A Primer on Plymouth

Here's How "All Three" Low-Priced Cars Compare in the 22 Important Features Found in High-Priced Cars

Car	1 117-inches or Longer Wheelbase	2 Hydraulic Brakes	3 L-head Engine Design	4 Aluminum Alloy Pistons	5 Four Rings per Piston	6 Chain Camshaft Drive	7 Sealed Beam Headlamps	8 Automatic Choke	9 Precision Type Lower Connecting Rod Bearings	10 Full Pressure Lubrication of Lower Con. Rod Bearings	11 Valve Tappet Adjustment	12 All-Silent Transmission	13 Roller Bearings on Transmission Countershaft	14 Steering Post Gear Shift	15 X-Braced Frame	16 Four Chassis Springs	17 Independent Front Wheel Suspension	18 Four Double-acting Shock Absorbers	19 Hotchkiss Drive	20 Roller Bearing Universal Joints	21 Hypoid Rear Axle	22 Tapered Roller Differential Bearings	Total
Chrysler Crown Imperial	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	22
Cadillac 60 Special	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	22
Cadillac 62	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	22
Packard Super Eight	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	21
La Salle 52	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	22
Graham De Luxe Superch.	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	21
Packard Eight	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	21
Studebaker President 8	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	19
Nash Ambassador Six	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	20
Buick 40	YES	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	18
Pontiac De Luxe 8	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	19
Oldsmobile 70	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	20
Hudson 8	YES	YES	YES	YES	YES	NO	YES	YES	NO	NO	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	NO	YES	16
De Luxe Plymouth	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	21
Chevrolet Special De Luxe	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	YES	YES	NO	YES	NO	YES	YES	YES	NO	YES	YES	NO	10
Ford De Luxe	NO	YES	YES	NO	NO	NO	YES	NO	YES	YES	NO	YES	YES	YES	YES	NO	NO	YES	NO	NO	NO	YES	11
Chevrolet Master De Luxe	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	YES	YES	NO	YES	NO	YES	YES	YES	NO	YES	YES	NO	10
Chevrolet Master 85	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	YES	YES	NO	YES	NO	YES	NO	NO	NO	YES	YES	NO	8
Ford V-8 "85"	NO	YES	YES	NO	NO	NO	YES	NO	YES	YES	NO	YES	YES	YES	YES	NO	NO	YES	NO	NO	NO	YES	11
Plymouth "Roadking"	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	21

Manufacturers generally can be expected to use in their highest-priced cars the type of construction they have found to be best . . . even though it may cost more to produce. For this reason, more and more buyers measure the value offered by the different low-priced cars by comparing the low-priced cars with high-priced cars as to engineering and construction. The more a low-price car resembles high-price cars in the way it is built, the more value these careful buyers consider it offers.

High-price cars are not identical, but analysis shows them to be in general agreement in their use of twenty-two important features of design and construction, as shown here in this reproduction of the 1940 Quality Chart.

To make clear what high-priced car engineering and construction mean to the buyer of a 1940 Plymouth — in added comfort, added safety, added pleasure, added economy—the following pages are devoted to an explanation of the fundamental workings of a modern motor car.

This book provides you with a useful standard by which you can judge the value of any automobile. In addition, the information it contains will permit you to be numbered among the comparatively few people who really know what makes a car run . . . and what work the important parts of a car perform.

Here is how these Quality Features Contribute to the Better Value Plymouth Gives You

1. 117-INCHES OR LONGER WHEELBASE—You benefit by a better ride and a smoother ride. Longer Wheelbase helps level a car's ride just as greater length makes a ship ride the waves more smoothly.

2. HYDRAULIC BRAKES—Safer, smoother stopping. Every Plymouth ever built has had Hydraulic Brakes.

3. L-HEAD ENGINE DESIGN—You benefit from permanently quiet operation and simplicity and economy of servicing. The L-head engine has fewer parts to wear and get out of adjustment than the valve-in-head type of engine.

4. ALUMINUM ALLOY PISTONS—Their light weight gives you fast acceleration and reduces the load on engine bearings so that you benefit from long bearing life.

5. FOUR RINGS PER PISTON—Give you more complete oil and compression seal than three rings, safeguarding against waste of oil and fuel.

6. CHAIN CAMSHAFT DRIVE — Makes your driving more enjoyable because it is more permanently quiet than gears alone.

7. SEALED BEAM HEADLAMPS — Add greatly to your enjoyment of Plymouth's Luxury Ride as well as to your safety at night. They give 50% to 65% better road lighting than former type headlights.

8. AUTOMATIC CHOKE — Exclusive to the higher-priced cars.

9. PRECISION TYPE LOWER CONNECTING ROD BEARINGS — Safeguard you against the possibility of expensive servicing, as they can be replaced, if necessary, very quickly and economically, without fitting or the use of special tools.

10. PRESSURE LUBRICATION OF LOWER CONNECTING ROD BEARINGS — Safeguards against the possibility of wear caused by insufficient lubrication, contributing to engine life.

11. VALVE TAPPET ADJUSTMENT — Assures greater satisfaction for you throughout the life of your car by making it possible and easy to maintain quiet tappet operation.

12. ALL-SILENT TRANSMISSION—Quieter, longer lived than old-type spur gears. Remarkably free from clashing. Shifting is smooth and quiet.

13. ROLLER BEARINGS ON TRANSMISSION COUNTERSHAFT—You get longer life in the transmission than when plain bushings are used and the use of these more expensive anti-friction bearings contributes importantly toward maintaining gears in proper alignment.

14. STEERING POST GEARSHIFT—(*Power operated only on the Chevrolet.) Plymouth uses the same less complicated type manually operated Steering Post Gearshift as is used on all other cars that have this convenience in shifting.

15. X-BRACED FRAME—An important factor in your enjoyment of Plymouth's Luxury Ride. The X-braced frame, used by almost all makes of American cars, effectively resists the twisting and weaving strains resulting from unevenness of the road, giving a smoother ride and adding to the life of the whole car.

16. FOUR CHASSIS SPRINGS—Give you a softer ride than when fewer springs are used.

17. INDEPENDENT FRONT WHEEL SUSPENSION — You ride smoothly over rough roads because each front wheel independently conforms to road irregularity without affecting the other wheels or tipping car.

18. FOUR DOUBLE-ACTING SHOCK ABSORBERS—You ride over bumps far more gently than when single-acting shock absorbers are used, because double-acting shock absorbers control both the downward and the upward movement of the springs of the car.

19. HOTCHKISS DRIVE — Your starts and stops are much more smooth, because the forces of starting and stopping are cushioned by the rear springs. And since there are no torque tubes or radius rods there is less unsprung weight, which results in giving you a smoother ride at all times.

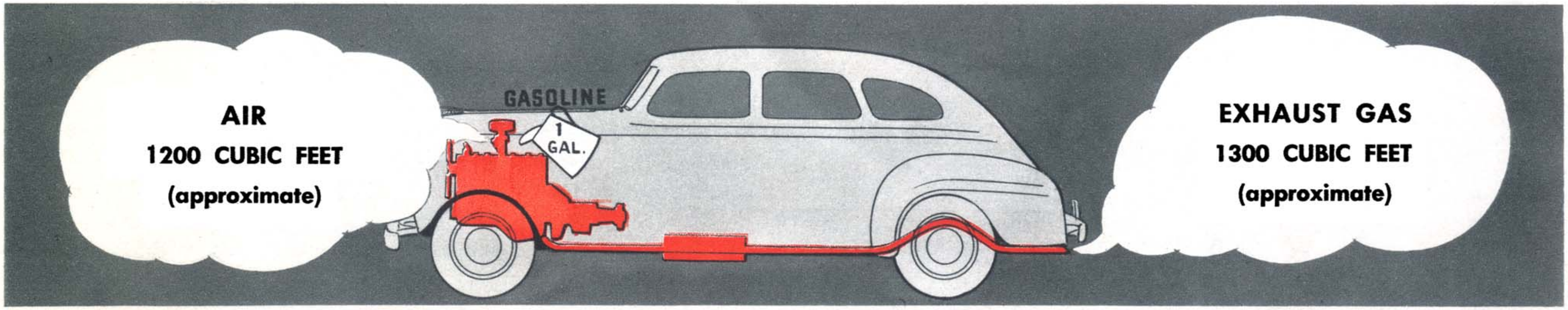
20. ROLLER BEARING UNIVERSAL JOINTS—You benefit from longer life for in these hard-working units you need give them attention for lubrication only at long intervals.

21. HYPOID REAR AXLE—The hypoid design gives you an axle much stronger and with one and one-half to two times the life of the ordinary spiral bevel type axle. And the hypoid design permits a low rear compartment floor unobstructed by an unsightly tunnel.

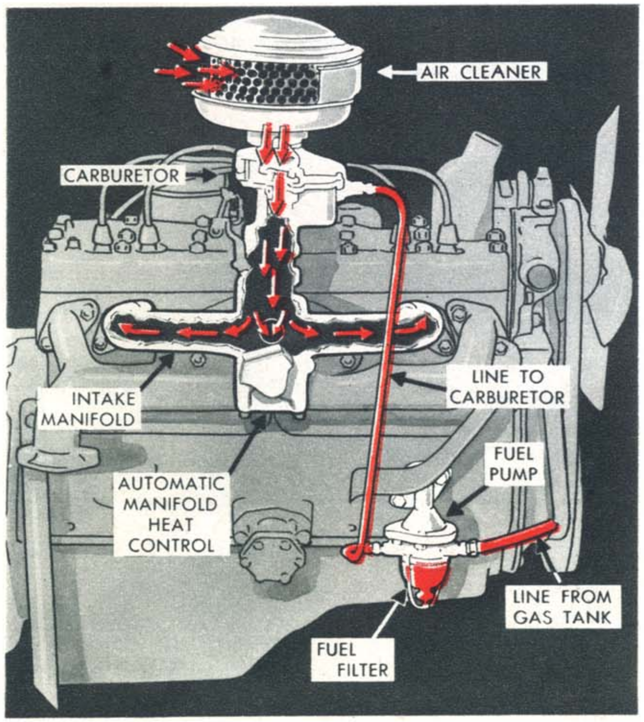
22. TAPERED ROLLER DIFFERENTIAL BEARINGS—Use of the tapered roller bearings adds to gear life and permits greater strength to be built into the entire rear axle.

AN AUTOMOBILE ENGINE IS A TRAVELING

Chemical Factory



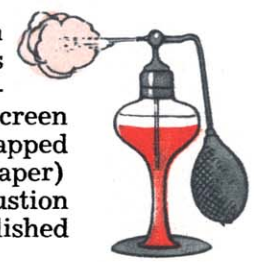
THE engine of an automobile is regarded primarily as a device for producing mechanical power. And so it is. But in another sense, the engine is really a miniature chemical factory. And thinking of it this way helps to a better understanding of how it works . . . how certain results are produced.



Nitrogen, carbon dioxide and water (the exhaust) are the chief "products" of this factory. In this sense, the mechanical power that drives the car is only a *by*-product but the most important.

One part of the factory's "Raw Materials"—gasoline—it carries with it; the other part—air—is found free for the using wherever it goes. Briefly, these "raw materials" are handled in the following manner.

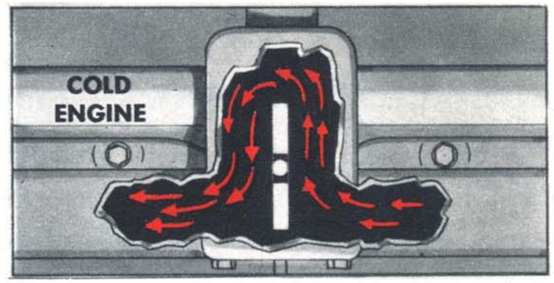
Carburetion



All air entering the Plymouth engine through the carburetor is "breathed" in through an oil-coated ("sticky") copper mesh screen filter. Here dust and grit are trapped (much as flies are caught in fly-paper) before they can enter the combustion chambers and damage the polished surfaces of precision-fit parts.

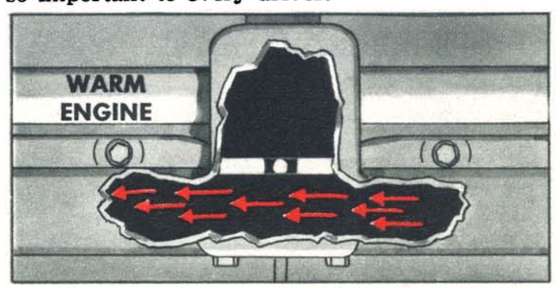
Gasoline is drawn from a sturdy 17-gallon tank at the rear of the car by a fuel pump. Gasoline, too, is cleaned . . . by being passed through a glass-enclosed filter before it reaches the carburetor.

In Plymouth's down-draft carburetor, gasoline and air are thoroughly mixed—somewhat as perfume is mixed with air in an atomizer—and are drawn by suction into the intake manifold leading to the six combustion chambers. The diagram at the left will help explain the sequence of these steps.



Automatic Manifold Heat Control

To insure proper combustion of this fuel mixture during the warm-up period, a part of the engine's hot exhaust gases is passed around the intake manifold to heat the mixture *before* it reaches the combustion chambers. Thus preheated, gasoline vapor is evenly distributed to all cylinders and burns more thoroughly than cold gas . . . saving fuel and preventing the misfiring common in some engines when cold. Plymouth's manifold heat control is *automatic* . . . constantly regulated by a thermostat. Not all low-price cars offer this economy and performance feature so important to every driver.

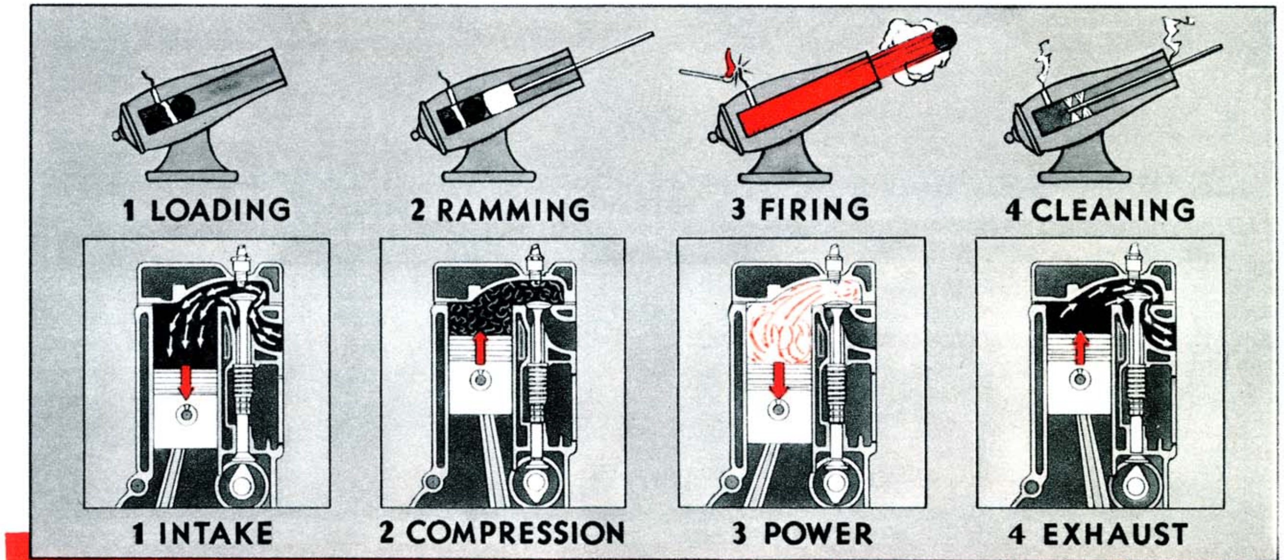


EACH CYLINDER WORKS SOMETHING LIKE

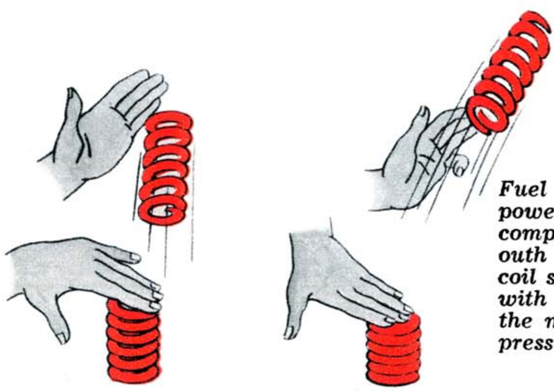
A *Cannon* . . .

How the fuel mixture—drawn in from the carburetor through the intake manifold and intake valves—is turned into the *power* which drives the car, is shown in the cross-section diagrams of a *single* cylinder at the right. As you can see, the four steps in firing an old style muzzle-loading cannon correspond to and help explain the four strokes of a four-cycle engine.

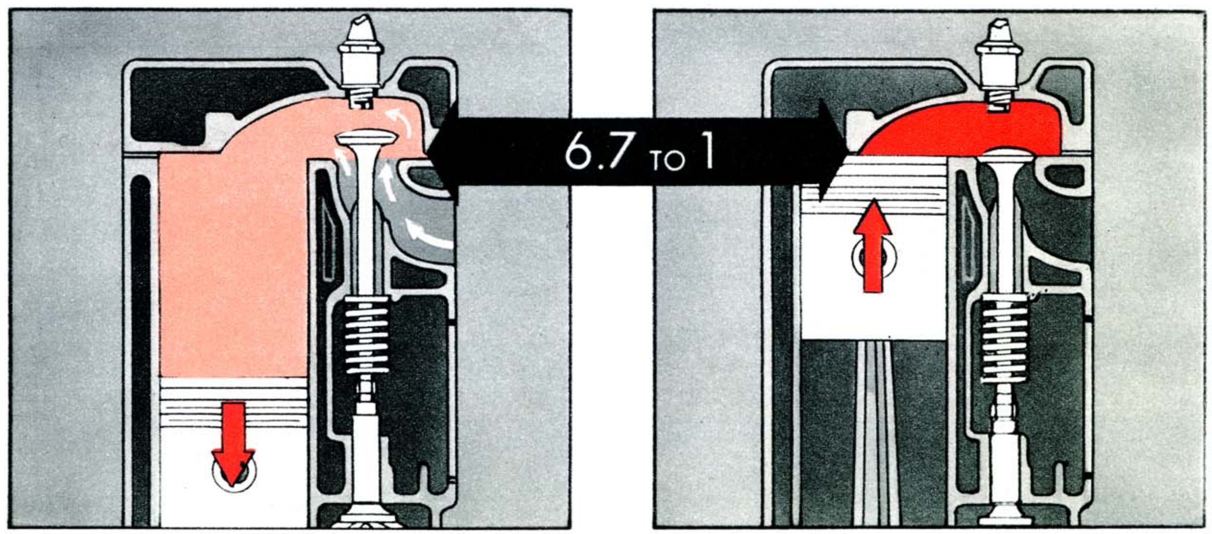
1. **INTAKE STROKE**—The piston is *pulled down* in the cylinder by the revolving crankshaft, filling the entire space above the piston with vaporized fuel mixture drawn in through the open intake valve (more about valves later).
2. **COMPRESSION STROKE**—Valves are closed. The piston is *pushed up* in the cylinder, compressing the fuel mixture into a small space in the cylinder head—the combustion chamber.
3. **POWER STROKE**—A spark from the spark plug ignites the fuel mixture and its expanding combustion forces the piston *downward,* turning the crankshaft. Both valves remain closed.
4. **EXHAUST STROKE**—The piston is *pushed up* in the cylinder, forcing burned gases out through the open exhaust valve.



