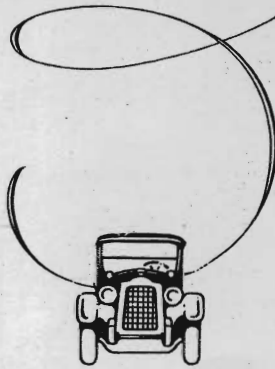


# KNOW YOUR CAR



# *Know Your Car*

*A Primer  
of  
Automobile  
Lubrication*



**STANDARD OIL CO. OF NEW YORK  
26 BROADWAY**

Back of every drop of Socony  
stands Standard Oil Company of New York



## INTRODUCTION

**D**URING the past few years we have been asked many questions concerning the care and upkeep of the automobile. To meet this demand for information we have prepared this book of first principles. We have tried to make it a primer which treats the automobile in terms familiar to us all.

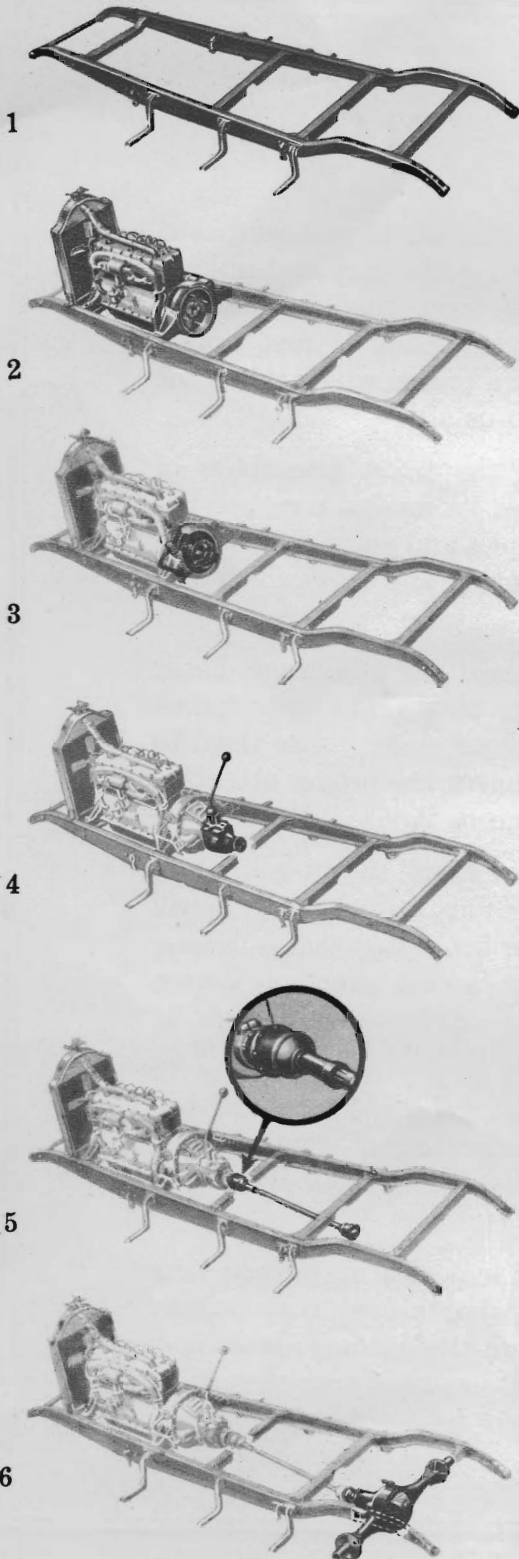
The automobile is one of the finest assemblies of machinery in existence, and yet its mechanisms are not complicated. Master its principles and you will be repaid many times over for the attention and care which you give your motor car.

Oil and grease are consumed on a mileage basis. Replenish them on the mileage basis. Let your speedometer and this book act as your guide. Use them to see that every moving part receives the proper attention where it needs it and when it needs it.

