank and valves by metal tubing.



The air tank itself is kept at a suitable and predetermined pressure by a compressor which is usually driven off the generator (as in the case of the Brougham), and the valves are actuated by the amount of weight placed in the vehicle. Thus the vehicle's constant road clearance is maintained. Firestone officials hasten to point out that there is currently some discussion as to whether the valving system should be activated instantaneously or whether there should be a slight delay.

If instantaneous action is desired, there would be a constant exchange of inside air pressure in the air springs—whenever the vehicle was subjected to bumpy roads and in cornering. The consensus is, and this seems reasonable to us, that a delayed action is preferable—in other words, the number of passengers carried and the distribution of the load (as when heavy items are placed in the trunk) will actuate the air tank and valve systems. Thus, the compressor will be called upon to supply additional air when leveling or other lateral correction is needed.

"Airide" springs may be applicable to your older car. In answer to our question as to whether some models of the Firestone air spring could be used as a replacement for the current coil springs in pre-'57 cars, we were told that there is a very good chance that this can be accomplished. This seems especially possible beneath those cars which have four-wheel coil-spring suspension (current Rambler, Nash, Hudson, and Buick models); where other makes are concerned, it is likely that the front coil steel springs may be replaceable with the "Airide" units. The one disadvantage would be finding suitable places for the installation of the compressor, storage tank, and the leveling valves with a rather complicated system of plumbing and actuating arms.

"AIR LIFT" RUBBER BAGS have been popular for several years and while these constitute only a *semi* sort of air suspension, they do go a long way towards accomplishing what full *air suspension will do*—namely, give you the smoothest ride you've ever experienced (the bumps and ruts, though still felt, will seem to have round edges and be more shallow. There will be less fatigue noticed by passengers and driver, and you will note a new quietness and seemingly more solid ride. Vibrations which loosen body and chassis bolts will be virtually eliminated with complete air suspension.

The fact that the wear and tear due to constant vibration is decreased almost to the vanishing point *may be* one reason why the swing to *integral* or *unitized* construction may be much less pronounced than was thought earlier this current model year.

GOODYEAR ENGINEERING PEOPLE have this to say of air suspension—stating the case as Goodyear's Mr. A. B. Hirtreiter (Industrial Products Design staff) sees it, conventional coil and leaf springs have one principal drawback: due to age and the associated deterioration, the riding qualities decrease and high body maintenance results from the constant vibrations transmitted through the suspension system.

General has developed what they call *elongated air bellows* which are used extensively on commercial vehicles. On successful installations in Mack buses, four of these bellows are mounted above each axle at the ends of rigid truss beams; these bellows are then secured to the ends of the axle in exactly the same way as are conventional leaf springs.

The Goodyear *elongated bellows air* springs, quoting Mr. Hirtreiter, "consist of an upper and lower (air) bag with a gommeted air passage connecting the two sections. (*See Fig. 5.*) The bags are vulcanized together and bonded to rectangular steel plates at the top and bottom. Each bellows is provided with a large solid rubber block in the upper bag to prevent a complete collapse of the suspension in event of deflection. Rectangular steel air reservoirs are attached to the frame (of the vehicle) and are parallel with the lower beams. These reservoirs communicate with

FIG. 4—Firestone Air Spring

the bellows through accurately machined orifices. The relative softness of the suspension and the natural frequency of the suspension is determined by the ratio of the bellows volume to the total volume of air."

Goodyear has more recently developed an air spring which is *self-sealing*. Installed on two end plugs, both tapered, the self-sealing spring requires neither bolts, nuts, nor clamps. The same sealing principle as that used on tubeless tires is applied, in this instance, and has so far been extremely successful. The seal is leak-proof and requires no tightening or any other adjusting.

Goodyear's air spring is in Hirtreiter's words, "built with integral bead and girdle rings and is a complete unit in itself. A small safety lip, similar to that used on passenger car tubeless tires, may be incorporated in the end plugs to help resist the bellows coming off their seats at excessive extensions."

Maintenance, therefore, is substantially reduced. If removal of the vehicle's axles is required, the air springs are removable in a very few minutes; they are just as quickly installed because they are held in place, as it were, by their own sealing action.

Art Hirtreiter goes on to explain that a newer development (not exclusive to Goodyear by any means), the *rolling sleeve or rolling lobe* type, requires very little, or none at all, expansion volume. (*See Fig. 5.*) In this type air spring the frequency is determined by the volume of air in the spring, the shape of the piston, the degree of exterior support, and the volume of the expansion tank. To get low frequency, a requirement for an ultra-soft ride, a piston having a decreasing section from the top to the bottom is necessary. This results in a decreasingly effective area in comparison to an increasing area (from top to bottom) as is common in bellows type air springs. It is just this type concept that was embodied in the 1947 Lewis patent.