High Compression Squeezes More Power From Every Drop of Gas Used . . .



Fuel delivers more power in the high compression Plymouth engine just as a coil spring rebounds with greater force the more it is compressed.



. . . and Thus Contributes To the Use of Less Gas

The fuel mixture drawn in to fill the entire space of cylinder and combustion chamber during the *intake* stroke of the Plymouth engine is squeezed into the combustion chamber—a space about only one-seventh as large—during the *compression* stroke as illustrated at the right.

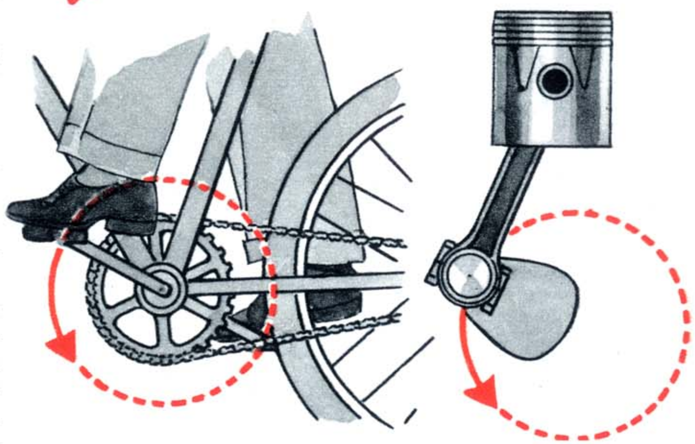
Automobile manufacturers have steadily tended to use higher and higher compression in their engines . . . because a *higher* ratio enables the engine to develop *more power* from *less fuel!* Engineers speak of the higher "thermal efficiency" obtained. But the idea can be stated in more common terms. The more you compress a coil spring before releasing it, for example, the harder it will rebound. Similarly, the more you compress fuel in an engine before igniting it, the more *power* you get from it *. . . and the less fuel you use to produce a given amount of power!*

Only Plymouth offers low-price car buyers the savings and the finer performance resulting from a modern, super-high compression ratio of 6.70 to 1.

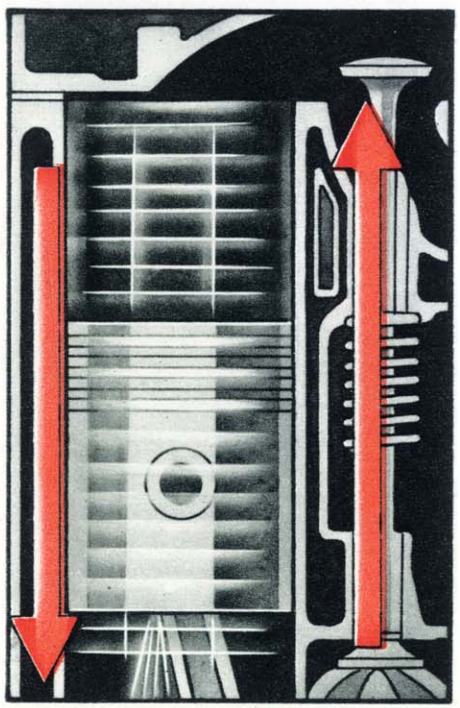
THE CRANKSHAFT IS TURNED AS YOU PEDAL A *Bicycle* . . .

THE up-and-down movement of a piston and connecting rod revolves the crankshaft of an engine much as a boy's legs operate the pedals of a bicycle . . . but almost unbelievably *faster!* When the engine is driving the De Luxe Plymouth forty miles an hour in high gear, each piston is stopped and restarted in the opposite direction *3,932 times a minute . . . more than 60 times a second!* Heavy pistons, such as those made of cast iron, naturally impose terrific loads on a spinning crankshaft's main and connecting rod bearings and impede acceleration.

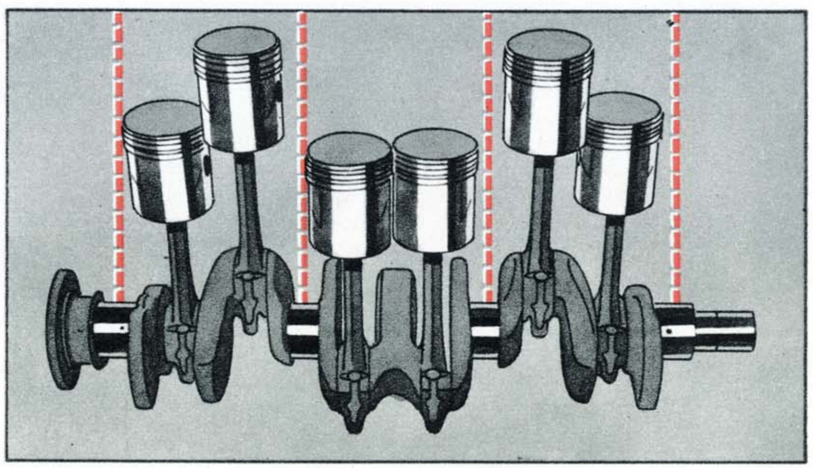
To minimize piston load and piston inertia, Plymouth uses pistons of *lightweight aluminum alloy* . . . a quality feature more commonly found on *higher* priced cars . . . considered essential for finest performance. A stannic coating of pure tin gives Plymouth pistons a slippery surface and SUPERFINISH contributes materially to longer life.



. . . By Pistons Moving Up and Down as Fast as *60 Times a Second*



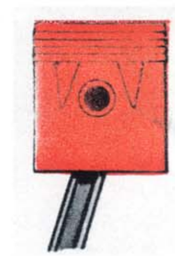
The crankshaft is the backbone of the engine mechanism . . . guiding connecting rod and piston movement, receiving and transmitting the full force of power impulses. Its construction thus has a direct bearing on the smoothness of engine operation and on the life of the entire mechanism. Four large main bearings support the Plymouth crankshaft, not three as in some engines. Thus only two pistons and connecting rods operate between each pair of main bearings, an arrangement which provides better distribution of load on bearings and reduces the opportunity for crankshaft deflection, or "whip." Main bearings and connecting rod bearing journals are SUPERFINISHED for longer life.



A Sprinter Runs in the Lightest Shoes He Can Find

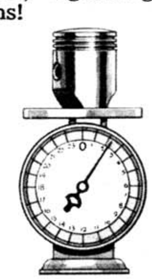
The first time you examine a pair of track shoes worn by a runner, you are amazed by the lightness of their weight. And this is important. For as any runner will tell you, heavier shoes would seriously *slow him down* . . . and the strain of their added weight would cause him to *tire* unduly!

Lightweight Pistons Are Similarly Important to an Engine's Performance

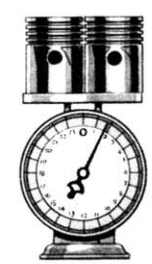


Because the pistons of an engine must travel up and down so fast the human eye could see only a blur, *their* weight is an important factor in how well an *engine* performs . . . and how long it *lasts!* For just as light shoes help a sprinter *run* faster, lightweight pistons contribute to an engine's *acceleration!* And just as light shoes are easier on a runner's *legs,* lightweight pistons impose lighter loads—are easier on an engine's *bearings!*

There is a big difference between cars in this matter of piston weight. For ONE *cast iron* piston, such as those still used in the engines of some cars, weighs about the same as TWO of Plymouth's modern, lightweight *aluminum alloy* pistons!

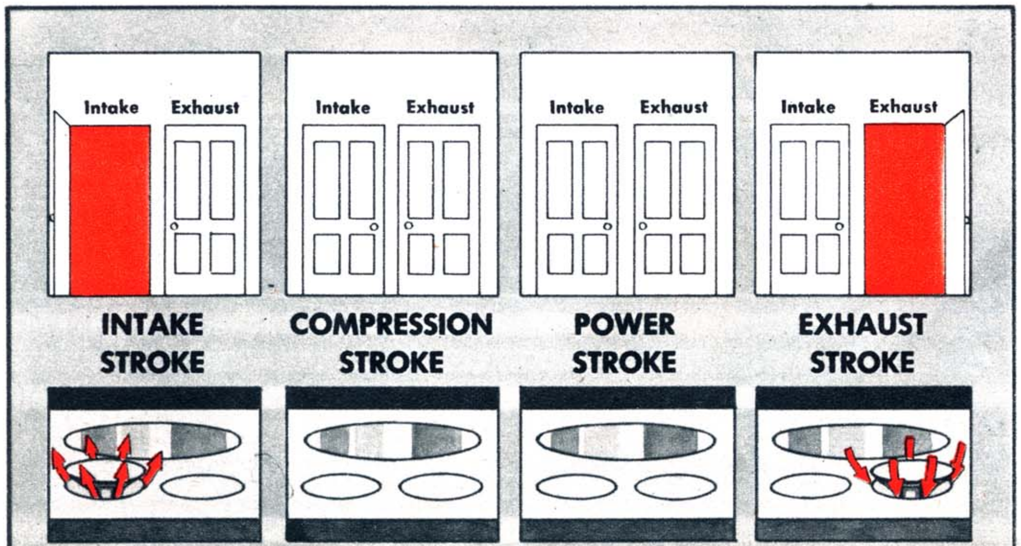


Cast iron piston.



Aluminum alloy pistons.

VALVES ARE THE *Doorways* OF THE ENGINE



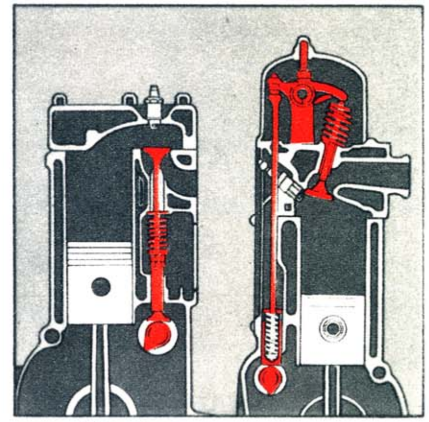
As piston descends in cylinder, intake valve opens for fuel mixture to be drawn in.

Both valves are closed during compression stroke as piston rises in the cylinder.

Valves remain closed during power stroke when combustion forces piston down.

Exhaust valve opens for exit of burned gases as piston rises in exhaust stroke.

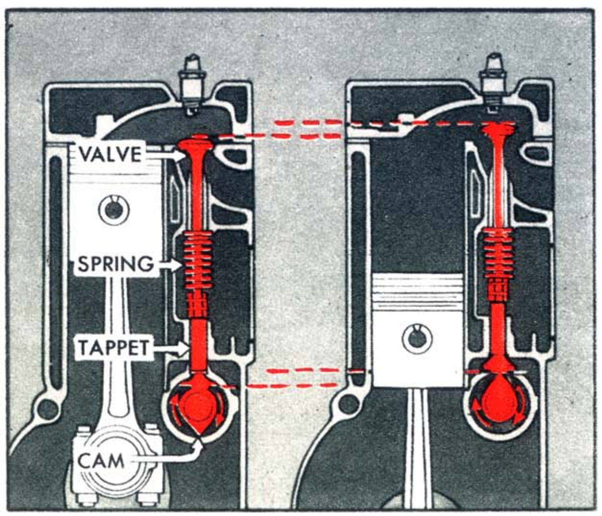
EACH cylinder of an engine is equipped with two valves: An *intake* valve—through which fuel mixture is drawn in from the intake manifold and carburetor, and an *exhaust* valve—through which burned gases are expelled into the exhaust manifold and out through the muffler and exhaust pipe. The reason why the type of engine used by Plymouth (and *most* American manufacturers) is known as an "L-Head" engine, can be seen in the cross-section engine views above at the right. In an L-head engine, the cylinder and combustion chamber form an inverted "L"; valves are mounted at the *side* of the cylinders.



L-head *Valve-in-head*

An L-head design engine is far *simpler* than a valve-in-head engine, which has many extra working parts in its valve mechanism—rocker arms, etc.—to wear, work loose, rattle and require repeated adjustment.

They Are Opened and Closed by Cams on the *Camshaft*



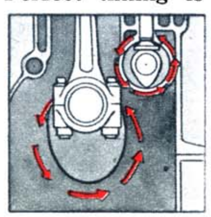
Valves are opened, or raised, by the upward movement of tappets which bear against the bottoms of valve stems. A coil spring keeps each valve tightly closed until the tappet opens it.

The lower end of each tappet bears against an egg-shaped cam on the camshaft. Every time this cam revolves, it pushes up the tappet to open the valve. The faces of these hard-working valve lifters are SUPERFINISHED FOR LONGER LIFE.

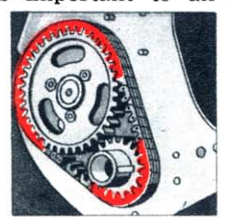
To have each valve open and close at *precisely the right instant*, the turning of the *camshaft* must be perfectly synchronized with the turning of the crankshaft and movement of pistons. Plymouth, like most *high*-price cars, uses a *chain* drive.

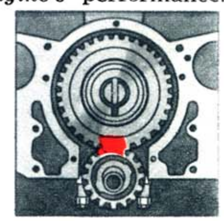
Perfect Timing Means More Power...

In almost any sport, you get more *power* if your "timing" is accurate. Perfect timing is *just* as important to an *engine's* performance.



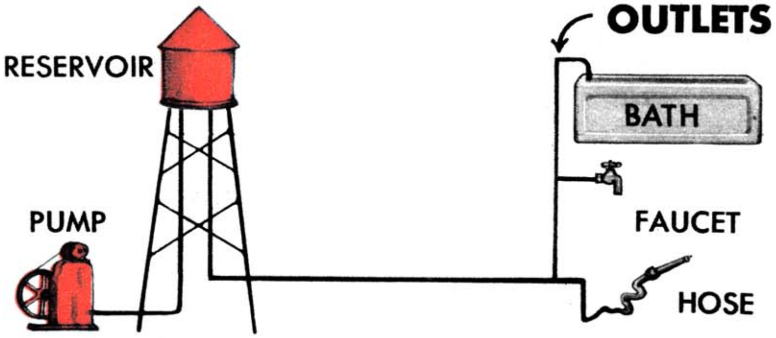
Turning of the crankshaft regulates *piston* movement. Turning of the camshaft regulates *valve operation*. Both must be perfectly synchronized.

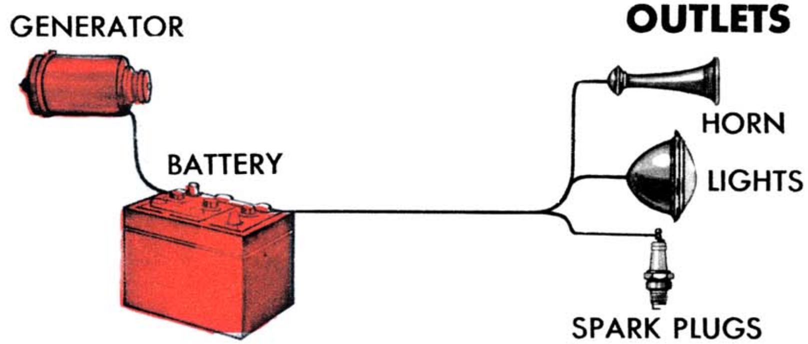




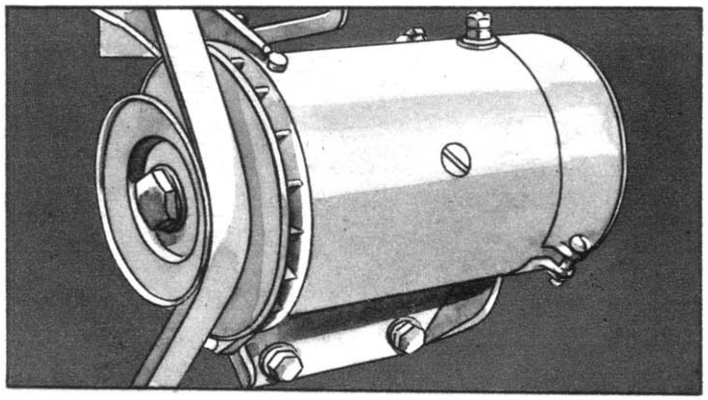
The contact area in a chain camshaft drive (left) and in a gear drive (right) is shown in RED. With its greater contact area, the chain drive is less subject to wear. Of "ALL THREE" leading low-price cars, however, only Plymouth offers chain camshaft drive!

THE *Pump and Reservoir* OF A WATER SYSTEM

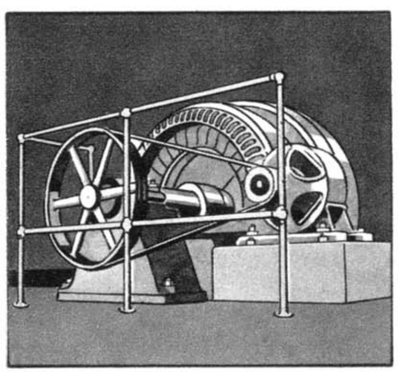




CORRESPOND TO A CAR'S *Generator and Battery*



An Automobile's Generator Works Much the Same as One In a Powerhouse



The chief difference between the generator in an automobile and the generator which produces the electrical current you use for lights and other purposes in your home is *size.* Of course the generator in a powerhouse is driven by an engine that does nothing else, whereas driving the generator is only *one* of the jobs of a car's engine.

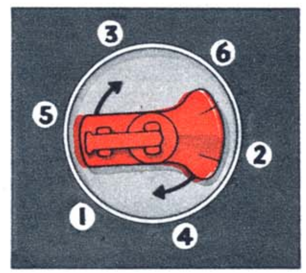
WHEN you consider that electricity and water are very similar in several important respects, it is then comparatively easy to understand the functioning of a car's electrical system. Both water and electricity *flow,* both can be *measured* in quantity or volume . . . both are subject to *pressure.*

Thus the storage battery and generator of an automobile's *electrical* system correspond directly to the water pump and reservoir tank of a town's *water supply* system. Just as a tank is kept full of water by a *pump,* a battery is charged with electricity by a *generator.*

Now if water is used faster than it is pumped into a tank, the tank will soon run empty. And if electric current should be used faster than it is replaced by the generator, a battery will become exhausted.

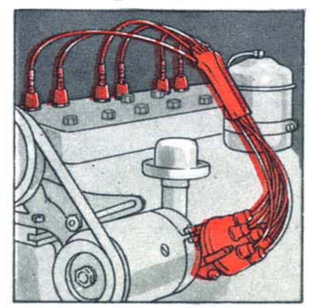
To provide the battery of a Plymouth with an abundance of electrical power—and at the same time supply plenty of current for lights, horn and other electrical devices—Plymouth employs a generator of unusually large capacity. To protect the Plymouth generator against overheating and thus insure its continued high output, an efficient air-cooling system is built into it, utilizing a fan and ventilating louvres.

