

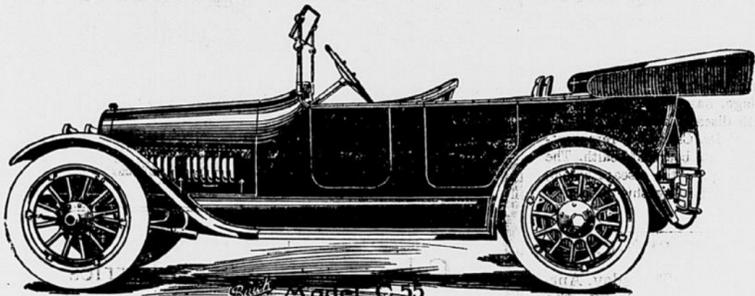
Buick

Supreme in Speed, Power and Dependability

SPEED, power and dependability go hand in hand; you cannot have one without the other. These attributes and fuel economy are important requisites of all motor cars. The first of these four factors in a successful motor is dependability, and it covers a broad field.

It means the motor must be able to withstand enormous strains and shocks, high temperatures caused by sustained speeds during a long run or race for a race requires an engine designed to let the gases in and out of the cylinder with the least amount of energy wasted in useless heating. Such a motor is the Valve-in-Head type—the motor that has been standard in all Buick cars for the past twelve seasons.

The Buick Line of fours and sixes for nineteen fifteen comprises five models built on three chassis (all have Valve-in-Head motors) and, while the same characteristics and features are largely general in the construction of each, yet enough variation is provided to satisfy the requirements of every buyer, and give him the choice of a Buick to fit his individual needs in either the four or six cylinder.



BUICK MODEL C-55 \$1650.

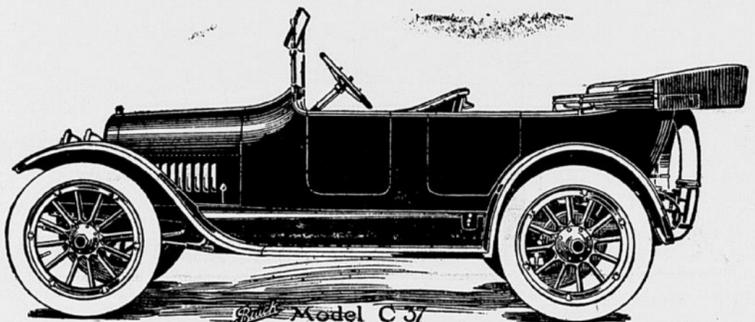
Six Cylinder

This Buick Six is a full capacity car—easy seating space for six passengers and driver when extra disappearing seats are in use—a five-passenger roomy car with ample space in the tonneau when these extra seats are folded out of the way.

Following closely the lines of last season, accentuating its stream line body and adding to its equipment every accepted motor car refinement developed this

season we place Model C-55 before the public with the guarantee that it will meet every possible requirement that can be demanded of any motor car at any price.

The Buick Six is built to meet the demand for a high-powered town and country car that affords the greatest efficiency and capacity at a minimum cost with the greatest possible fuel economy. Beautiful in line, splendid in performance, full powered and dependable—the Buick Six stands as the leader of all Buick cars past and present.



MODELS C-36 AND C-37.

Four Cylinder

These Buick Fours are known on every road for their faultless performance, power, beauty of line and refinement of detail. Capable of meeting the exacting conditions of season after season's wear, these powerful cars will give full service and maintain themselves at the minimum of cost.

As in preceding models of this type, both passen-

ger and driving compartments are splendid in their appointments, roomy and convenient, with deep cushions and ample leg room, thus affording both passengers and driver the maximum of comfort. Every instrument of control is easily at hand and in sight on the dash of the cowl. The beautiful lines of these models, their sturdy, sleek look of fitness, together with their ability to cope with all conditions on any road at any time, make them the ideal car for town and country use.

Roadster \$1185. Touring Car \$1235.

What a few of many owners say:

Have driven the "Buick valve-in-head motor cars" continuously since 1909. Season after season of continued success naturally makes me a booster.

C. J. McGurran, M. D.
"Perfectly satisfied" with my Buick C-55, valve-in-head motor. Would not exchange for any car I have ever driven or seen.

H. G. Hoeking, D. D. S.
I am driving a Buick bought from Ball and Stotlar in 1908. Have had excellent service and small expense in up-keep.