If you will read "*Know Your Car*," if you will study its interesting and instructive illustrations, if you will follow its simple charts, it is our belief that you will lower your car-operating costs. Your car will serve you better, give you less trouble, and in the end you will benefit by greater trade-in values.

It is our earnest hope that "*Know Your Car*" will leave with you a better understanding of what actually takes place when you "step on the gas" or when you "shift" your gears.

We take pleasure, therefore, in dedicating "*Know Your Car*" to the vast army of men who, through their Socony Lubrication services, have made the automobile a more highly desirable and economical means of transportation.



## First We Assemble Our Automobile

### 1. *The Frame*

**W**E begin the assembly of our automobile with a rectangular frame consisting of two long steel side members, braced with cross pieces for rigidity and strength.

The frame is the foundation upon which we will build our car. It must be exceedingly strong if it is to resist distorting road strains of every nature.

### 2. *The Motor*

To give our car a source of power we add a motor. The automobile motor is a marvel of compactness. It supplies the power of many horses to do your bidding—to speed along the highways and climb steep hills.

### 3. *The Clutch*

That we may control the power developed by our motor, that we may apply or release it at will, we install a clutch.

The metal housing which supports and protects the clutch is usually cast as an integral part of the engine crankcase.

### 4. *The Transmission*

We must be able to start our car, climb hills, and reverse. So we add a transmission.

The purpose of our transmission is to use more effectually the power of our engine. The transmission does not multiply the power of our motor. It merely changes this power into a more useful form—it gives more pulling power to our engine at a sacrifice of car speed.

### 5. *The Driveshaft and Universals*

To relay power from our transmission to the rear axle we install a driveshaft and universal joints. Universal joints are flexible couplers, permitting the angle of the driveshaft to change with the unevenness of the road.

### 6. *The Differential*

We next install a differential. Its main function is to direct the flow of power at right angle to our driveshaft.

Its other function is to allow our inside rear wheel to revolve more slowly than the outside rear wheel when rounding a turn.

7. *The Springs*

To smooth out road shocks and secure maximum riding comfort we support our frame on steel springs.

There are usually four springs in all—two anchored to the front and two anchored to the rear of the frame.

8. *The Axles*

To these springs we bolt our axles by means of steel clamps. The front axle assembly supports the front end of the car, above the front wheels. Our rear axle is next installed. It relays the power through the differential to the rear, or driving wheels.

9. *The Brakes*

For the purpose of stopping our car, two sets of brakes are installed—the foot brake, called the “service brake” and the hand brake, known as the “emergency or parking brake.”

The principle of braking is simply the application of the retarding action of band friction to metal drums fastened to the wheels or driveshaft.

10. *The Wheels*

To provide means for our car to move along the highways, we next add four wheels. These wheels are placed on the axles, first inserting bearings which permit them to turn freely. There are three types of wheels: wire, disc, and wood.

11. *The Steering Gear*

We must be able to control the direction of our car. For this purpose we add a steering gear.