The Distributor Is a *Rotating Switch . . .*



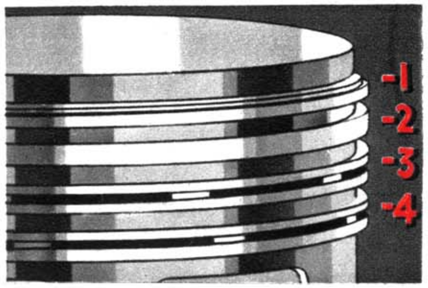
The sequence in which the six cylinders of the Plymouth engine fire is regulated by a Distributor or rotating switch. In the simplified diagram at the left, which shows the distributor with cap removed, this sequence — or "firing order"—is indicated by the circled numbers.

. . . Can Deliver More Than *5,000 Sparks a Minute!*



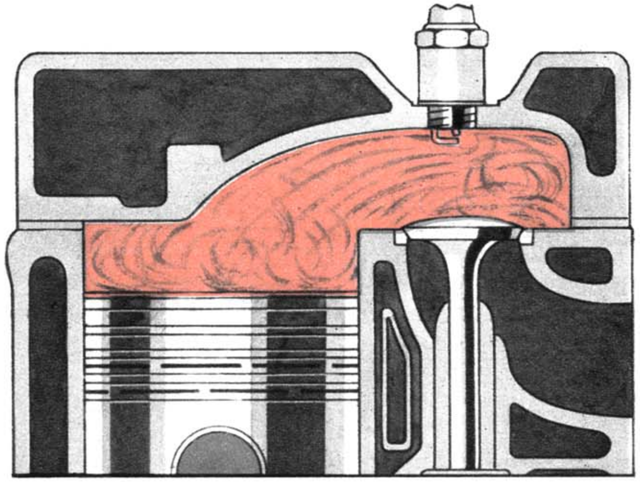
If the De Luxe Plymouth is being driven at 40 miles an hour in high gear, the distributor then delivers a total of 5,906 electrical impulses to the spark plugs *each minute* . . . or 100 impulses per second! Insulated wires carry these flashes of current from the distributor to the spark plugs.

Combustion Pressures ARE MEASURED IN HUNDREDS OF POUNDS PER SQUARE INCH . . .



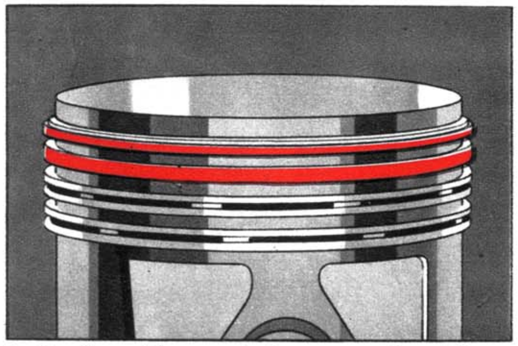
1. Four Rings Per Piston

By expanding to obtain pressure contact between closely fitted pistons and cylinder walls, piston rings perform two important functions. They seal compression and combustion pressures in the cylinder *above* the piston and control oil consumption by keeping lubricating oil *below* the piston top. Of "All Three" leading low-price cars, only Plymouth uses *four* instead of three piston rings to do these jobs.



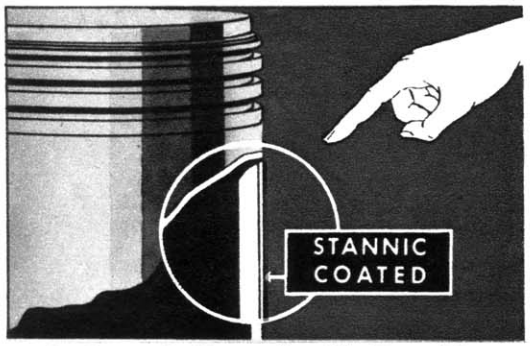
To help explain the four strokes of an engine a few pages back, it was pointed out that each cylinder works something like a cannon. This is still a useful analogy. For if a gun's projectile or shell should fit too loosely within the walls of the bore, much of the force of the powder explosion would escape *around* the projectile. Much the same thing is true in the engine of a car. For if the *full force* of the fuel mixture's expanding combustion is to be used to drive the piston downward, the terrific pressure must be *sealed* within the space above the descending piston.

These 5 Features Seal Pressure In . . . Contribute to Power and Economy



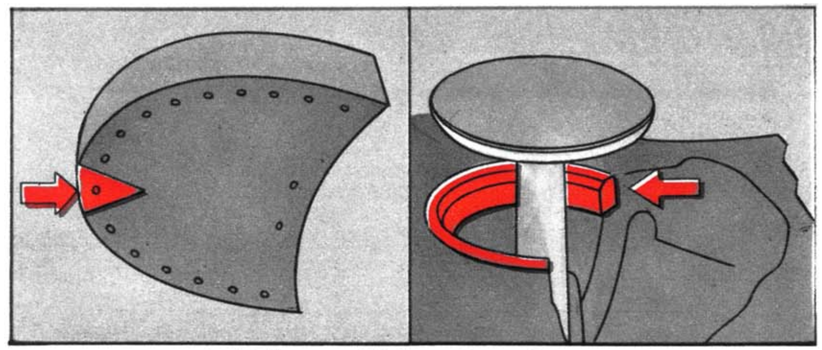
2. Surface-Treated Compression Rings

To minimize wear, Plymouth's compression rings are surface-treated. As they glide up and down within cylinders, their surface coating tends to produce a polished surface of contact between piston rings and cylinder walls . . . a super-smooth finish minimizes friction and wear and safeguards against "scoring," reducing the possibility of pressure "blow-by."



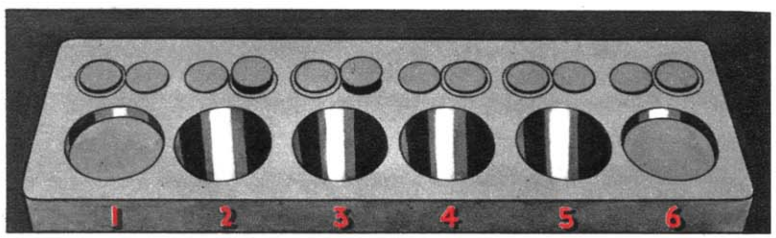
3. Stannic Coated with Pure Tin

Superfinish safeguards Plymouth's aluminum alloy pistons against wear caused by friction as they move up and down in cylinders. In addition, pistons are *stannic* coated with soft, pure tin (not an alloy) which acts as a lubricant . . . smoothing and polishing the surface of cylinder walls to a slippery finish which minimizes friction and wear.



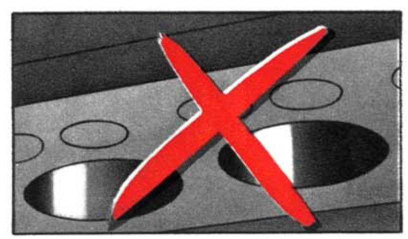
4. Exhaust Valve Seat Inserts

In the Plymouth engine, rings of extremely hard, heat-resisting alloy are inserted into the block to form seats for the exhaust valves. For just as metal inserts are harder than the leather of a shoe heel, exhaust valve seat inserts are much harder than the cast iron of the cylinder block. Both resist wear. Plymouth's advanced engineering thus obtains a long-lasting, close seal between exhaust valves and seats . . . maintaining the high efficiency of the Plymouth engine and greatly reducing the frequency of need for valve grinding.



5. Simple, Six-Cylinder Engine Design

The outstanding, all-around *economy* for which the six-cylinder type engine is noted is a product of its *simplicity*. Because there are two less cylinders and four less valves in a six than in an eight, there are fewer points where loss of combustion pressure can occur with consequent fuel waste. And with two less cylinders to be lubricated, there is less opportunity for *oil* consumption! Not to mention the important saving in fuel!

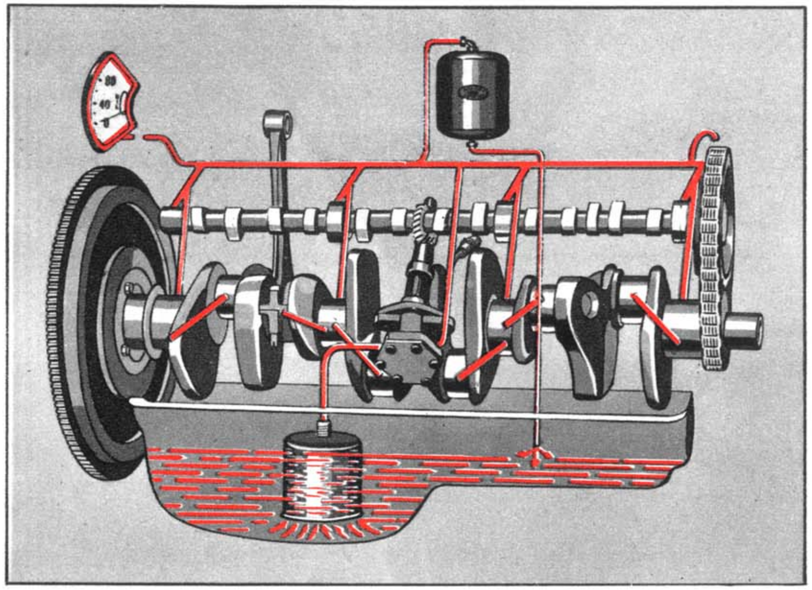


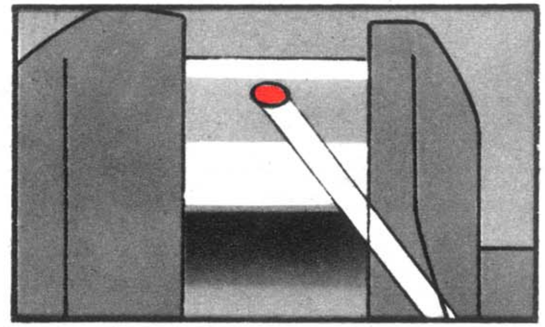
OIL IS THE *Life Blood* OF AN ENGINE

LUBRICATING oil is as vital to the operation of an automobile engine as blood is to the functioning of the human body. Without a constant flow of oil, an engine would very shortly wear itself out. And on the degree to which its lubrication system is *efficient* greatly depends how long the engine will *last!*

The film of oil which separates and prevents wear between the closely fitted moving parts of an automobile engine is *microscopically thin.* Lubricating oil obviously must be *where* it is needed *when* it is needed.

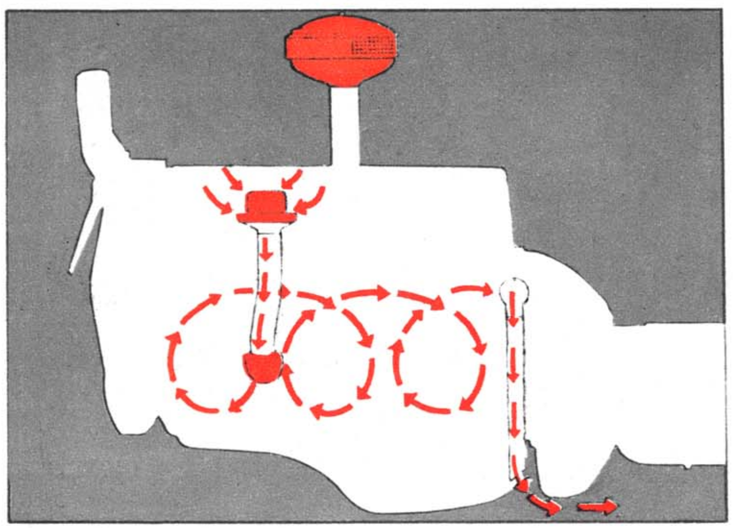
In the Plymouth engine, oil is pumped from the crankcase reservoir and forced under *positive pump pressure* to all crankshaft bearings, camshaft bearings and lower connecting rod bearings . . . for sure, safe lubrication. No reliance whatsoever is placed on so-called "splash" lubrication for any of these bearings as is the practice in some low-price cars.





In the Plymouth engine, oil is forced under positive pump pressure to all *lower connecting rod bearings* as well as to all main bearings. Not all low-price cars offer this quality feature, which is more common among *higher*-price cars. The oil passages from main bearings to connecting rod bearings are drilled through the "crank throws" of the crankshaft . . . a costly manufacturing operation, but important protection against bearing failure.

Air Cleaners, Crankcase Ventilation and Oil Filter Keep the Oil Stream *Clean!*

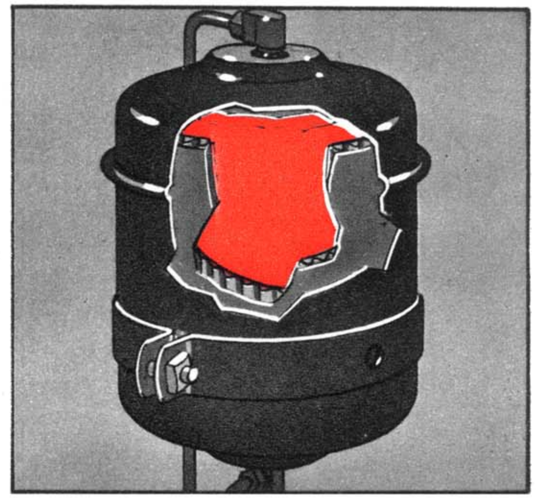


Air cleaners and crankcase ventilation safeguard against foreign matter reaching the oil stream . . . are important reasons for the Plymouth engine's long life. The circulation of air in Plymouth's crankcase ventilation system is aided by the spinning crankshaft, which acts as a fan.

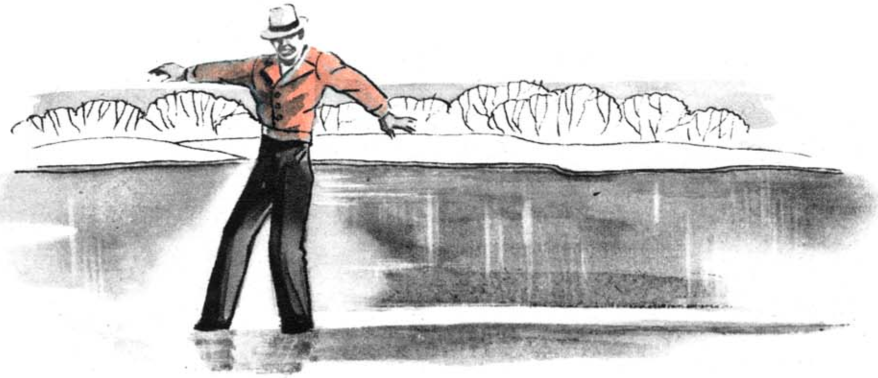
IN any engine, fuel combustion produces harmful gases which are capable of injuring fine bearing surfaces. For example, the small amount of natural sulphur contained in gasoline forms a sulphuric oxide during combustion. If this oxide has a chance to combine with water—another product of gasoline combustion—sulphuric acid may be formed in the crankcase oil reservoir.

To insure the *quick elimination* of all such harmful gases and vapors, the Plymouth engine is equipped with an extremely efficient system of crankcase ventilation.

To further protect the purity and lubricating efficiency of oil, the Plymouth engine is equipped with two copper mesh screen air filters . . . one in the carburetor intake air cleaner and the other in the oil filler tube cap. All air entering the Plymouth engine is thus cleaned of dust and grit, which might otherwise enter the oil stream and damage fine bearing surfaces.

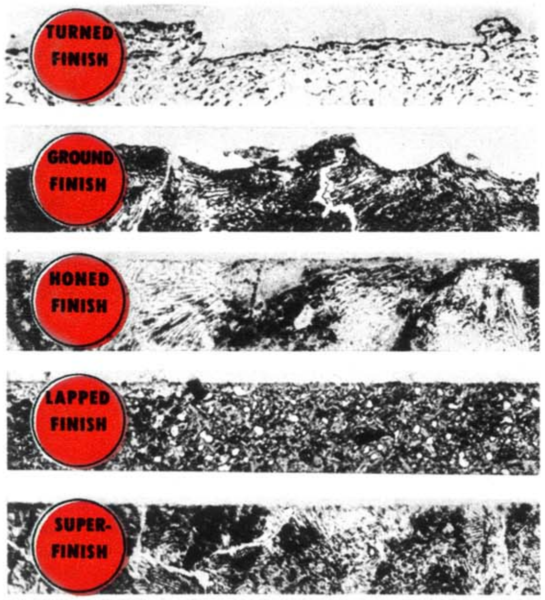


The 1940 Plymouth engine is equipped with an oil filter which cleanses the oil as it circulates through the engine, insuring for all bearing surfaces a film of lubricant which is free of abrasives.



LIKE *Ice,* SLIDING SURFACES OF AN ENGINE ARE MORE SLIPPERY WHEN THEY ARE *Smoother*

Variations in Surface Smoothness of Engine Parts Finished by Different Methods



PROFILE PHOTOS ENLARGED 750 TIMES

You can slide farther and faster on smooth ice than on rough ice because smooth ice has fewer bumps or surface projections. Rough ice will cause tiny scratches on the sole of your shoe, thus causing the leather to wear faster. This wearing action of the ice on your shoe is caused by friction. The smoother the ice the less friction there is—and the less wear occurs as a result.

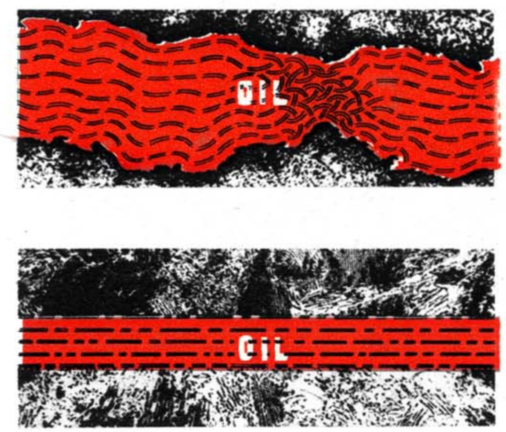
Practically all wear that occurs in an automobile engine is caused by friction between the surfaces of moving parts. And friction is increased by any tiny irregularities that occur in these metal surfaces.

SUPERFINISH, developed by Chrysler Corporation engineers, is a finishing method that produces metal surfaces so smooth that any irregularities can be measured only in millionths of an inch. Think of it! *A millionth* is *one hundred times smaller* than a ten-thousandth, a *thousand* times smaller than a thousandth of an inch.

Other methods of finishing leave irregularities *above* the hard metal surface. These irregularities puncture the oil film and *grind* against the opposite metal. But when SUPERFINISH is used, the small, *millionths-of-an-inch* irregularities that do occur are *below* the surface of the metal. Instead of puncturing the oil film, they act as tiny oil reservoirs. Parts are so free from friction that even after long service no wear is discernible.