C. W. Kelley
The Buick valve-in-head motor is all they claim for it, and am perfectly satisfied with my car.

R. O. Chapman
The Buick first, last and all the time for me. Three years Buick's service convinces me the car is right.

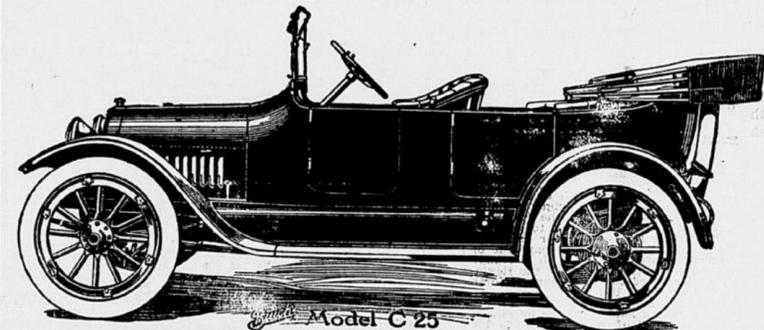
G. M. Vargstend
Am pleased with my new Buick 6, and had excellent success with my former small Buick.

Napoleon Lambert.
My Buick roadster is very satisfactory. It suits me better than anything I have seen.

Hollo F. Hunt.
We can recommend the Buick to any one wishing to purchase a car. Our model 17 stood up wonderfully considering the many miles driven.

C. M. Fisher.
Own and drive a Model 10 Buick, and well pleased with the car.

H. E. Maher.
Have driven many kinds of cars but like the Buick best. My Model B 24 is very satisfactory.



MODELS C-24 AND C-25.

Four Cylinder

These two famous Buick models represent the highest type of small car construction. Sturdy, graceful and reliable with all the power required for any purpose, easy to operate, economical in up-keep, are intended to meet the demands of business or pleasure where a light full sized car is desired.

All of these elements required in a small car have been adequately provided and all of the features that

have made Buick cars famous in the past are embodied in this season's model. These features, with their complete Delco electric starting, lighting and ignition systems, and their new stream line bodies, make them the most graceful, powerful small car on the market. No higher efficiency or more refinement of detail can be found in any car of this type at any price. Both of these light four-cylinder models are built for heavy duty—constant driving in town or country under any and all conditions.

Read What Chief Engineer Marr says about the "Valve in the Head Motor." He draws the largest pay check of any engineer in the world and knows what's what.

In any gasoline motor, such as those used in automobiles, three things must happen in the cylinders in order to get the power to make the automobile go. First, vaporized gasoline must be introduced into the cylinder through a gate, or as we say, a valve. Second, this gasoline vapor must be compressed and then exploded with an electric spark, and third, the useless gases which result from the explosion must be expelled from the cylinder through another valve.

Automobile engine cylinders are of three types, the 'L' head, the 'T' head, and the valve-in-head. Now let's get these three types firmly fixed in our minds. They have been explained time and again, and yet there are people, including thousands of automobile users, who do not understand the fundamental differences in the construction of three types of motors. Otherwise the 'L' and 'T' head types would be hard to sell, for it can be mathematically demonstrated and proven, in cold facts and figures, that the valve-in-head motor will yield 15 per cent more power than the 'L' head, and 20 per cent more power than the 'T' head motor of equal size, and for the same amount of fuel. It is plain, therefore, that if every purchaser of an automobile realized and understood this truth no amount of salesmen's talk could create much of a market for 'L' and 'T' head motors.

"To help you understand why the valve-in-head is superior, I shall draw a very much enlarged parallel. Perhaps by comparing these forms of motor construction to some familiar object much larger than automobile motors—something entirely apart from motors—I can help you to understand. The non-mechanical mind is always puzzled as long as the talk is confined to engines, or motors, no matter how simple we try to make it, so we will get entirely away from mechanics for this magnified comparison.

"Everybody has walked down a hallway in a hotel, with rooms ranged along each side. Now let's imagine ourselves in such a hallway. We walk along toward the end of the hall and find all the doors leading to the various rooms tightly closed. We come to the end of the hall and find two windows, also closed.

"Now we will open the door of the last room on the left, and leave it open. At the far side of this room are two windows. The hallway itself is the cylinder and the room at the head of the hall is the valve chamber, or pocket, as it is called. The two windows at the far side of the room are the valves, one an inlet valve and the other an outlet valve. Air, to reach that hallway, would have to come through the window of the room, pass through the room, and thence through the door into the hall. Same way in an 'L' head motor. The gas enters through the valve, passes through the valve chamber, or pocket, and then into the cylinder proper.