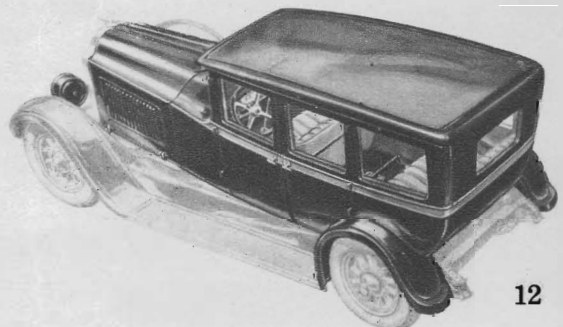
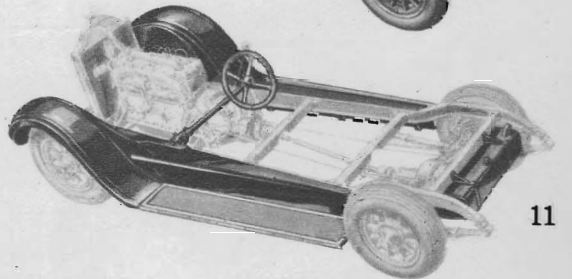
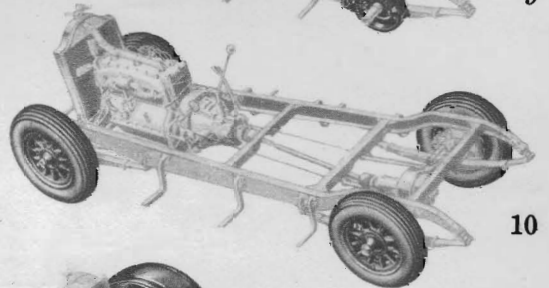
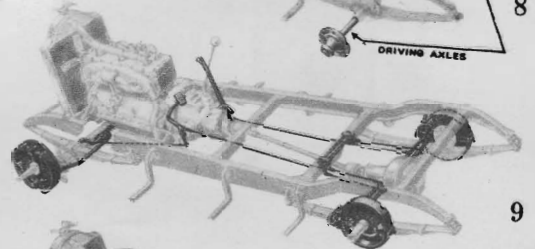
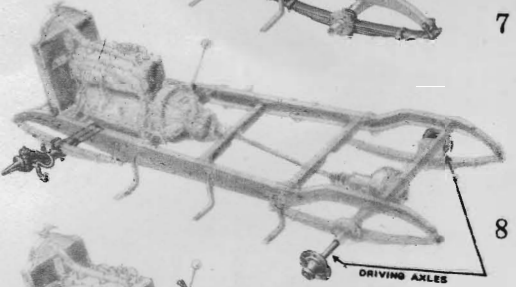
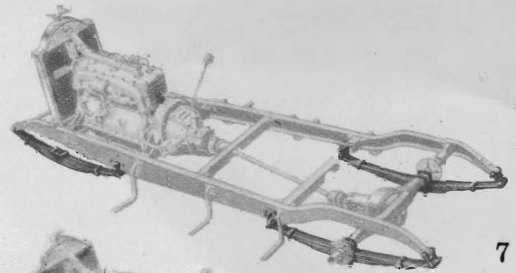
The front section of our axle remains stationary and the two hinged axle tips, to which the wheels are attached, turn in unison as we turn the steering wheel.

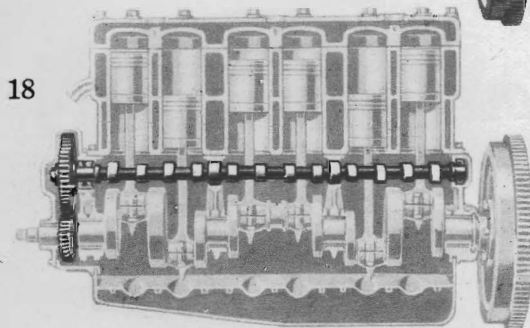
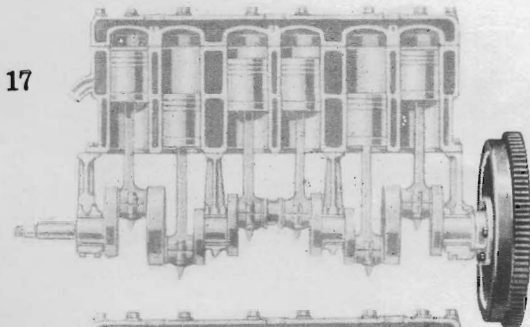
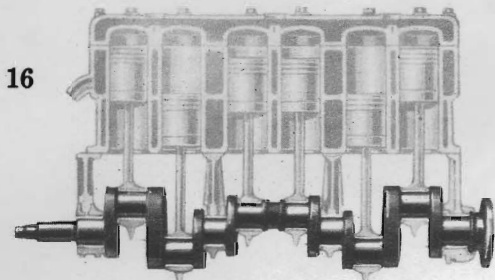
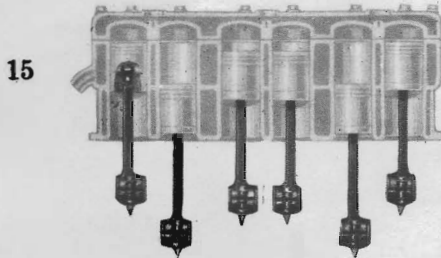
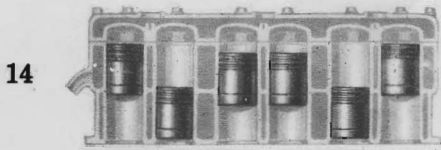
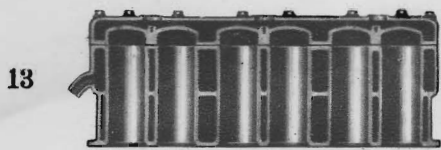
12. *The Body*