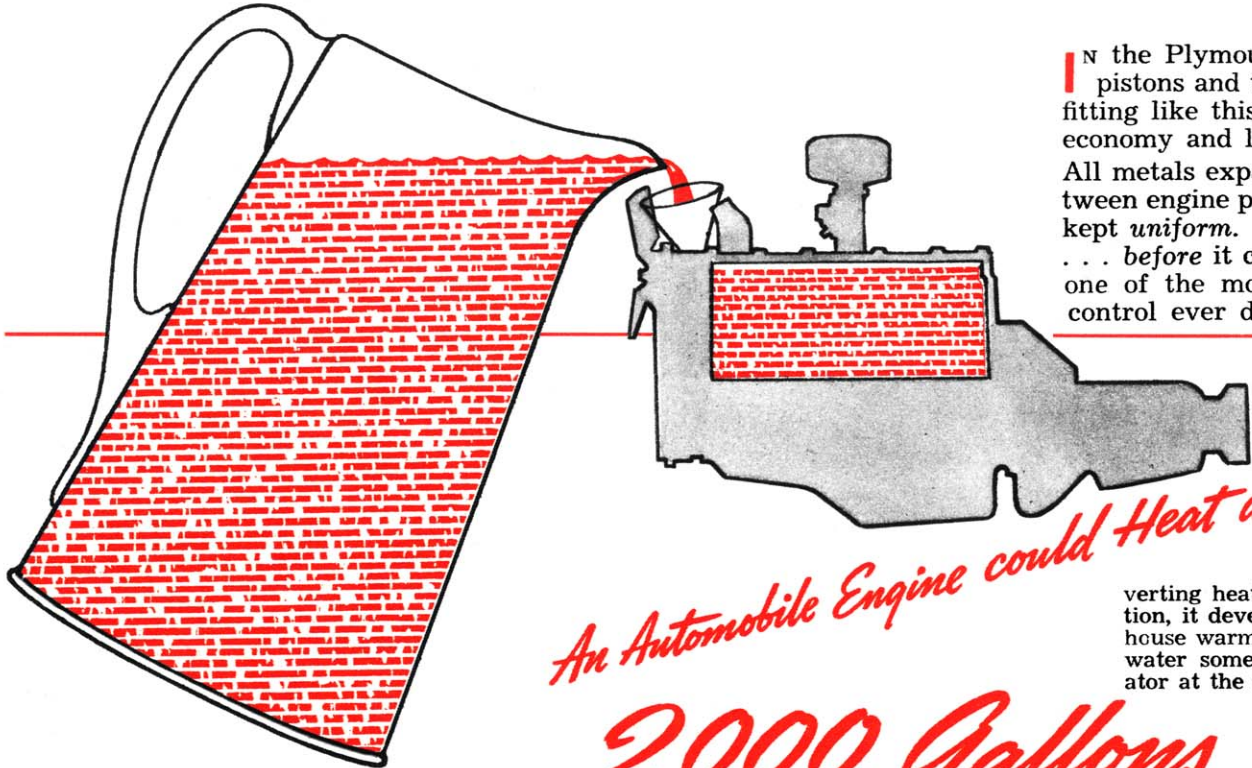
For freedom from friction, for long life, smooth operation and better lubrication, vital working parts in the 1940 Plymouth engine are SUPERFINISHED.

Without Metal-to-Metal Contact No Wear is Possible



The above illustrations show oil flowing between two moving parts. The jagged edges of the rough metal surface puncture the oil film, destroys its protective qualities and wears out the oil. The *Superfinish* surfaces have no metal projections above the bearing surface, therefore, the oil film is not ruptured and complete lubrication is assured. Any scratches will be below the bearing surface and will function as oil reservoirs.

ENLARGED PHOTOS SHOWING OIL FLOW



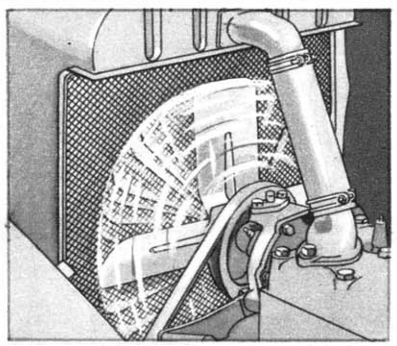
In the Plymouth engine, the clearance between the six rapidly moving pistons and their cylinders is less than *one-thousandth of an inch!* Close fitting like this greatly contributes to the Plymouth engine's smoothness, economy and long life.

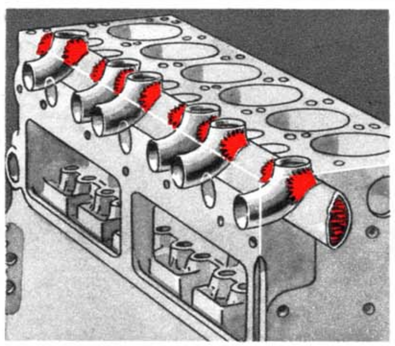
All metals expand as they are heated. To maintain proper clearances between engine parts, their temperatures—and thus their expansion—must be kept *uniform.* The terrific heat of combustion must be removed *quickly* . . . *before* it can have any destructive effect. These are the functions of one of the most advanced and efficient systems of engine temperature control ever developed.

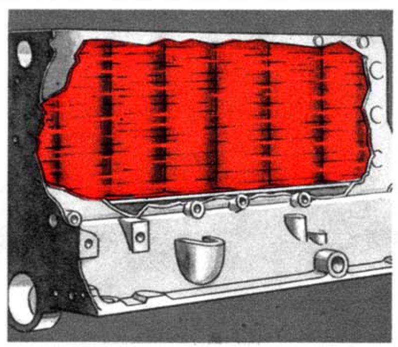
An Automobile Engine could Heat a 6-Room House

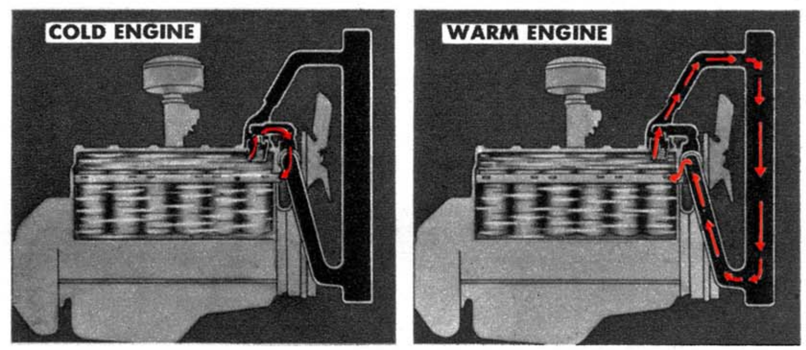
While the gasoline engine is primarily a device for converting heat (expanding combustion) into motion, it develops *enough* heat to keep a 6-room house warm. To cool this heat at higher speeds, water sometimes must flow through the radiator at the rate of 2,000 gallons an hour!

2,000 Gallons OF WATER AN HOUR PROTECT THE ENGINE FROM Heat!









Water Is Cooled in the Radiator . . .

Water carrying heat from the engine is pumped into a tank in the top of the radiator. From there, the water flows down through the passages in the radiator core. Heat from the water is dissipated through the radiator's hundreds of metal surfaces into the air, passing through openings between them. A large fan insures an adequate volume of air passing through the radiator openings.

. . . Distributed by a Tube . . .

In the Plymouth engine, each of the six cylinder-and-valve units receives an individual supply of cooling water at high pressure—fresh from the radiator—through one of six outlets in Plymouth's modern water distributing tube. By this advanced, *directional* circulation, all parts of the Plymouth engine are cooled the same! Not all low-price car engines are equipped with a water distributing tube.

. . . Circulated in Hollow Jackets

By means of *full length* water jackets, each cylinder of the Plymouth engine is cooled uniformly *throughout* its length. Thus temperature and expansion are approximately the same at the *top* of cylinders as at the *bottom.* Plymouth's full length water jackets extend the life of cylinder walls, pistons and piston rings . . . prevent loss of compression and excessive oil consumption.

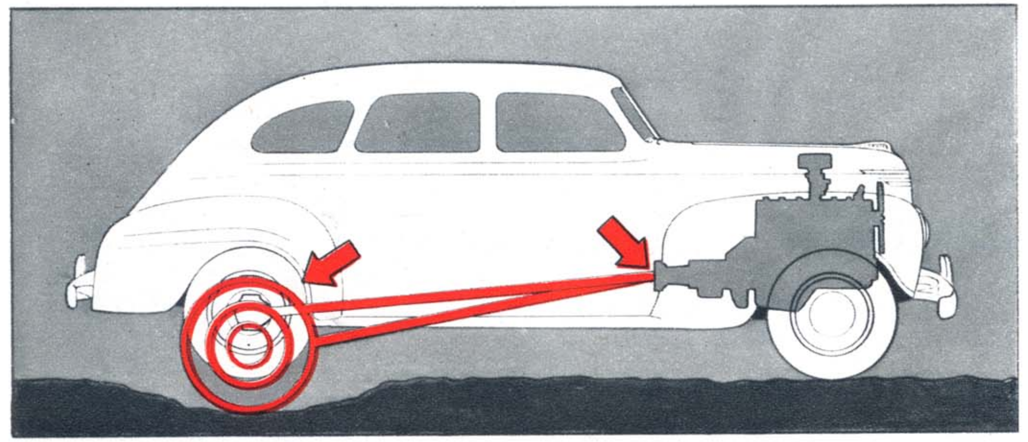
A Thermostat Regulates Circulation

The Plymouth cooling system is designed to maintain the engine at proper operating temperature. This involves more than *cooling* the engine, for when the engine is started cold it is desirable to warm it to the proper temperature as *quickly as possible.*

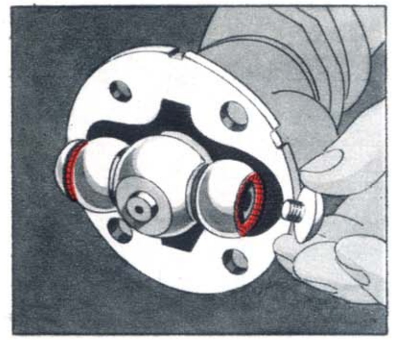
This is accomplished by the use of a thermostat control which prevents water in the engine from entering and flowing through the radiator until the engine has reached the proper operating temperature.

In the De Luxe Plymouth, a *by-pass* thermostat is used. As shown in the diagrams above, this type thermostat allows the water in the engine to *circulate* during the warm-up period... thus promoting fast warm-up and uniformity of temperature throughout the engine.

FROM CRANKSHAFT TO REAR WHEELS . . . . . POWER IS TRANSMITTED AS A *Twisting Force*



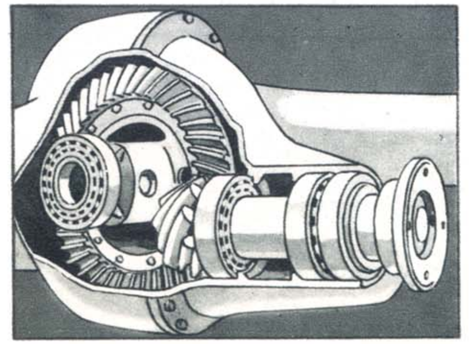
Universal Joints Provide Flexible Linkage for the Propeller Shaft

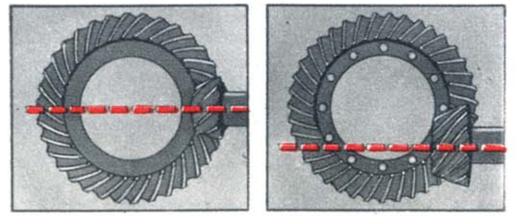


When the car is traveling on the road, up-and-down movement of the rear wheels is *constantly changing* the angle of the propeller shaft at the transmission and rear axle. Therefore the universal joints—which provide flexible connections at these points—are extremely hard working units. While another low price car provides plain bushings in these units, Plymouth engineers specify expensive roller bearings in the universal joints . . . to reduce friction and wear to a minimum and provide quiet operation.

The Rear Axle Gears Change the Direction of Turning From Sidewise to Forward

In the picture of the rear axle below, the casing, or "housing," is cut away to show how the pinion gear, actuated by the propeller shaft, drives the ring gear, with which the differential gears, axle shafts and rear wheels revolve.



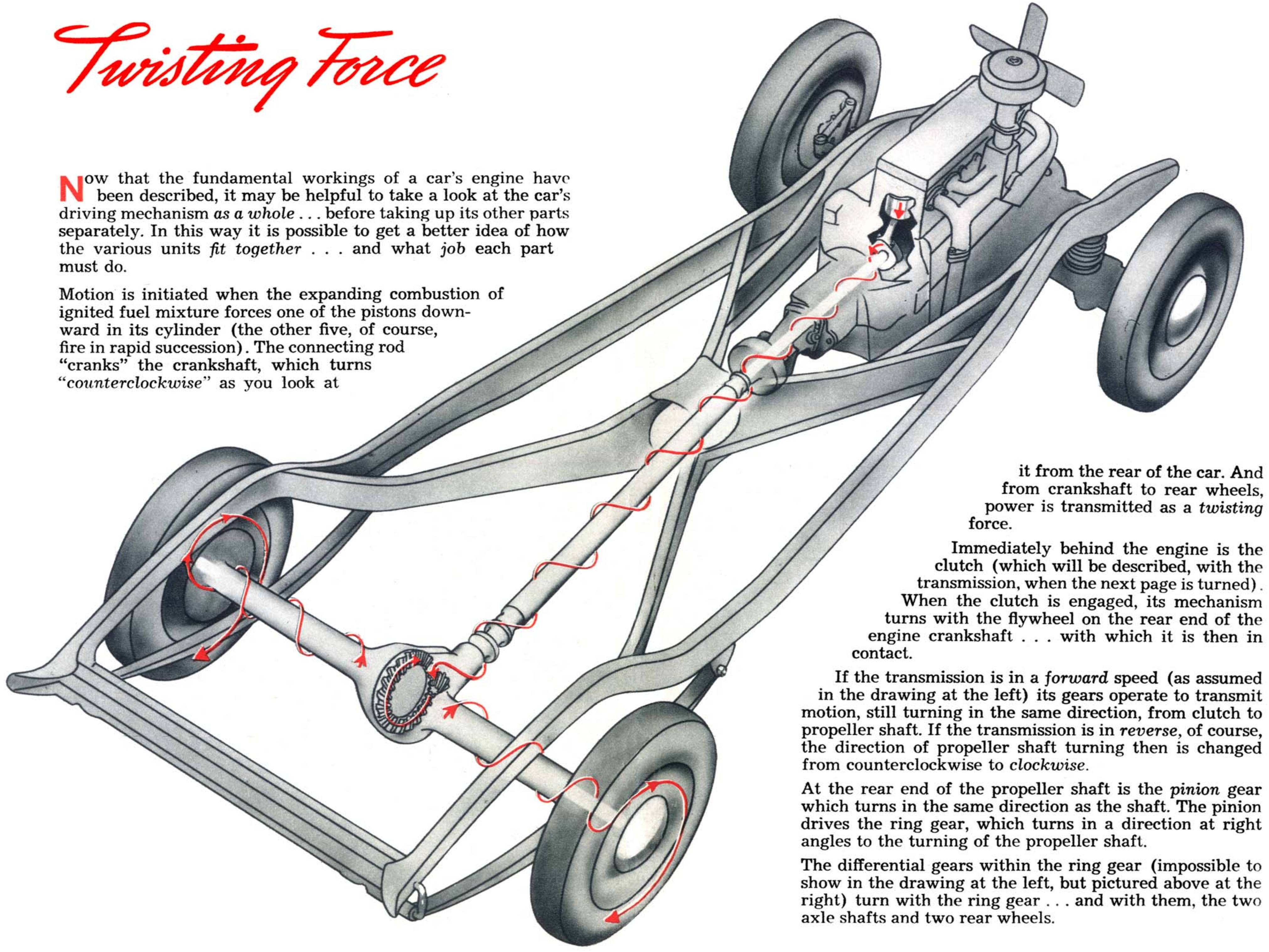


A Hypoid Rear Axle Lowers the Propeller Shaft . . .

In Plymouth's hypoid rear axle (above, right), the pinion gear is mounted *below* the center of the ring gear, lowering the propeller shaft and thus making possible a low rear compartment floor *without* a tunnel or "hump." Also much stronger and quieter.

Now that the fundamental workings of a car's engine have been described, it may be helpful to take a look at the car's driving mechanism *as a whole* . . . before taking up its other parts separately. In this way it is possible to get a better idea of how the various units *fit together* . . . and what *job* each part must do.

Motion is initiated when the expanding combustion of ignited fuel mixture forces one of the pistons downward in its cylinder (the other five, of course, fire in rapid succession). The connecting rod "cranks" the crankshaft, which turns "*counterclockwise*" as you look at it from the rear of the car. And from crankshaft to rear wheels, power is transmitted as a *twisting* force.

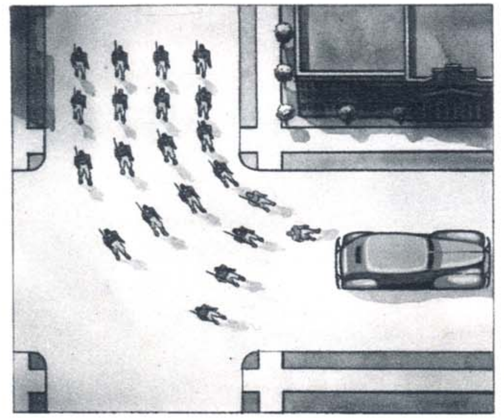


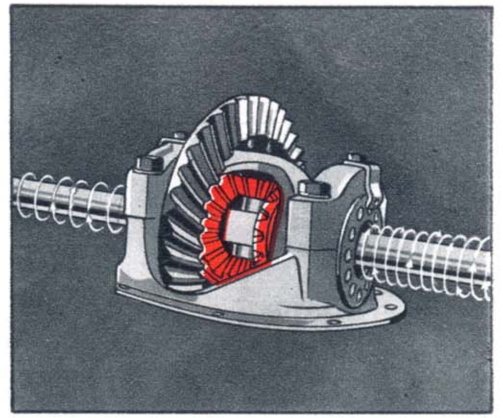
Immediately behind the engine is the clutch (which will be described, with the transmission, when the next page is turned). When the clutch is engaged, its mechanism turns with the flywheel on the rear end of the engine crankshaft . . . with which it is then in contact.

If the transmission is in a *forward* speed (as assumed in the drawing at the left) its gears operate to transmit motion, still turning in the same direction, from clutch to propeller shaft. If the transmission is in *reverse*, of course, the direction of propeller shaft turning then is changed from counterclockwise to *clockwise*.

At the rear end of the propeller shaft is the *pinion* gear which turns in the same direction as the shaft. The pinion drives the ring gear, which turns in a direction at right angles to the turning of the propeller shaft.

The differential gears within the ring gear (impossible to show in the drawing at the left, but pictured above at the right) turn with the ring gear . . . and with them, the two axle shafts and two rear wheels.