"For a 'T' head motor we would have to extend the comparison by opening the door on the opposite side of the hall also. A 'T' head motor has two valve chambers, or pockets, the intake valve being on one side of the cylinder and the outlet valve on the opposite side.

"And now, using this same comparison to give you an idea of the valve-in-head motor, we simply close the doors to the

two rooms, leaving no inlet or outlet to the hallway except the two windows at the head of the hall. These windows serve as the valves in a valve-in-head motor. That's what the term means—the valves are in the head of the motor, just as the two windows are at the head of the hall. Surely you can see how much easier it is to get air into and out of that hall through these windows than through the windows at the far sides of the adjacent rooms.

"Now for the application of these principles. Now we will see exactly why the valve-in-head motor yields more power for the same amount of fuel.

"I told you, you remember, that the first step in the production of power in an automobile engine is the introduction of vaporized gasoline, or gas, as we call it, into the upper end of the cylinder. This gas is introduced through the intake valve. Once into the cylinder, the piston head, returning under momentum from its previous downward strokes, squeezes, or compresses this gas. And just at the instant of highest compression the electric spark explodes it. To explode gas means to heat it, and heated gas, you know, expands. It is this expansion of the gas that forces the piston down, thus turning the crankshaft.

"Now let's return, for a second, to the instant of the explosion. The gas has been introduced into the upper end of the cylinder, through the inlet valve, and the piston in its upward thrust, has compressed that gas into a very small space. The electric spark plug to the other terminal, an eighth of an inch away. What happens? Why, the compressed gas is set on fire, and you know what happens when gas is set on fire. It expands. It expands violently. It tries to get out of the cylinder. It pushes and struggles in every direction, and from every direction, save one, it is hurled back. The one portion of the surrounding surface which yields under its onslaught is the piston head. The latter, unable to withstand the attack, is pressed downward. The piston is attached to the crankshaft and when the piston presses downward the crankshaft turns. This causes the drive shaft to revolve, and when the drive shaft revolves the rear axle turns. Attached to the rear axle are the wheels, and when the axle turns they turn too. Thus the automobile moves.

"Now it happens that the man up in the seat, who has to pay for the gasoline, wants that gasoline to go as far as possible. He wants the last ounce of power that he can get. He wants the full force of that explosion to be hurled against the top of the piston head.

"This brings us to the 'L' and 'T' head, and to the valve-in-head construction again. In the first two types, when the explosion takes place, the lines of force are scattered. Some of them go downward against the piston, where they should go, and others are hurled sideways into the valve chambers, where they do no good.

"In the valve-in-head motor there are no valve chambers, or pockets. Every last ounce of the force generated in the explosion goes directly against the piston head. There is no place for this force to go. Let's return to our hotel hallway illustration again. Suppose you were standing about halfway down the hall, at a place that would correspond to the location of the piston head in the cylinder. A revolver is fired in the room to the left, corresponding to the valve pocket in an 'L' or 'T' head motor. Why, you hardly hear it, let alone feel any concussion. But suppose the doors leading to those rooms were closed and the same revolver fired in the hallway just in front of you. Can't you imagine the difference? Your ear drums would rock and you would distinctly feel the concussion of the air. In a word, the full force of the explosion would be directed toward you, just as it is directed toward the piston head in a valve-in-head motor.

"Now we come to the very important matter of getting the dead gases out of the top of the cylinder after the explosion. After each explosion in the cylinder there is a residue of dead gases. The inside of the cylinder walls, you know, must be constantly lubricated, so the piston will work up and down with the least possible friction. Some of this lubricating oil is burned with each explosion, and this leaves a residue of carbon in the cylinder.

It is the duty of the piston head, in the upward stroke following the explosion, to push all these dead gases, including the carbon, out of the cylinder. If they are

pushed out they mix with the next charge of gas, line up, and when it thus dies is the force of the next explosion.

"In an 'L' or 'T' head motor, these gases, to get out, have to turn corners, as it were. They have to take a roundabout course in getting out. They must go first to the valve chambers and thence to the outlet, or as we say, the exhaust valve. Invariably in these types of motors, a portion of these gases fails to get out. The valve opens for only the smallest fraction of a second—so quickly that you couldn't begin to see it with the naked eye—and some of the gas 'gets left' every time.

"But these gases do not 'get left' in a valve-in-head motor. The exhaust valve, you know, is directly in the top of the cylinder, just like the window we spoke of was directly at the head of the hallway. Consequently when the piston starts its upward stroke these gases take a straight shoot for the opening. No corners to turn. No projections to stop them. No crannies or pockets to retard their flight. They make a straight, headlong dive through the exhaust valve.