Goodyear's rolling lobe air spring uses a self-contained air spring with a formed piston but there is no external air container; the construction is such that a fixed outside diameter is maintained without additional restricting means. Goodyear engineers believe that this rolling lobe type may offer the greatest overall advantages because of its greater simplicity, lower cost, flexibility which it has to an extreme, and a very low rate of frequency. At most, only a very small reservoir for expansion is necessary and, according to Hirtreiter, the complete elimination of the expansion chamber may be feasible.

Leveling and height control valves are, in the Goodyear view, more subject to change, at this time, than the overall method of providing the actual air springing. As it stands now, though, Goodyear is in a position to *go* on air suspension for your car and mine; they've got the know-how, and they have the actual air springs and the means to turn them out in the volume production that may be required before the printer's ink dries on this issue.

A letter received just prior to this writing from Goodyear's Art Hirtreiter had this interesting comment: "While the riding qualities are not nearly as constant with the *hydro-pneumatic* system, it, too, holds a great deal of promise for passenger car suspensions because of its simplicity and compactness. The built-in shock absorber principle and the absence of air compressor are two big factors which can very well overcome some of the minor shortcomings of the hydro-pneumatic design."

GENERAL TIRE CO. has less to say than the two previous firms, but they claim large reduction in the space required for installation and the "lowest spring rate—or softest ride—yet attainable."

A band-diaphragm unit is the General entry in the big air spring derby. This, briefly, is an air cell "retained by a metal band to form a rolling diaphragm." As in other concepts, the load is supported by the pressure of air acting against "an area (referred to as the 'effective area') permitting a constant car height regardless of the number of passengers."

The floating girdle band, which looks like a sleeve, on General's air spring (*see Fig. 6—p. 69*), takes a varying suspension geometry into consideration without disturbing or altering the spring's action. Made of Nygen fabric and rubber, the General air cell compresses the air which is then acted upon, due to the car's action, by the piston.

General's air spring differs from others in that: 1) The piston can be firmly attached to the suspension arm eliminating additional heavily loaded joints; 2) the space required is considerably less; 3) the characteristics derived allow greater design flexibility; 4) the design does not rely as greatly upon the fabric and rubber, thus assuring longer life.

These are General's statement, in brief, and not ours. We must hasten to say that we have not yet been able to sample the General air spring ride.

GOODRICH WOULD NOT COMMENT at this time but this does not mean that Goodrich is not busy with an air ride of their own. We know they are, and so are a number of smaller manufacturers like Armstrong, Norwalk, etc.

THE GREATEST BENEFITS of air suspension are increased durability and a no-

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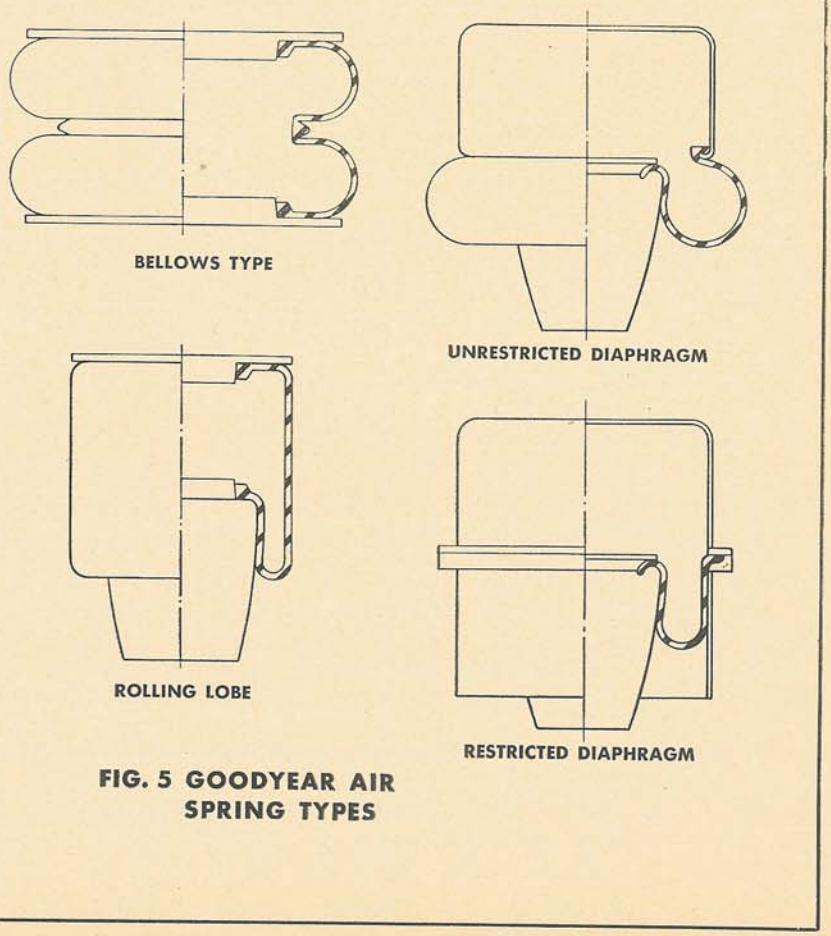