Differential Gears Allow One Rear Wheel to Turn Faster or Slower Than the Other . . .

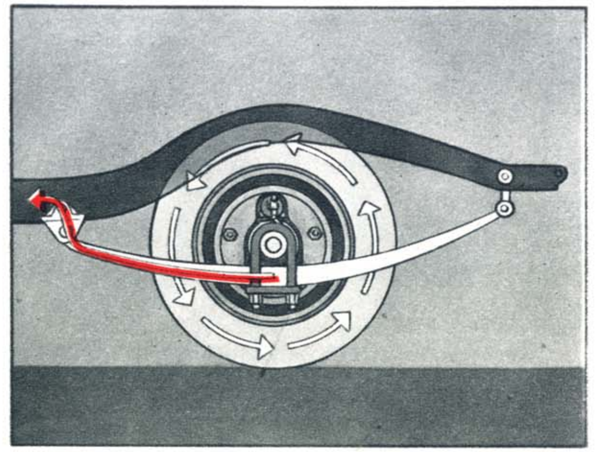
When a row of marching men turns a corner, the man on the *inside* of the turn must take *short* steps, almost marking time . . . while the man on the *outside* must take *full* steps and walk a much greater distance to complete the turn.

And when a car turns a corner, the wheels on the outside of the turn likewise must revolve faster and travel a greater distance than the wheels on the inside. The front wheels, of course, are not connected with each other and thus are free to revolve at different rates.

For the rear wheels to turn at different speeds, however, it is necessary that their individual axle shafts be connected with the ring gear in such a manner that each shaft can turn at a *different* rate and *still be driven by the engine*. This is the function of the "differential gears," whose purpose is not generally understood. A little study of the picture above at the right will show how they work.

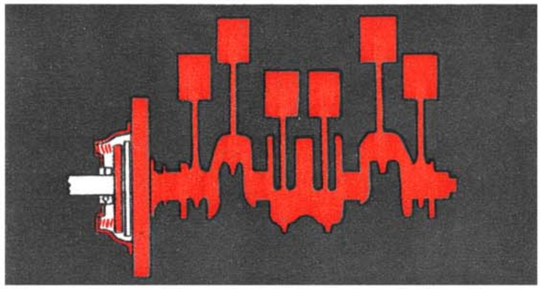
To maintain gears in proper alignment and thus protect the long life of the rear axle, Plymouth uses adjustable *tapered* roller bearings for mounting the differential assembly and pinion shaft. A *tapered* roller bearing also is used at each rear wheel.

Rear Springs Cushion Starting Forces in the Hotchkiss Drive . . .



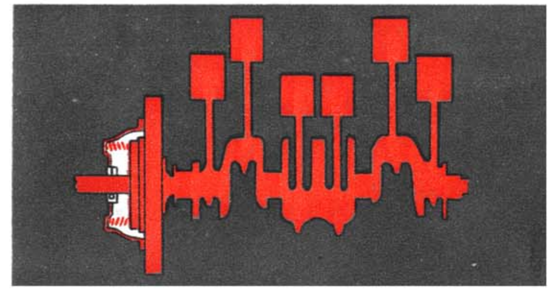
In the Hotchkiss drive, the propelling force of rear wheels is transmitted from the rear axle to the frame through the *rear springs*. Designed for such service, the rear springs *cushion* the shocks of starting and stopping and thus make an important contribution to Plymouth's smooth *performance* as well as its smooth *Luxury Ride!*

When a phonograph record is held above a revolving turntable, there is no frictional contact between the two and the revolution of the turntable has no effect on the record. This is similar to a disengaged clutch.



When the clutch pedal is depressed, the driving disc is separated or "disengaged" from the revolving pressure plate and flywheel on either side of it. Turning of the crankshaft, flywheel and pressure plate has no effect on the driving disc and transmission, which remain stationary.

When a phonograph record is lowered onto a turntable, frictional contact with the turntable causes the record to turn with it much as the elements of a clutch turn together when in frictional contact.



When the clutch pedal is released, powerful springs force the pressure plate forward and the three elements of the clutch are pressed or "clutched" together. Frictional contact with pressure plate and flywheel causes driving disc and transmission to revolve with the engine.

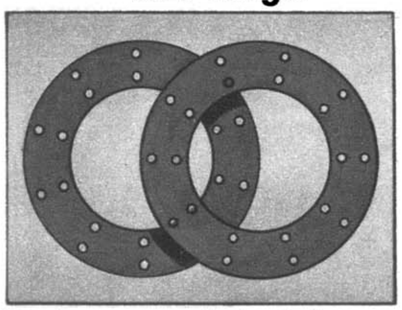
PLAYING A *Phonograph Record* ILLUSTRATES HOW A CLUTCH TRANSMITS POWER

A CLUTCH transmits turning force from crankshaft to transmission by *frictional contact* . . . the same reaction which causes a phonograph record to spin when you place it on a revolving turntable.

Because a car's clutch must disengage and engage every time gears are shifted and must transmit the full force of engine torque to the transmission and driveshaft, its mechanism is one of the hardest-working parts of a car. An understanding of its operation is essential to full appreciation of the advantages of Plymouth clutch's advanced design.

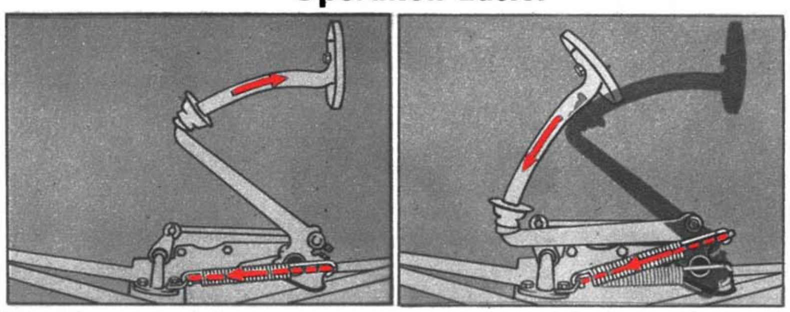
The clutch is composed of three major elements: (1) the engine flywheel face; (2) the driving disc, with a "facing" of woven asbestos riveted to each side of the disc; and (3) the pressure plate. These three elements are pressed or "clutched" together in frictional contact by powerful springs bearing against the back of the pressure plate. While thus engaged, the flywheel is connected with the transmission. Depressing the clutch pedal disengages these elements. The flywheel then revolves *free* of the driving disc and is not connected with the transmission.

Larger Facings Tend to Last Longer

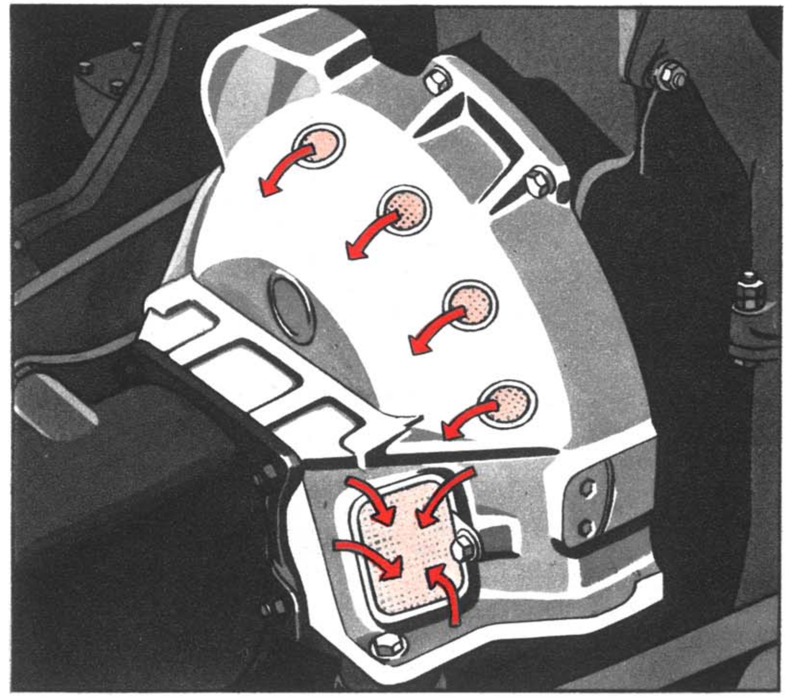


The two woven asbestos facings on the Plymouth driving disc are the largest used by any one of the three leading low-price cars . . . 9¼ inches in diameter. Larger facings naturally are more efficient.

An Over-Center Pedal Spring Makes Clutch Operation Easier



The Plymouth clutch is equipped with an over-center pedal spring which *augments* the driver's pressure on the clutch pedal. Depressing the clutch pedal a short distance raises this spring *over* the center of pedal pivot. The "pull" of this over-center spring then *opposes* the action of clutch springs holding the clutch in engagement . . . thus making it easier for the driver to disengage the clutch.



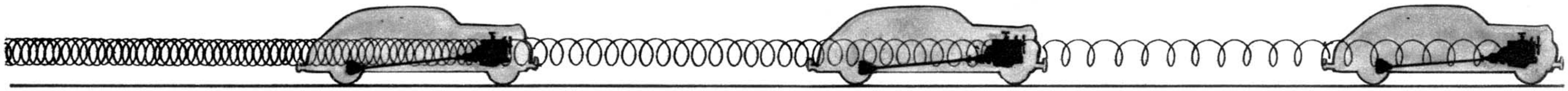
Ventilation Removes the Heat of Friction

Because a clutch transmits power through frictional contact and friction produces heat. Temperature control is important to the efficiency and life of a clutch mechanism. To quickly remove heat before it can have any destructive effect, the Plymouth clutch is provided with an exceptionally efficient ventilating system.

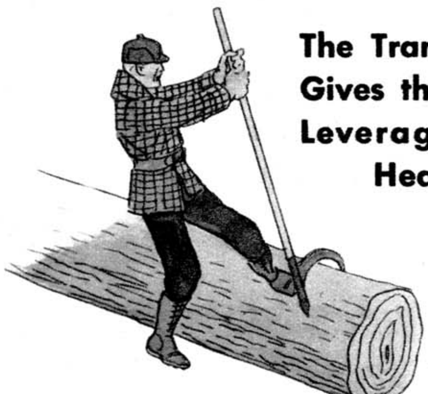
Cooling air is drawn in through a screened intake opening, is circulated throughout the mechanism by the centrifugal fan action of ribs on the pressure plate . . . and is forced out through outlets in the forward end of the clutch housing.

AT A GIVEN SPEED, THE ENGINE RUNS NEARLY

3 TIMES AS FAST IN *Low*... 2 TIMES AS FAST IN *Second*... AS IN *High Gear*



The Transmission Gives the Engine Leverage to Do Heavy Work

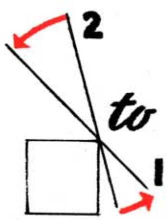


Just as a *lumberjack* needs leverage to start a heavy log rolling, an automobile's *engine* needs leverage to easily do *its* heavy work . . . such as starting the car from a stand-still, pulling the car up a steep grade.

Gears Are a Form of Lever

You can double your ability to move an object by so arranging a bar-type lever on a pivot point (fulcrum) that the distance you pull one end of the lever is twice the distance the other travels to move the object.

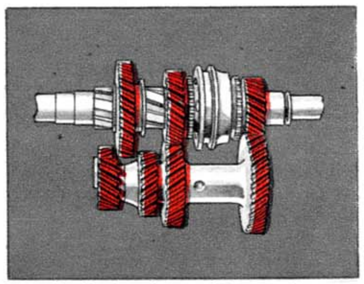
You can increase your ability to turn a gear and its shaft by employing a smaller gear to drive it. If the size of the smaller, driving gear is half that of the larger gear as shown below, you turn the smaller gear twice to revolve the larger gear once . . . doubling your ability to turn the larger gear and its shaft.



The purposes of a car's transmission is to make the power of the engine more effective at low speeds and to allow the car to be backed up without reversing the engine. The *principle* of the transmission is explained in the box at the left; *how it works* is diagramed in the box at the right.

The outstanding characteristics of the Plymouth transmission are its long life, its quietness and its ease of operation. For long gear life, the gears in Plymouth's All-Silent transmission are *carburized Amola steel* . . . combining the strength and toughness of Amola steel with the extremely hard, long-wearing surface produced by carburizing.

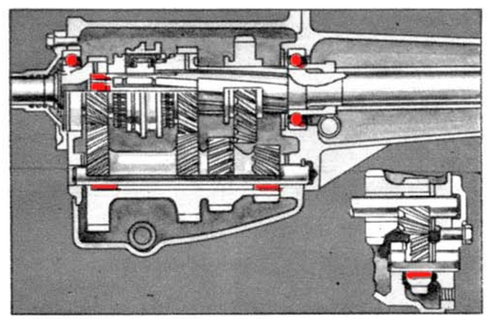
Helical Gears Throughout Transmission Produce Quiet Operation in Every Speed

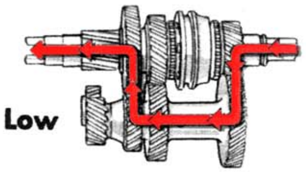


In the Plymouth all-silent transmission, all gears are *helically* cut for quiet operation in *every* speed. Cut at an angle, gear teeth *slide* into engagement and tooth contact is more *continuous* than when gear teeth are cut straight across . . . as in the noisier spur-type gears formerly in general use.

Anti-Friction Bearings Maintain Gears in Proper Alignment

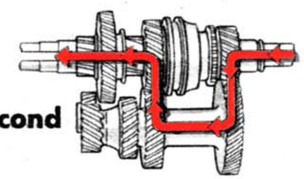
All gears in the Plymouth transmission operate on anti-friction bearings. The mainshaft turns on two ball bearings and one roller bearing, the countershaft on two roller bearings, the reverse idler gear on a roller bearing. Wear is reduced to a minimum by these six quality anti-friction bearings.





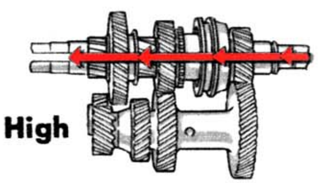
Low

When the shift lever is in low gear position, turning motion is transmitted through the gears as indicated by the arrows above. In this low gear, the engine crankshaft revolves 2.57 times to turn the propeller shaft *once*.



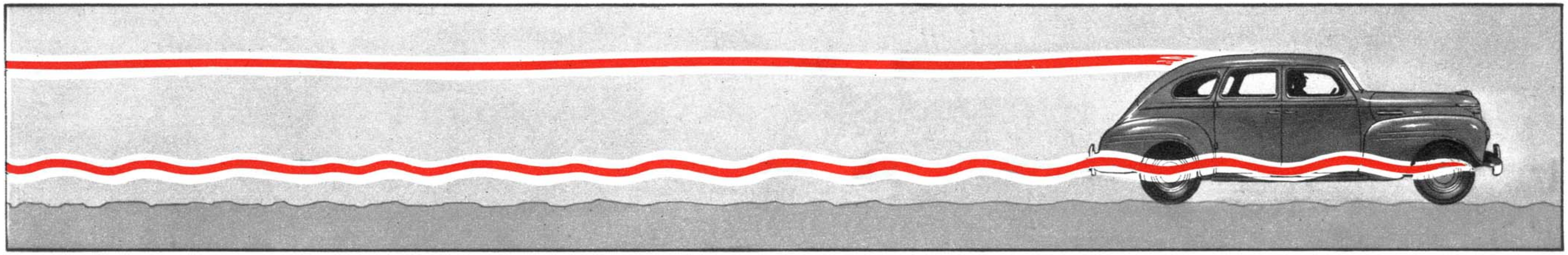
Second

In second gear, the course of turning motion through the transmission is above. The crankshaft revolves 1.55 times to turn the propeller shaft *once*.



High

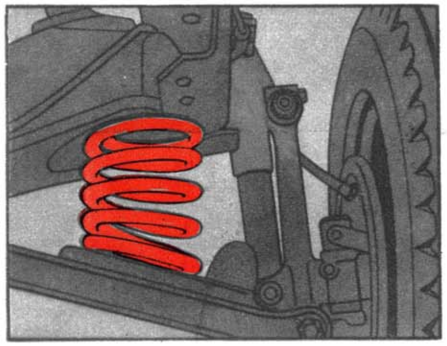
In high gear, there is a direct drive between the engine and the propeller shaft as indicated in the diagram. Ratio is 1 to 1.

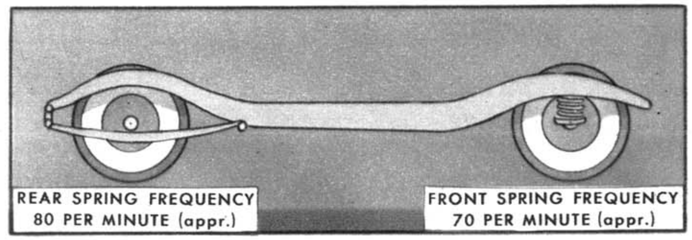


THE CAR FLOATS OVER THE ROADBED ON MORE THAN *Thirty Feet* OF STEEL SPRINGS

IF Plymouth's two front coil springs were uncoiled to their full length and laid end-to-end with Plymouth's long and flexible rear springs, the total length of Amola steel springs on which a Plymouth rides would be found to be more than thirty feet!

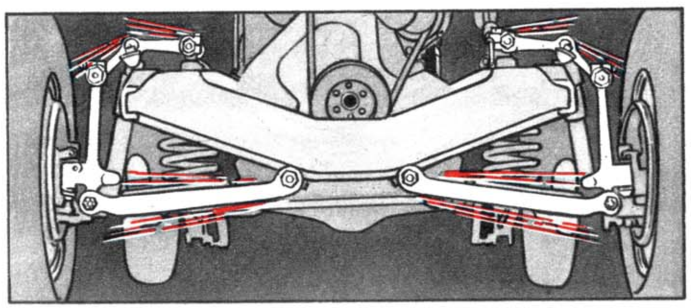
Greater spring *length* usually contributes to softer spring *action* . . . and Plymouth is outstanding among low-price cars in this important respect.





Each Coil Spring Is Formed From a Rod Nearly 11 Ft. Long

Plymouth's coil-type front springs are made of Amola steel, which combines great strength and toughness with extremely soft action. The rod of Amola steel from which each spring is coiled is *10 feet 8 inches long!* Of "All Three" makes of low-price cars, only Plymouth and one of the other two offer coil-type front springs. Only Plymouth, however, offers it in *all* its passenger car models!



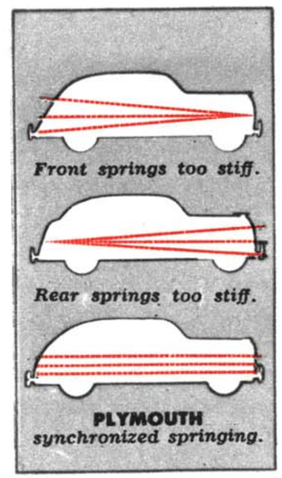
Front Wheels Independently Conform to Irregularities . . .