"This means, among other things, that in a valve-in-head motor the cylinders are always clean. In an 'L' or 'T' type motor it is impossible to make the insides of the valve chambers or pockets smooth. There are little projections and roughnesses and these catch and hold carbon deposits. And then, when the motor gets to running rapidly, these deposits become heated. They get red hot and thus ignite the incoming charges of gasoline vapor before it is compressed. This gas is exploded before it is compressed which means that it is burned without any resultant power. This is the condition we speak of as pre-ignition. You never have pre-ignition in a valve-in-head motor.

"Now there's one other vital thing I meant to tell you about a minute ago when we were talking about the explosion of the gas in the cylinder. All automobile men know that for best results it is necessary to have a quick and complete explosion. To get this it is necessary to have your spark plug as near the gas as possible. In an 'L' or 'T' type motor, you can readily see, the flame has to travel a great deal farther than in a valve-in-head, for the simple reason that the diameter of the combustion chamber is greater. In a valve-in-head motor this diameter is simply the diameter of the cylinder itself, whereas in the other two types the flame has to travel to the far corners of the valve chambers, or pockets.

"That this is a vital matter is shown by the fact that some makers of 'T' head motors provide two sets of spark plugs, one for each side of the cylinder. This is manifestly a makeshift effort to get around the obvious disadvantages of a 'T' head motor, which is the least efficient of the three types.

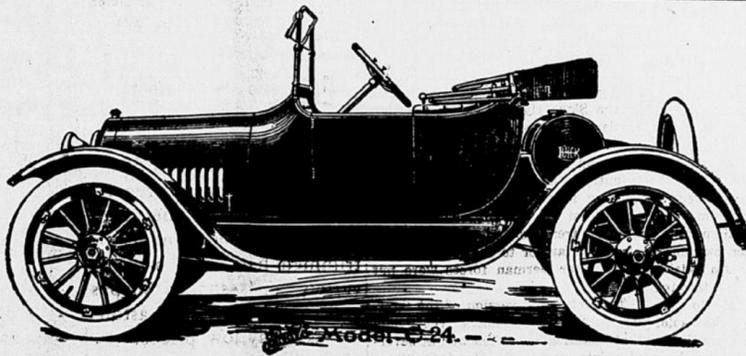
"An automobile motor is a heat engine. A theoretically perfect motor would be one in which an extremely high temperature could be maintained in the metal cylinders. It is not practical, however, to operate an automobile motor with its cylinder surfaces superheated, consequently a cooling device is provided. This is accomplished by having the cylinder walls surrounded by a hollow jacket, which is kept full of circulating water. In this cooling a number of heat units are necessarily wasted and destroyed, but the smaller the surface of the cylinder walls to be cooled the greater the efficiency of the motor. In the 'L' and 'T' types, with their side pockets cast into the cylinder for the insertion of the inlet and exhaust valves, the combustion chamber is enlarged by the exact amount of extra surface in these pockets, and these pockets must be as perfectly water jacketed as the remainder of the cylinder wall. The result is a greater amount of cooling surface and the consequent greater loss of heat units.

"The valve-in-head motor has no valve chambers, or pockets, consequently it presents less surface to the cooling agent and therefore loses fewer heat units. That is why the valve-in-head cylinder will develop more power than the 'L' or 'T' type of the same size.

"Now I wish to thank you, ladies and gentlemen, for your kind attention, and I trust . . ."

"Just one minute, Mr. Marr. Your explanation of the valve-in-head certainly is indisputable, but you haven't told us, since the valve-in-head motor is manifestly the best, why the other companies stick to the 'L' and 'T' types."

"That is an easy question to answer. The other types are cheapest to manufacture, for one thing. Another reason is that some manufacturers, after boasting of their 'L' or 'T' type motors for years, hate to acknowledge that they have been wrong. Having developed the 'L' and 'T' motors to the highest degree attainable, they dislike to admit that no further progress, is possible with those types. They hesitate, also, to re-equip their factories, and go to the great expense of re-designing. Hence they continue with these inferior types as long as they can. But they are coming around—or perhaps I should say 'soft pedaling' around—gradually, and it won't be long before they are all shouting in chorus that they were the original inventors of the valve-in-head, despite the fact that for twelve years start on them and there's little danger of any of them over taking us.



"When a better car is made Buick will make them and I will sell them." Arrangements now being made for the best garage west of the Twin Cities.

Tires--any kind; Accessories of all kinds.
Discount on all goods. Agents wanted.
Horses and used cars taken in exchange.

C. A. STOTLAR

Devils Lake, N. D.