FIG. 5 GOODYEAR AIR SPRING TYPES

RIDING ON AIR

continued from page 21

sag spring life—something steel springs cannot give. They also offer quieter operation (fewer road noises), and less servicing for the springs themselves. But, as we shall shortly see, there are other maintenance problems which could loom large—those which will concern the various valves, the compressor, the plumbing required, and the associated electrical circuits, solenoids, and the like.

The Republic Co. in Cleveland, Ohio is a prime manufacturer of height control valves whereas the majority of the rubber manufacturers concern themselves, mainly, with the design and making of the air cells or springs, and the pistons. The automobile manufacturers are also rapidly increasing their specialized staffs to develop new systems and to work with the air cell and valve builders.

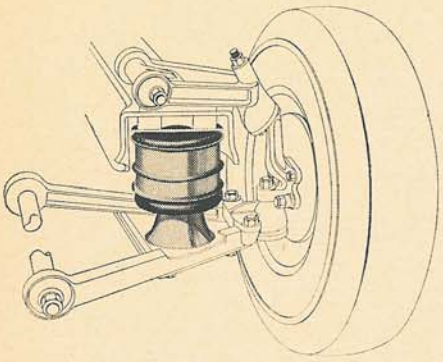


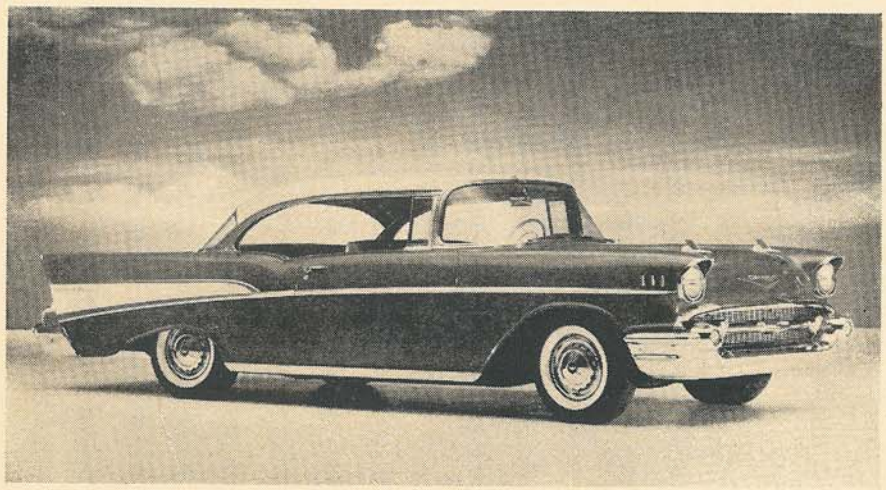
FIG. 6—General's Air Spring

WHAT'LL RIDING ON AIR be like in 1958? It will be like riding in a very softly sprung, conventionally-sprung car on a slightly bumpy road with the sharp edges removed from all the breaks and chuckholes in the road. It will be laterally level and level fore and aft regardless of whether you load the trunk with a half ton of coal or not. It will be like sleeping on a soft mattress in a slight earthquake instead of on a GI sack mattress with a top kick trying to awaken you.

WILL OTHER CARS HAVE IT? Yes, you can expect it to be optional at extra cost on all Cadillacs as well as on several other makes, and if we say more at this time, we'll have to move out of Detroit. It can stand improvement, and that will come, but it is a great experience—so is the Eldorado Brougham.

EL

New production-line custom is R. Allender's answer to the Eldorado Brougham



CHEVY BEL AIR body lines serve as basis for Cad-like custom restyling.

THE FACTORY where the new El Morocco is being built on a limited production basis has been visited by your Detroit Editor. Experienced body craftsmen were working like beavers on 18 cars.

Ruby (for Ruben) Allender, a dealer in surplus materials, has been badly infected with the desire to own a distinctive car that would combine a package of reasonable overall size with the features of "the standard of the world" while still retailing at a moderate price.

To accomplish this, Ruby selected the Chevrolet Bel Air with 283-cubic-inch V8 with four-barrel carburetor, radio, heater, and Powerglide, as the base.