Because Plymouth's front wheels are independently mounted and are equipped with separate springs, each wheel is free to *independently* move up and down . . . and conform to road irregularities *without* disturbing the action of the other front wheel. Each front wheel spring mechanism can thus do its job more efficiently!

Balanced Weight and Balanced Springing Produce a Level Ride . . .

In the 1940 Plymouth, the Amola Steel coil springs at the front have approximately the same *rate and frequency* of up and down movement as the tapered leaf Amola steel springs at the rear. And front springs carry approximately the same amount of *weight* as do the rear springs . . . balanced distribution!

With balanced weight and balanced springing, all parts of the Plymouth car ride the *same* . . . the same comfort for passengers in both front and rear seats. It's a level ride, with remarkable smoothness and steadiness . . . a ride that's hard to describe but most pleasant to experience. Truly, it's the *Luxury Ride!*

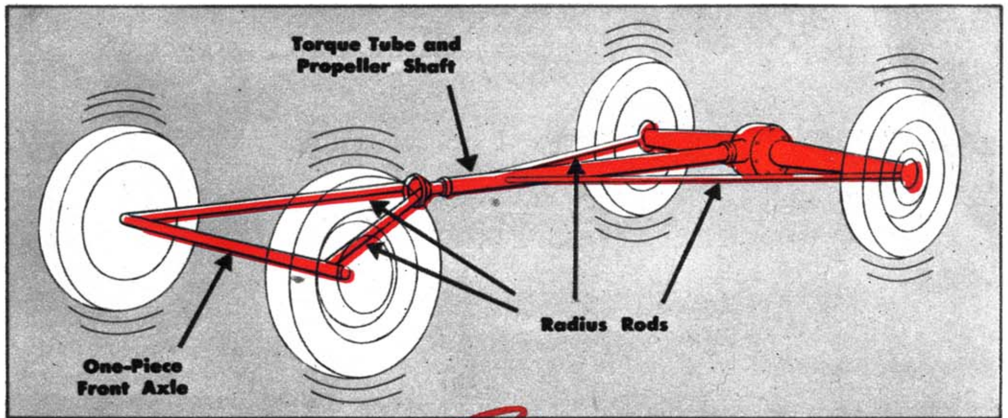


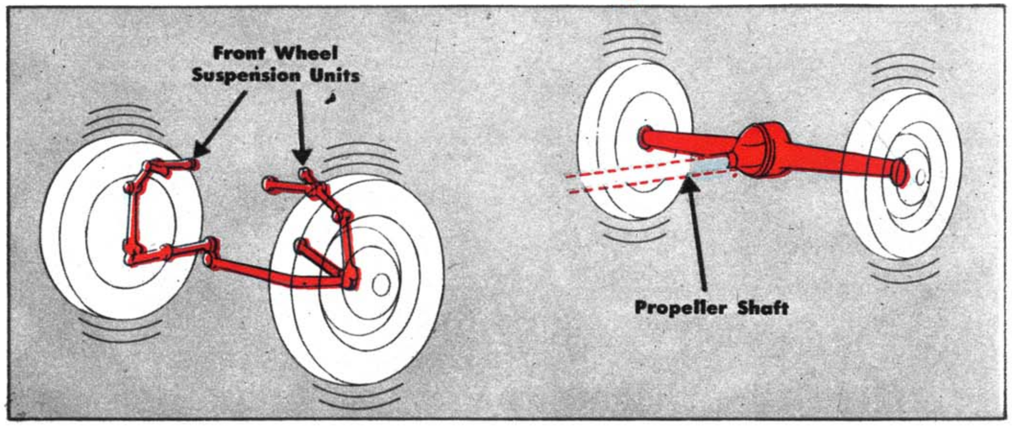
Front springs too stiff.

Rear springs too stiff.

PLYMOUTH *synchronized springing.*

LOW UNSPRUNG WEIGHT MAKES WHEELS *Lighter*...





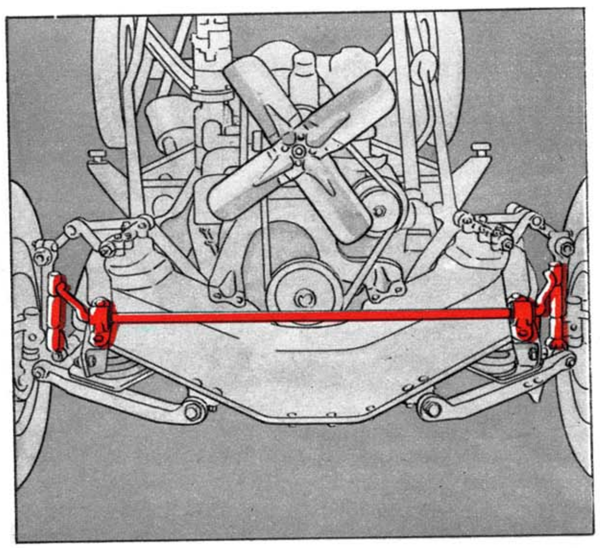
.... *Easier* FOR A CAR'S SPRINGS TO CONTROL

THE less unsprung weight there is bouncing up and down with a car's wheels, the *easier* it is for springs and shock absorbers to *control* wheel movement and produce a soft, smooth ride.

"Sprung" weight may be roughly defined as the portion of a car's weight which is carried on its springs . . . the weight of frame, body, engine, etc. The remainder of a car's weight is "unsprung" weight . . . wheels, tires, rear axle, etc. This is the weight that moves up and down with the wheels as they follow road irregularities. Of course the weight of several parts of the chassis is partly sprung and partly unsprung . . . that of the propeller shaft, for example, which rests on the transmission at the front and on the rear axle (which is supported only by the rear wheels) at the rear. Likewise, only part of the weight of the control arms supporting the front wheels of a car with independent front wheel suspension like Plymouth's is unsprung weight . . . as part of the weight of these arms rests on the *frame*.

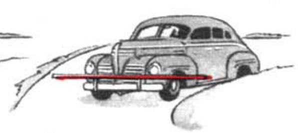
Because Plymouth follows the practice of high-price cars in employing independent front wheel suspension and the Hotchkiss drive, its unsprung weight is remarkably low. Of "All Three" low-price cars, only Plymouth has neither a front axle, a torque tube, nor radius rods adding to the unsprung weight of the car.

The Sway Eliminator Is a *Fifth Spring*



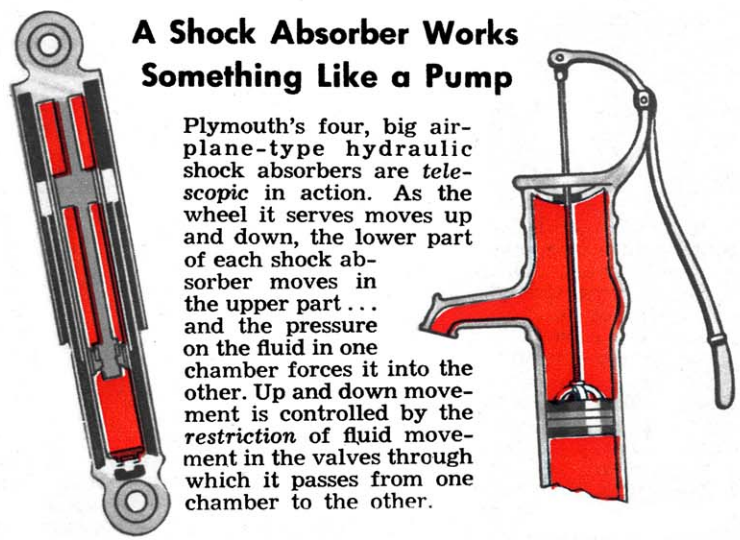
To prevent the body from leaning to one side when rounding a curve, the DeLuxe Plymouth employs a sway eliminator . . . a torsion bar which is in effect a fifth spring. For maximum efficiency, it is located at the *front* of the car . . . where any change in forward motion first affects stability.
The sway eliminator is a steel bar mounted on the frame through rubber bushings and linked at either end to the coil spring lower seat. Thus connected, this bar operates to hold frame and body parallel with the road level. It has to be twisted before frame and body can lean to one side. The steel sway eliminator bar *resists* twisting, of course, and thus tends to keep the body on an *even keel*.

A car's body tends to lean on curves.



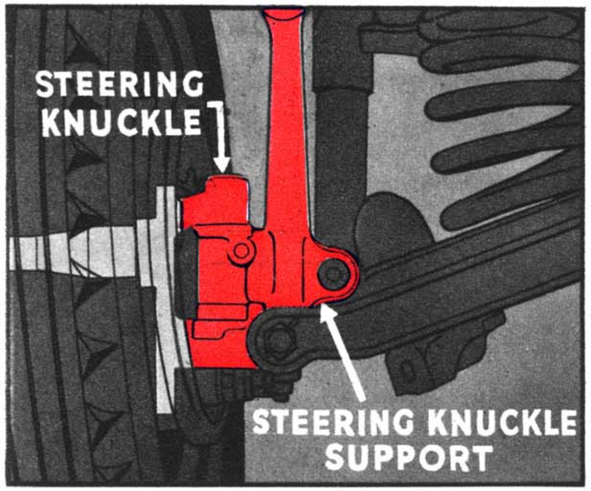
A sway eliminator keeps body level.

A Shock Absorber Works Something Like a Pump



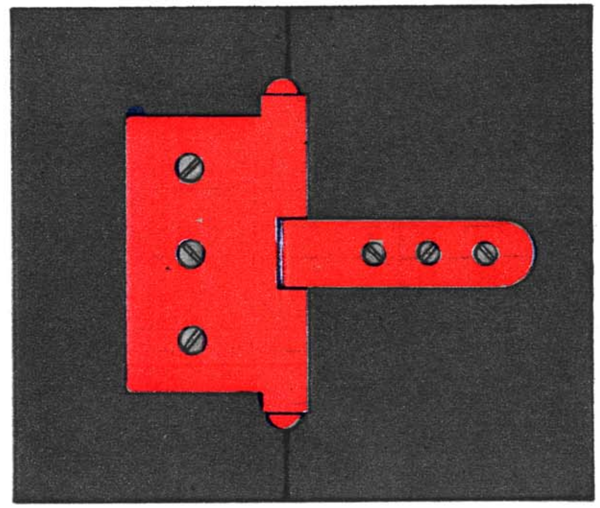
Plymouth's four, big airplane-type hydraulic shock absorbers are *telescopic* in action. As the wheel it serves moves up and down, the lower part of each shock absorber moves in the upper part . . . and the pressure on the fluid in one chamber forces it into the other. Up and down movement is controlled by the *restriction* of fluid movement in the valves through which it passes from one chamber to the other.

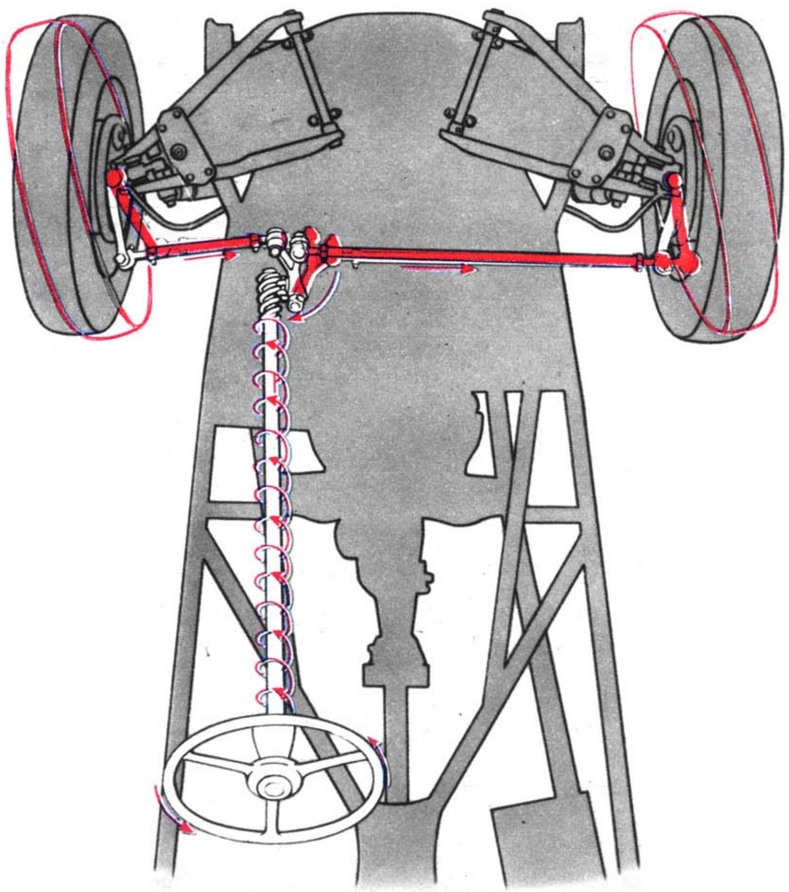
STEERING KNUCKLES ARE SIMILAR TO *Door Hinges*

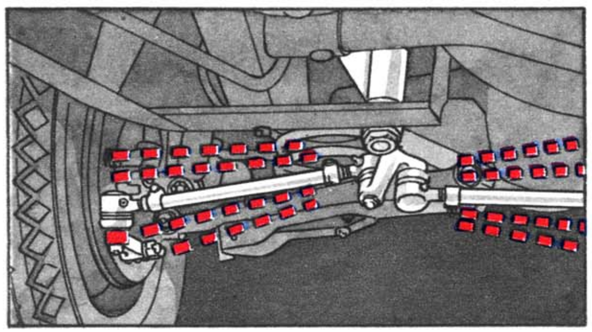


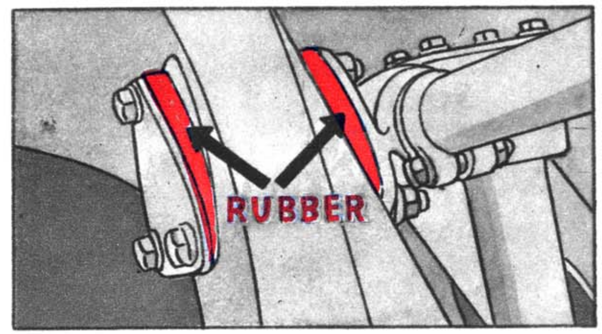
THE steering knuckle and steering knuckle support assembly on which a car's front wheels are mounted is much like one of the hinges on which a door is hung . . . as you can see by comparing the drawing at the left with the one at the right. How a car's steering mechanism functions when the driver operates the steering wheel to turn the front wheels on their hinge-like steering knuckles, is explained in the simplified diagram below.

A shaft inside the steering column jacket turns with the steering wheel. The turning of a worm (spiral) gear on the forward end of the shaft causes the "V"-shaped pitman arm to swing sideways. Tie-rods connect the pitman arm with the wheel steering arms. Sidewise movement of the tie-rods thus causes either wheel to turn in the direction the driver steers.









Separate Tie-Rods Banish Steering Wheel Shock

One of the important advantages of Plymouth's independent front wheel suspension is that the steering gear Pitman arm is *separately* connected with the steering arm on either wheel . . . by means of *individual* tie-rods. A one-piece tie-rod and a drag-link are eliminated thus improving steering geometry!

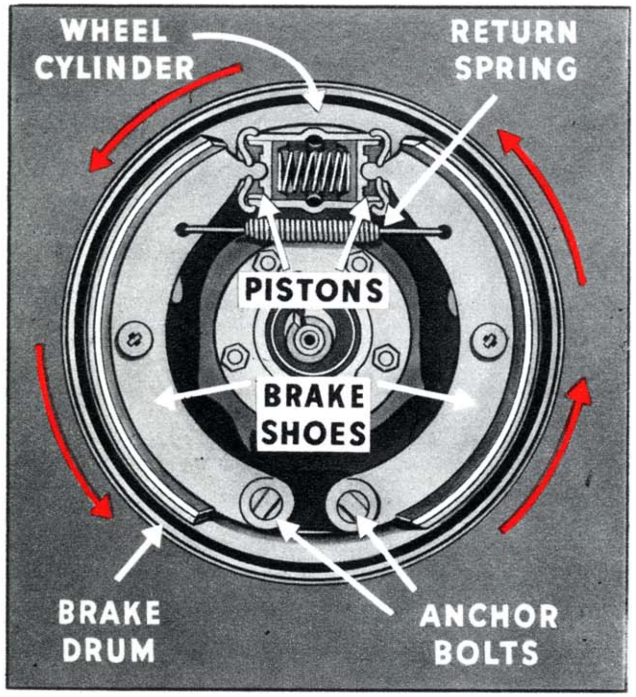
The two tie-rods are *hinged* in their connection with the steering gear Pitman arm and with the wheel steering arms by means of ball joints. They are thus free to move up and down with the wheels *without* shaking the Pitman arm! As a result, the driver of a Plymouth is safeguarded against road shock at the steering wheel . . . a source of much fatigue.

Rubber Mounting Insulates Steering Gear From Frame

To prevent chassis vibration from reaching and being felt in the steering wheel, the Plymouth steering gear is *rubber mounted* . . . completely insulated from the frame.

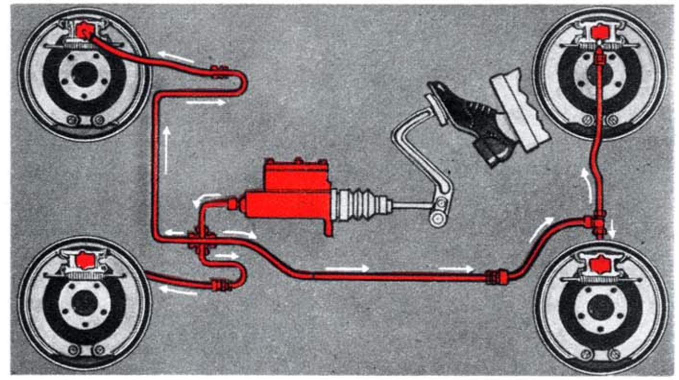
Further contributing to driving pleasure and safety is the easy handling obtained by Plymouth's generous use of expensive anti-friction bearings in the steering mechanism. There are two tapered roller thrust bearings in the gear, a roller bearing on the roller tooth and a ball thrust bearing in each steering knuckle . . . all combining to insure easy positive steering for a long period . . . and greater owner satisfaction during the car's life.

The steering gear ratio of the 1940 Plymouth is exceptionally high—18.2 to 1. This high ratio makes parking as well as steering on the road exceptionally effortless.



The simple mechanism shown at the left is perhaps *the most important single part of a car!* It is the wheel brake—a device for producing and utilizing friction—and on the accuracy and dependability of its action the safety of a car greatly depends.

In a hydraulic brake system, pressure exerted on the brake pedal at the master cylinder is transmitted instantly and equally to all four wheels . . . through tubing leading to the cylinder in the top of each wheel brake. In the wheel cylinder, hydraulic pressure forces the two opposed pistons *outwards* . . . thus forcing the two brake shoes to which the pistons are connected out against the revolving brake drum which is fastened to and turns with the wheel. Friction between the brake shoe facings and the drum retards its turning or stops it altogether, depending on how fast the car is going and how much pressure the driver exerts at the brake pedal. When pressure is released, the return spring pulls the brake shoes in away from the drum.



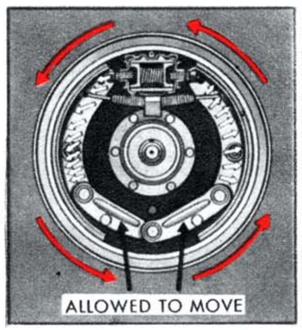
It's important to know that the diagram at the left is of a *Plymouth* wheel brake, for not all cars have brakes like Plymouth's. *Every Plymouth built* has had hydraulic brakes! And it is only to be supposed that other types of hydraulic brakes more recently developed for use in low-priced cars would differ from Plymouth brakes, and that their differences are important to the low-priced car buyer.

EACH WHEEL BRAKE IS A *Friction Machine*

When a driver applies the brakes, he can measure and regulate stopping force only by means of "pedal feel."

Anchoring brake shoes at bottom effectively prevents development of any harmful degree of "self-energizing" action.

If brake shoes are allowed to be moved around by friction of revolving drum, they "wedge" against drum . . develop uncontrolled braking force.



Stopping Is Measured by "Pedal Feel"

It is by "pedal feel," of course, that the driver measures and regulates the amount of stopping force he produces with his foot pressure.

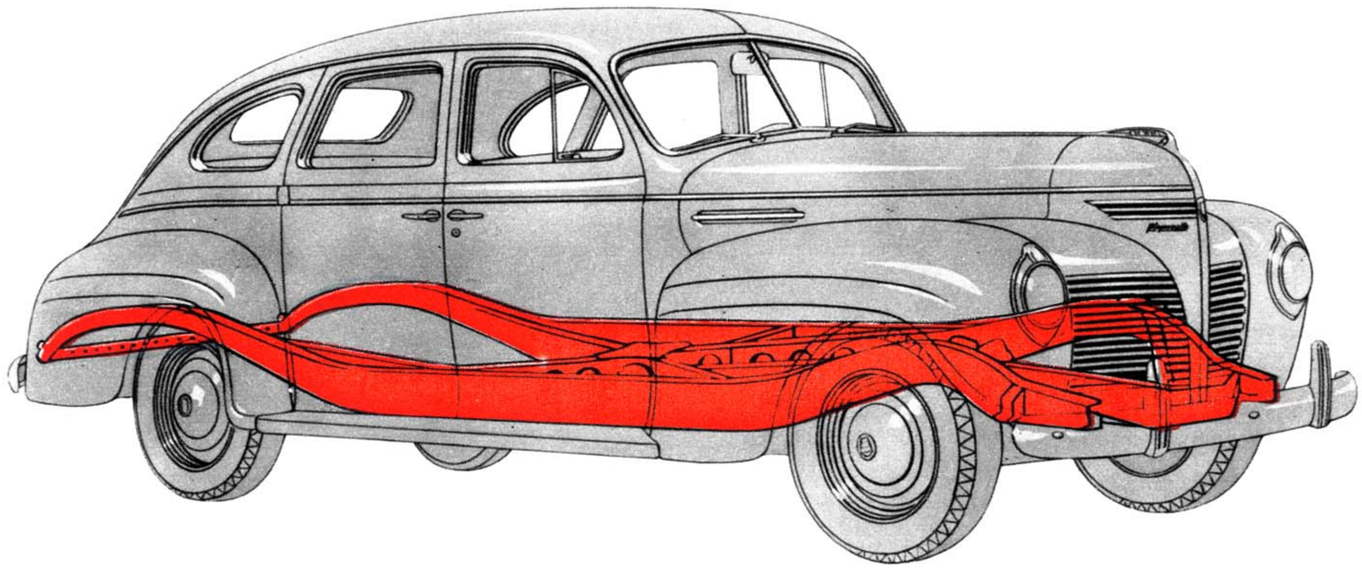
When driving on slippery roads, for instance, the driver applies foot pressure cautiously, gingerly . . . "feeling" the brake pedal with his foot, in order to avoid overbraking and skidding the tires.

To *prevent* the development of any harmful degree of "self-energizing" action in Plymouth brakes, each brake shoe is firmly anchored at the bottom. Hydraulic pressure in the brake cylinder—operating each shoe by an individual piston—is the *only* force employed in this design to produce brake action.

In some brakes, however, the shoes are *not* anchored in position and a "wedging" or "self-energizing" action between shoes and drum *by itself* develops considerable braking force in the wheel brake . . . *in addition* to braking force produced by the driver's foot pressure on the brake pedal. Naturally, the driver cannot determine by the "pedal feel" when this independent braking action is about to take hold.

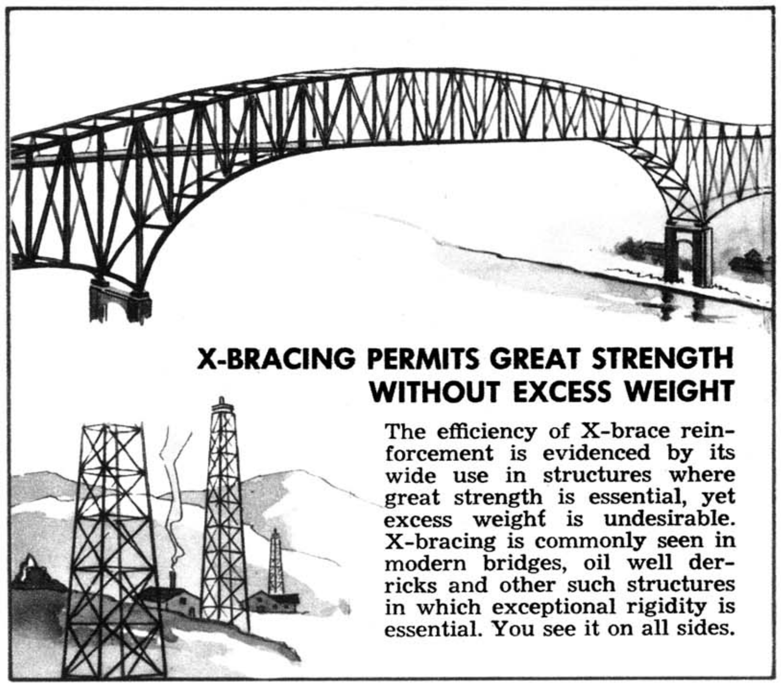
Modern, hydraulic brakes are so effortless to operate that the brake pedal is properly described as a "control." In a Plymouth this control is *accurate*. Plymouth's "positive control" type hydraulic brakes are responsive to the lightest pressure on the pedal, yet are designed to never develop more braking action than the amount measured by "pedal feel." They operate with a *precision* which minimizes the possibility of under-braking or over-braking.

THE FRAME IS THE *Structural Foundation* OF THE ENTIRE CAR



An automobile's frame is the backbone of its chassis, the foundation on which its body is mounted. The design and construction of the frame are therefore of great importance. It must be exceedingly strong and rigid . . . *and yet not be so heavy as to impair the car's performance!*

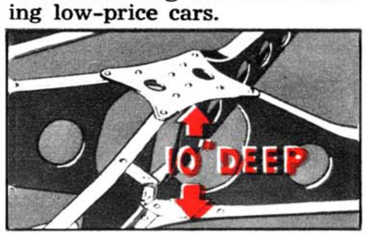
Builders of bridges, oil well derricks and other structures which have to withstand extraordinary stresses and strains have for many years used the X-brace type of construction to obtain exceptional strength and stiffness. And the advantage of an X-brace in an automobile frame is clear. The X-member is ideally shaped to withstand the diagonal thrusts imposed on the frame structure by changes in the car's direction of movement, uneven road shocks, and other stresses and strains.



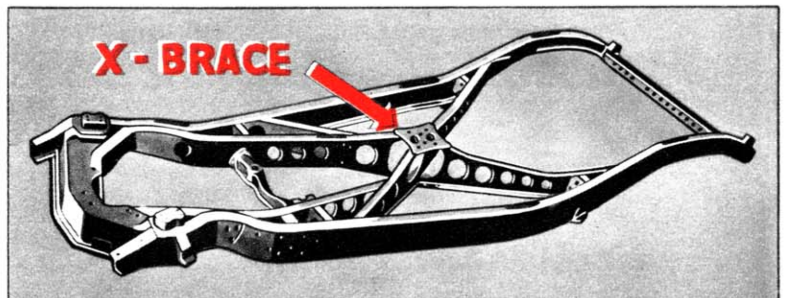
X-BRACING PERMITS GREAT STRENGTH WITHOUT EXCESS WEIGHT

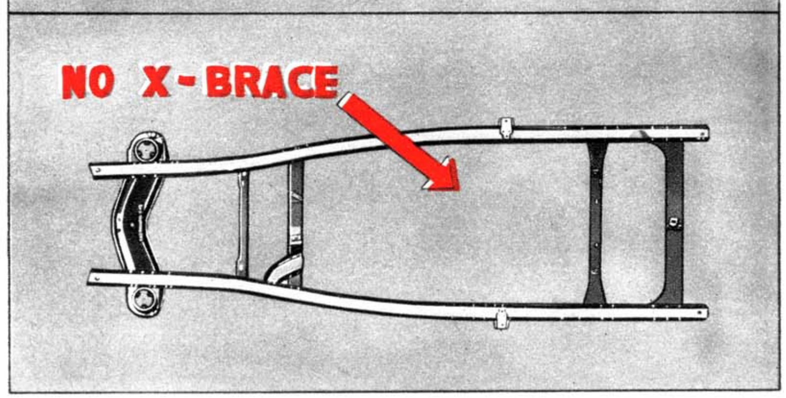
The efficiency of X-brace reinforcement is evidenced by its wide use in structures where great strength is essential, yet excess weight is undesirable. X-bracing is commonly seen in modern bridges, oil well derricks and other such structures in which exceptional rigidity is essential. You see it on all sides.

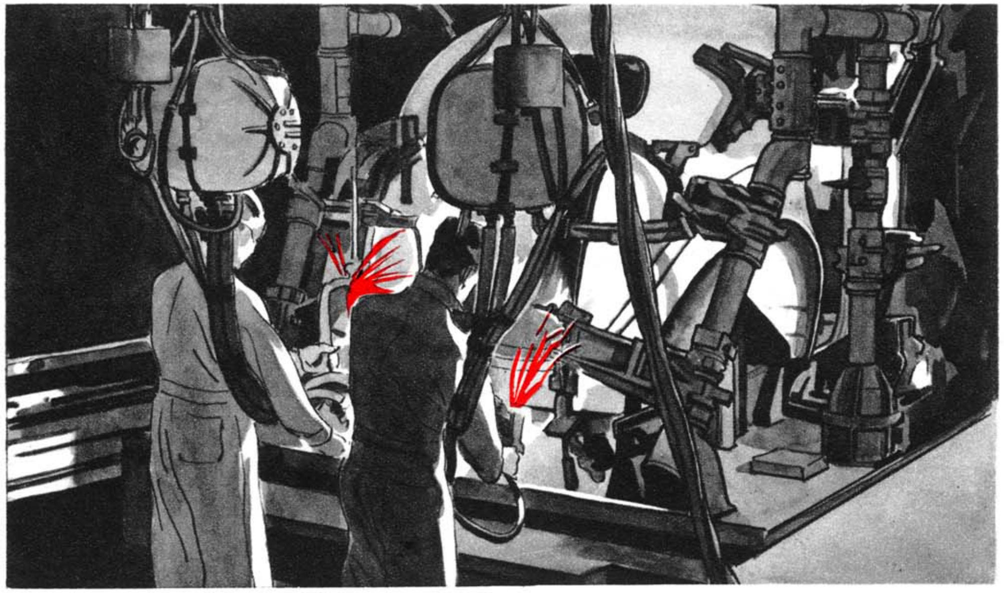
The X-brace section reinforcing the center of the Plymouth frame is unusually massive and strong. The diagonal members crossing to form the "X" meet directly in the center. Here, in the center of twisting forces, the frame is ten inches deep. The side rails of the Plymouth frame are a full six inches deep, highly unusual among the three leading low-price cars.

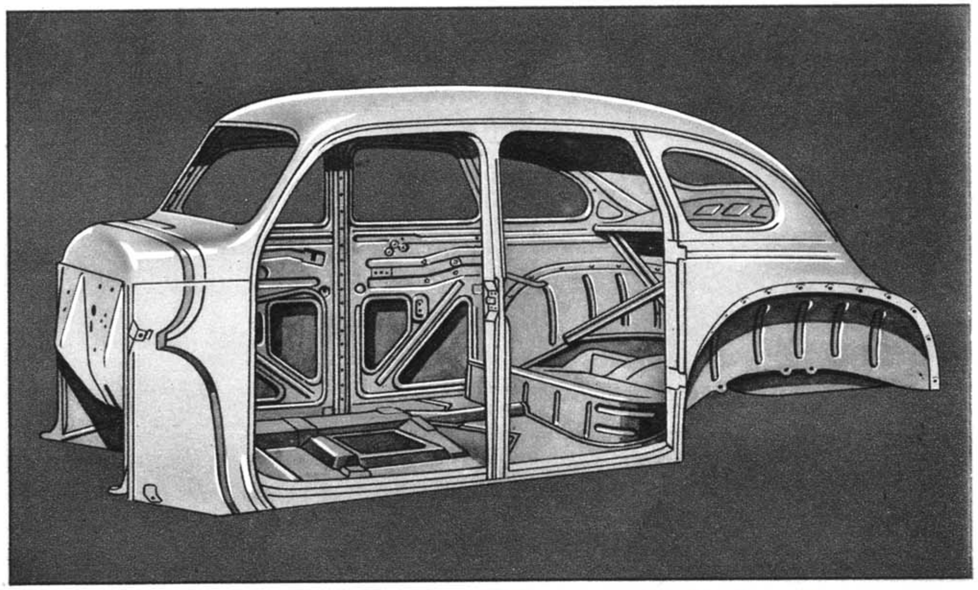


Although an X-brace frame is an important construction feature of almost every high-price car, not all low-price cars have an X-braced frame as Plymouth does. The drawing at the right shows the lack of diagonal reinforcement in a frame which has no X-brace.









400 LBS. OF STEEL WELDED INTO A *Rigid Unit*

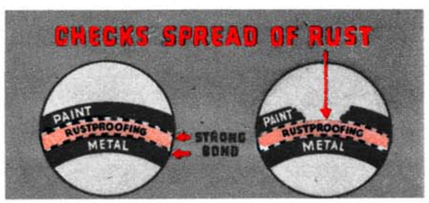
IN the body of the 1940 Plymouth, steel floor, steel pillars, steel panels and one-piece steel top are all welded into one solid, rigid unit of great strength. Within, it is reinforced by sturdy steel bracing which gives the Plymouth Safety-Steel body the added strength for which it is famous.

Box-section construction gives tremendous strength to center posts and corner posts, and their wide flare at the roof contributes great rigidity.

At the front of the body, Z-bar bracing at top and bottom of cowl sides unites corner posts, cowl and floor into an exceptionally strong structure.

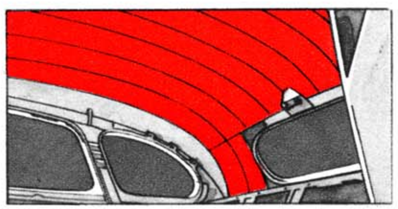
The all-steel doors are of welded construction and are stiffened against the possibility of sagging by sturdy diagonal braces. In all these ways, the Plymouth body is engineered for *extra reinforcement* at points of greatest stress and strain!

Because of its importance, rustproofing is provided for the fenders and sheet metal parts of *most* cars. However, not all low-priced cars, provides, as Plymouth does, this protection for the finish of the *entire* car—rustproofing fenders, sheet metal parts *and body* thus preserving its original beauty!



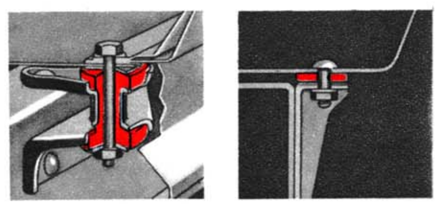
COMPLETE RUSTPROOFING

Beneath the finish of a Plymouth, the metal surface is covered with a special rustproof coating which forms an unusually strong bond between the steel and surface finish. If the finish ever should be chipped or scratched—by a flying stone, for instance—the rustproofing on the steel checks the undermining spread of rust.



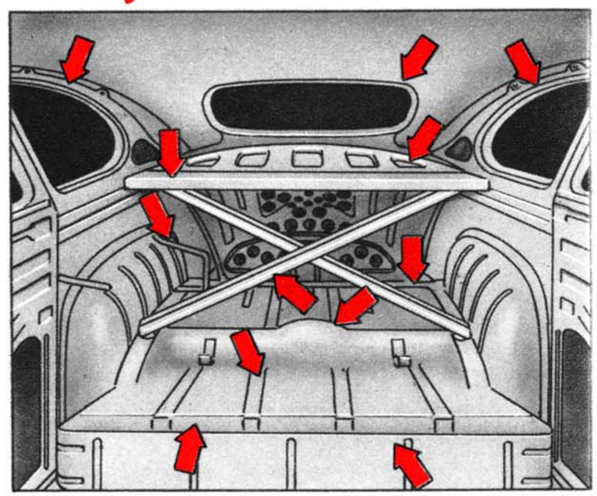
SCIENTIFIC INSULATION

In all, five different insulation materials—in addition to rubber—are used to soundproof and weatherproof the Plymouth body. To each section of the body is applied the type of insulating material proven by tests to be best for absorbing the noises that could be developed or transmitted at that point.