Allender is buying showroom new Bel Air models in fair quantity. He is organizing a network of distributors and plans to deliver the cars by the most economical means at hand. In all but the largest cities Allender envisions one dealer only. It is understood they will still be covered by the factory guarantee.

Available at as yet undisclosed prices will be a convertible (white, blue, bronze, or light green), and two- and four-door hardtops. The latter will be finished in Eldorado Brougham colors: dark blue, black, dark green and dark gray on the lower portion with the roofs finished in either silver or aluminum. The final enamel finish, after the extensive custom rebuilding, is put on in a well-equipped spray booth.

When the stock Chevy first enters the factory, it is stripped of all trim, the hood and rear deck are removed, and the trim-mounting holes are filled in. Then the hood is completely smoothed with extra sheet steel, welded in place.

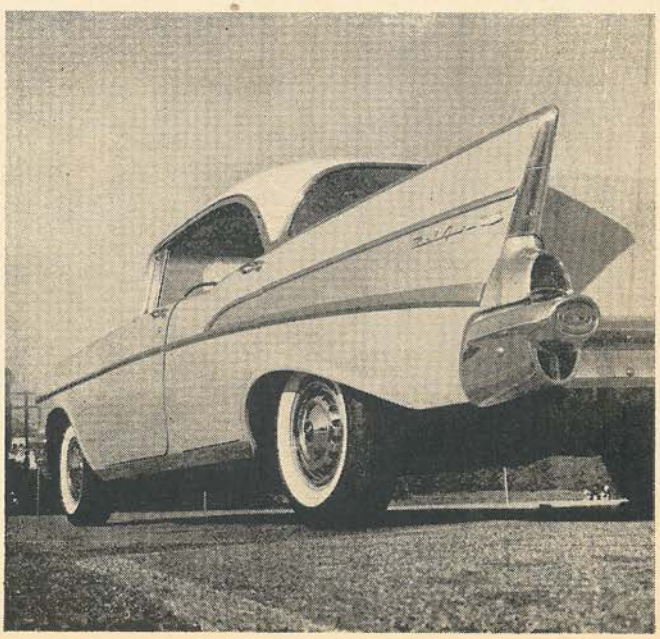
The fender fins are built up of steel (last year, when about 27 models were built, the fins were of Fiberglas) and welded in place. The only original trim that remains on the El Morocco when finished is the chrome fin tip and the headlight bezels. All other trim is special (and expensive) cast or shaped aluminum or steel. All trim items are chromed.

Front bumpers are slightly reworked and the turn signal lights are new. The Eldorado-like latticework grille is aluminum. The generous chrome rear-quarter side panels are dimpled sheet brass, which is chromed. Similar material is used in back at each side of the license plate recess. The two small lights in each rear chrome panel are dummies.

Of course the cast and chromed hints of airscoops on the lower rear-quarter panels are not functional, but they add to the Eldorado illusion, as do the dual and louvered dummy exhaust outlets below the rear dagmars. Special wheel discs are used.

We have it that 1957 will see well over 100 El Morocco models on the loose. They will be attractively priced just a bit over what one would have to pay for a completely stock and

CHEVY SPEAR TRIM and taillight assembly are replaced.



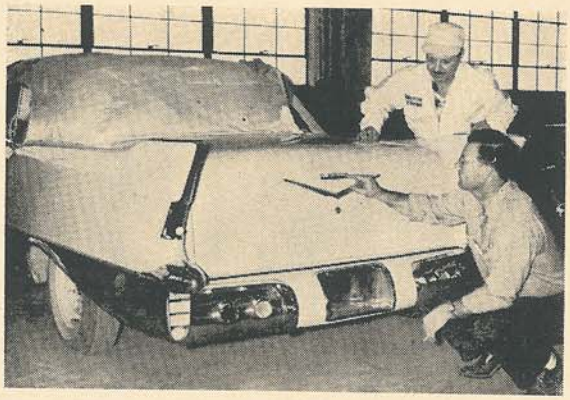
MOROCCO

Story and photos by Joseph H. Wherry

EL MOROCCO convincingly disguises its Chevy ancestry.

FRONT has new grille, reworked bumper.

REAR END has recessed license, dummy lights.



comparable Chevy Bel Air, putting it within everyone's reach.

On the "personal" side, the steering wheel hub of each El Morocco is fitted with a piece of leather with the following imprinted in gold gilt: "El Morocco Custom Built for ....."

It's a nice package and one which may very well ignite the old urge for distinction which once enabled many a limited production shop to flourish. Incidentally, Allender is toying with the idea of *not* changing models each year — rather he's thinking about making the El Morocco a changeless prestige item without annual facelifts. Sounds like a good idea!

LARGE FINS, chrome panels add to Brougham illusion.