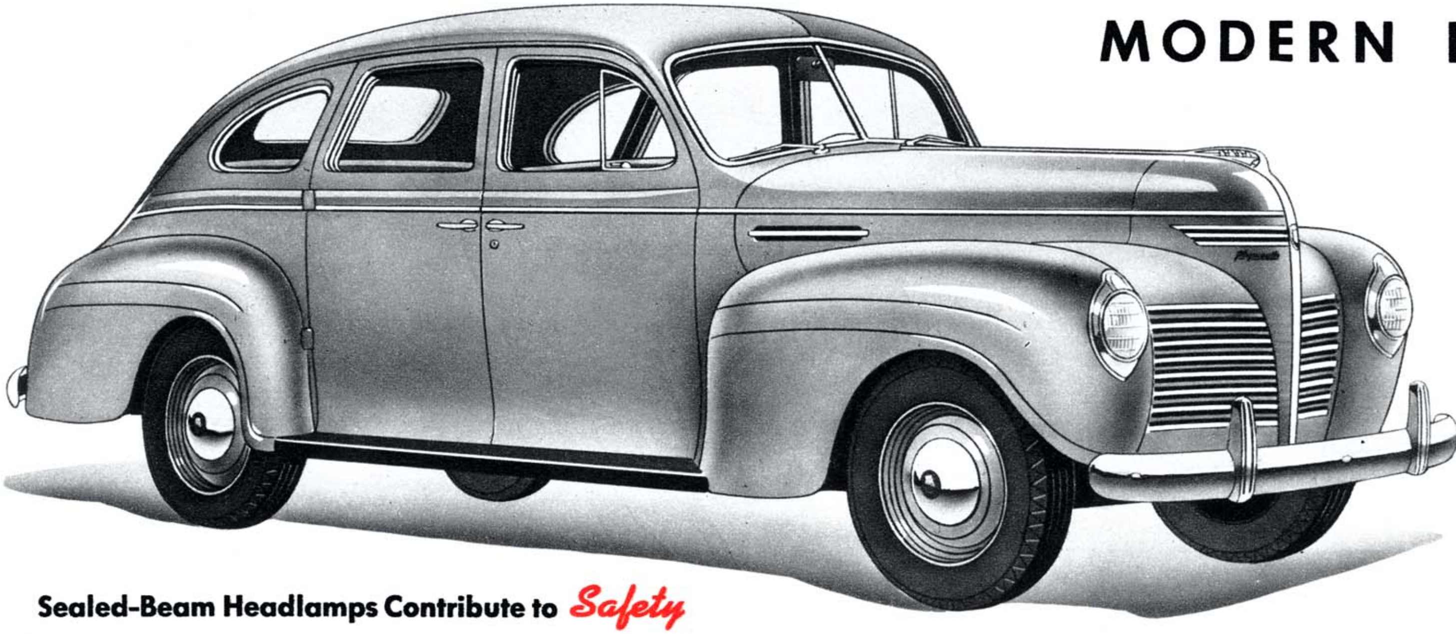
RUBBER CUSHION BODY MOUNTINGS

Plymouth's body is mounted on spools of live rubber (above, left). The rubber cushions prevent metal-to-metal contact between body bolt and frame bracket. In some cars (above, right) a body bolt makes direct metal-to-metal contact between frame and body even though a rubber pad is used.



EXTRA BRACING AND REINFORCEMENT GIVE ADDED MARGIN OF STRENGTH

Behind the rear seat of sedan models, a massive X-brace is welded to either side of the body—contributing extra strength and stiffness to the rear section. Heavy braces extend from the rear of rear quarter windows down to the inside of wheel housings below. Massive reinforcing brackets in the lower rear corners add further strength to the rear structure. For rigidity, the steel floor is formed with rib sections, a type of construction used to stiffen flat sections throughout the body interior.



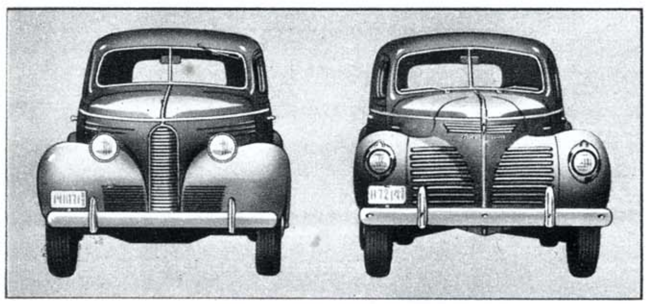
Sealed-Beam Headlamps Contribute to *Safety* as Well as to Modern Streamlining

MODERN BEAUTY IS BORN

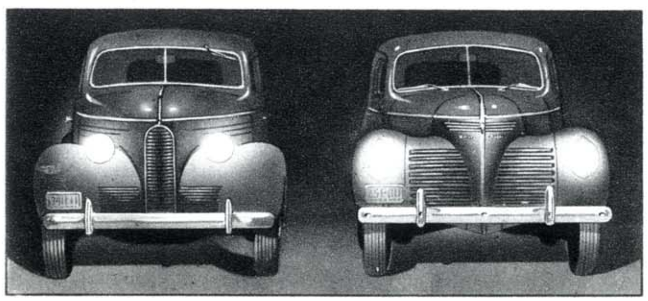
NATURE "designed" fish to swim swiftly and easily through water . . . "designed" birds to fly with the least wind resistance. Artists and engineers, architects and scientists call

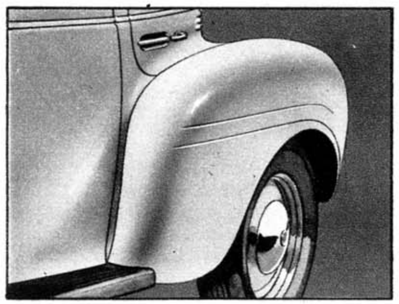
this Functional Design, *form dictated by function.*

Functional Design is expressed in the clean, efficient lines of the modern



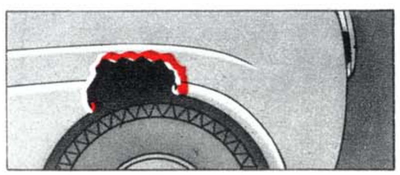
The headlamps set low and streamlined into the sweeping front fenders are smartly modern in appearance. But even more important, they are designed to light up more of the road at night . . . to show the approaching motorist *the full-width of the car.* Sealed-Beam headlamps give better light, longer lamp life than former type lights.





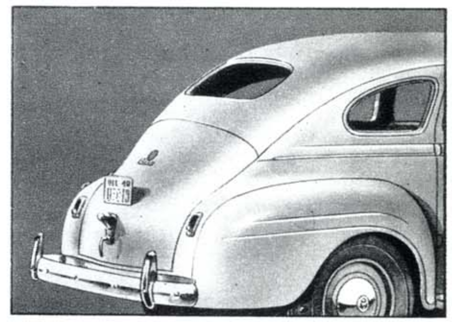
Fender Edges Are Formed to Give *Reinforcement*

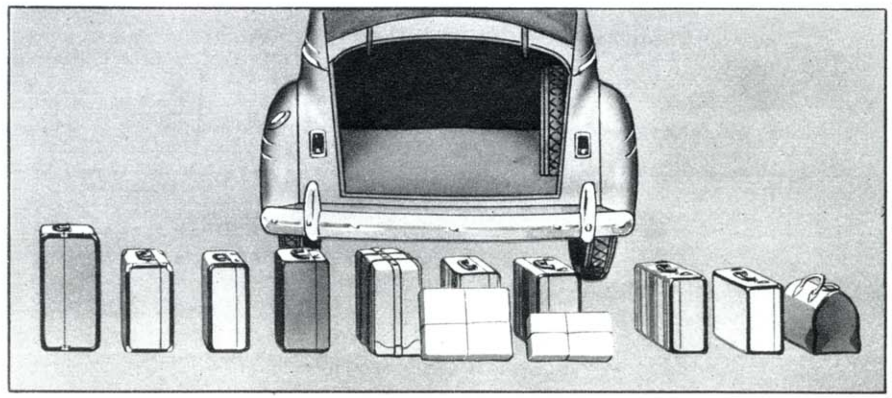
The fender edges that accent the graceful shape of Plymouth fenders are basically *functional.* For the outer fender edge is wrapped under to give added *reinforcement* to the fender, as well as to resist tearing.



Flowing Rear Lines Produce an Abundance of *Luggage Space*

By giving the car smooth curves at the rear, Plymouth designers achieved more than smartness of appearance . . . and more than streamlining efficiency! Inside, there is an *abundance* of room for luggage. Every piece of the luggage shown below can be packed in the roomy 1940 Plymouth trunk!

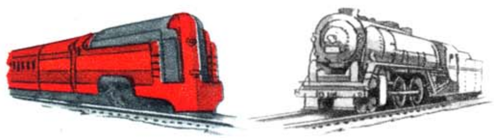




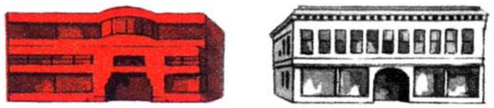
OF *Functional Design*

airliner . . . the smooth shape of the modern train . . . the simplified design of the modern building. *It is this same Functional Design which gives the 1940 Plymouth its dynamic, modern beauty!*

For everywhere you look in this brilliant new car, you find that form follows function . . . from the smarter,



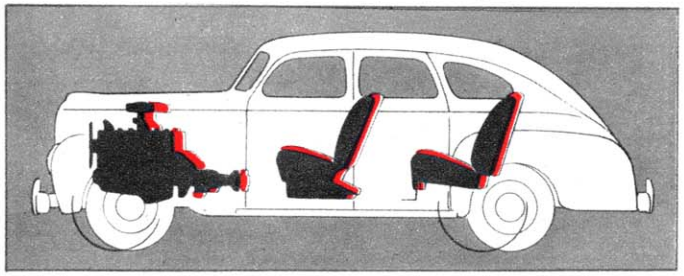
more efficient ventilating sections at the front to the smoother, *more-room-*



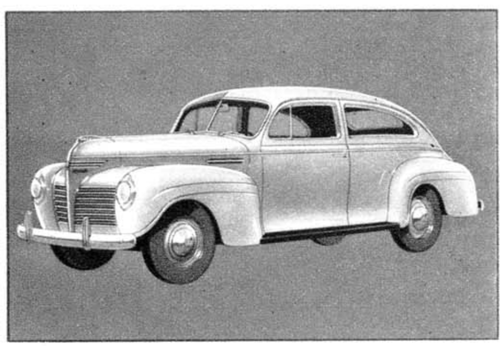
producing lines at the rear. Design with a purpose enriches the interior, too. Extra inches of room to stretch and relax contribute to spacious proportions. And many an interior detail is as outstanding for its beauty as for its *convenience!*

Scientific Weight Redistribution Formed These Dynamic Proportions

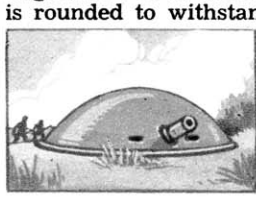
By moving engine and seats forward in the car, Plymouth engineers achieved better balanced weight for a smoother, more level ride. But at the same time, they gave Plymouth its dynamic, aggressive proportions!

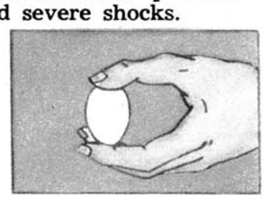


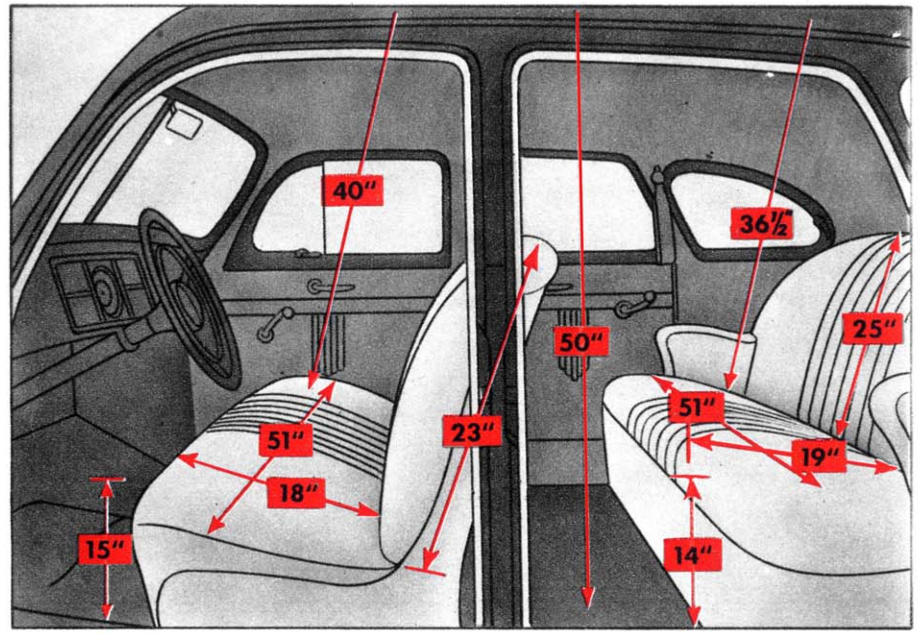
Shaping the Body for *Structural Strength* Added to Its Style



The rounding curves of the Plymouth body are characteristic of its modern appearance. But *more* important, they are curves contributing to structural strength . . . just as the shape of an egg gives its shell the strength to defy crushing when held end to end between the fingers . . . or as modern warfare's "pill-box" is rounded to withstand severe shocks.

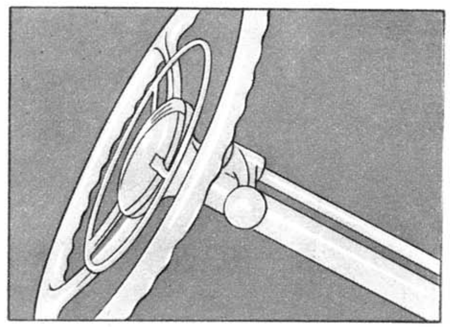






Comfort and Convenience Dictate Interior Design

Throughout the interior of the big new Plymouth, comfort and convenience for driver and passengers were the primary objects of design. Thus Plymouth has chair-height seats to permit a natural and easy sitting position . . . a level rear compartment floor, with no tunnel or "hump" to take up useful space and trip passengers . . . the extra inches of headroom, legroom, seat room and shoulder room so important to the full enjoyment of motoring in *comfort!*

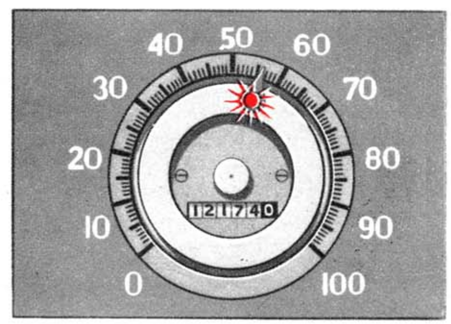


The Smart Appearance of this New Gearshift Is Equalled Only by Its *Practical Advantages . .*

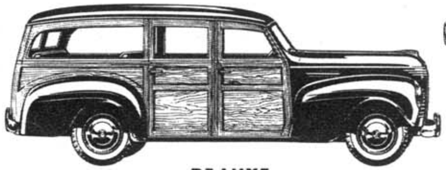
In the new 1940 Plymouth, the gearshift lever is mounted on the steering column, easier to reach and easier to operate . . . out of the way of the center passenger's knees!

A *New Function* Gives the Speedometer New Beauty

Up to thirty miles an hour, the warning light of Plymouth's new Safety Signal Speedometer is *green;* between thirty and fifty, it shows *amber;* over fifty, it shines *red* . . . reminding the driver to regulate speed according to driving conditions!

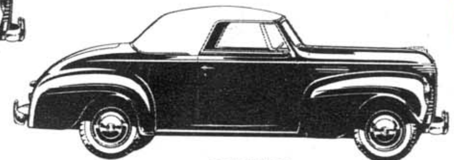


IN EVERY ONE OF THESE CARS . . . THE SAME GREAT ENGINEERING THAT HAS EARNED FOR PLYMOUTH ITS PRICELESS REPUTATION AS . . .

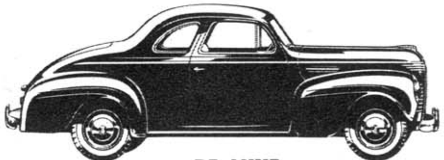


DE LUXE
STATION WAGON

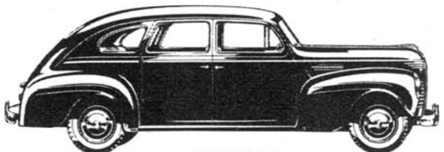
DE LUXE
4-Door Touring Sedan



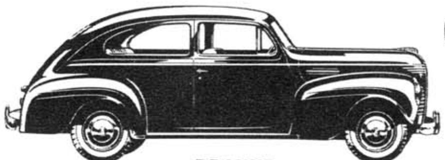
DE LUXE
Convertible Coupe



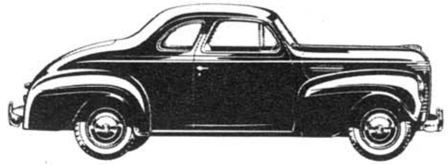
DE LUXE
4-Passenger Coupe



DE LUXE
7-Passenger Sedan



DE LUXE
2-Door Sedan

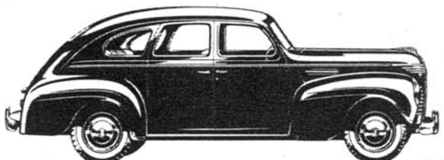


DE LUXE
Coupe

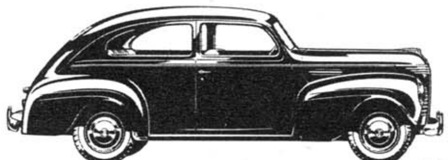
The Car That Stands Up Best!

Plymouth brought to low-price cars the brilliant engineering, the same precision of manufacture formerly applied to the manufacture of higher-priced cars alone. And Plymouth owners, delighted to be free of the frequent nickel and dime repairs that low-price car owners used to expect, were quick to spread the news about "the car that stands up best."

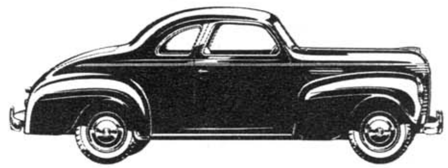
Even today, many important engineering features found in most high-price cars are to be had *only in Plymouth* among low-price cars! You expect more from Plymouth . . . and get it!



"ROADKING"
4-Door Touring Sedan



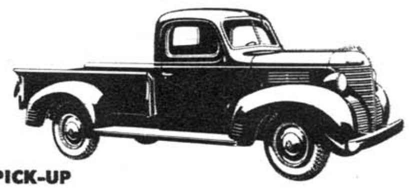
"ROADKING"
2-Door Touring Sedan



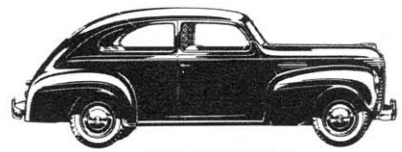
"ROADKING"
Coupe

Stands Up Best for Business . . . Too!

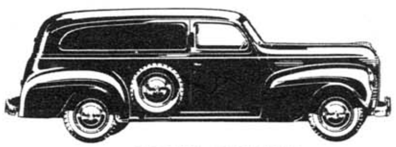
Plymouth offers a full line of commercial cars and special utility models designed to do every kind of light hauling and fast delivery work *better*, and at *new, lower costs!* These outstanding new commercial cars give commercial users the same great engineering which has made the Plymouth passenger car famous as "the car that stands up best!"



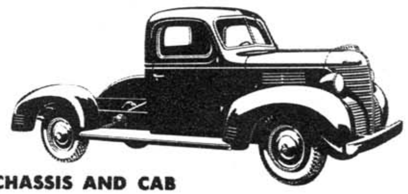
PICK-UP



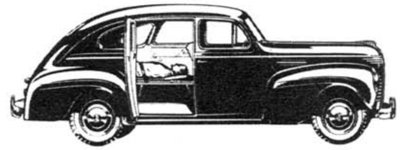
UTILITY SEDAN



PANEL DELIVERY



CHASSIS AND CAB



AMBULANCE CONVERSION

Printed in U.S.A.—Form No. 5318-K-40