Finally, we fit the body, running boards and mud guards to our chassis.

Now that we have assembled our car, let us turn our attention to the engine and its component parts.

There is a Socony Product for every moving part in our assembled automobile—the nearest Socony dealer will recommend the proper grade for your car.





## Now Let Us Examine Our Engine

### 13. *The Cylinders*

Our motor consists of a group of cylinders. A cylinder is a cylindrical hole in a block of cast iron, with water jackets surrounding it for cooling purposes.

### 14. *The Pistons*

In each cylinder there is a movable part called a "piston" which slides up and down. Pistons are hollow and usually made of cast iron or aluminum alloy. In operation our piston is similar to a plunger in a pump.

### 15. *The Connecting Rods*

The piston is supported in its cylinder by a connecting rod. The connecting rod is a metal shaft "connecting" the piston with the crankshaft.

At the piston end of the connecting rod there is a movement similar to our wrist-joint. We place a bearing here and call it a "wrist-pin bearing." The lower end of the rod "connects" to the crankshaft. We call it a "connecting-rod bearing."

### 16. *The Crankshaft*

We install a crankshaft. A crankshaft is a series of crank arms or coffee grinder handles, one per cylinder, forged as one shaft. It is suspended in our motor by a number of "crankshaft bearings."

As our pistons move up and down in their cylinders, the connecting rods follow, hence the crankshaft revolves.

### 17. *The Flywheel*

We fasten a flywheel to the end of the crankshaft to smooth out the flow of power from our cylinders.

Our flywheel is a balance wheel for our motor. Without a flywheel a motor would tear itself to pieces. Usually the flywheel has gear teeth cut in it for starting.

### 18. *The Timing Gear*

On the opposite end of the crankshaft from the flywheel, we mount a small gear which drives the camshaft gear. These two gears are known as "timing gears."

The timing gears "time," through the medium of a camshaft, the opening and closing of our valves.

## To Open and Close the Valves We Add a Camshaft

### 19. Camshaft Drive

The illustration at the right shows the arrangement of the timing gears when the two gears move in contact with one another.

### 20. The Camshaft

Our camshaft is simply a straight steel shaft provided with a series of "cams" or eccentrics. There are two or more cams per cylinder arranged on the shaft to "time" the opening and closing of our valves.

### 21. The Cams

A cam is a flat section of an egg-shaped piece of steel which rotates with a "wobbly" motion as it revolves. The movement of our cams may be compared with the rotation of a phonograph record through which a hole has been bored off center.

### 22. The Cam Followers

It is impracticable to allow the ends of our valve stems to come in direct contact with their cams, because of wear. Hence we install adjustable cam followers.

Our cam followers are round metal rods with mushroom-like fittings where they rest on the cam surfaces. They are adjustable in length and transmit to the valves the up and down movement of our cams.

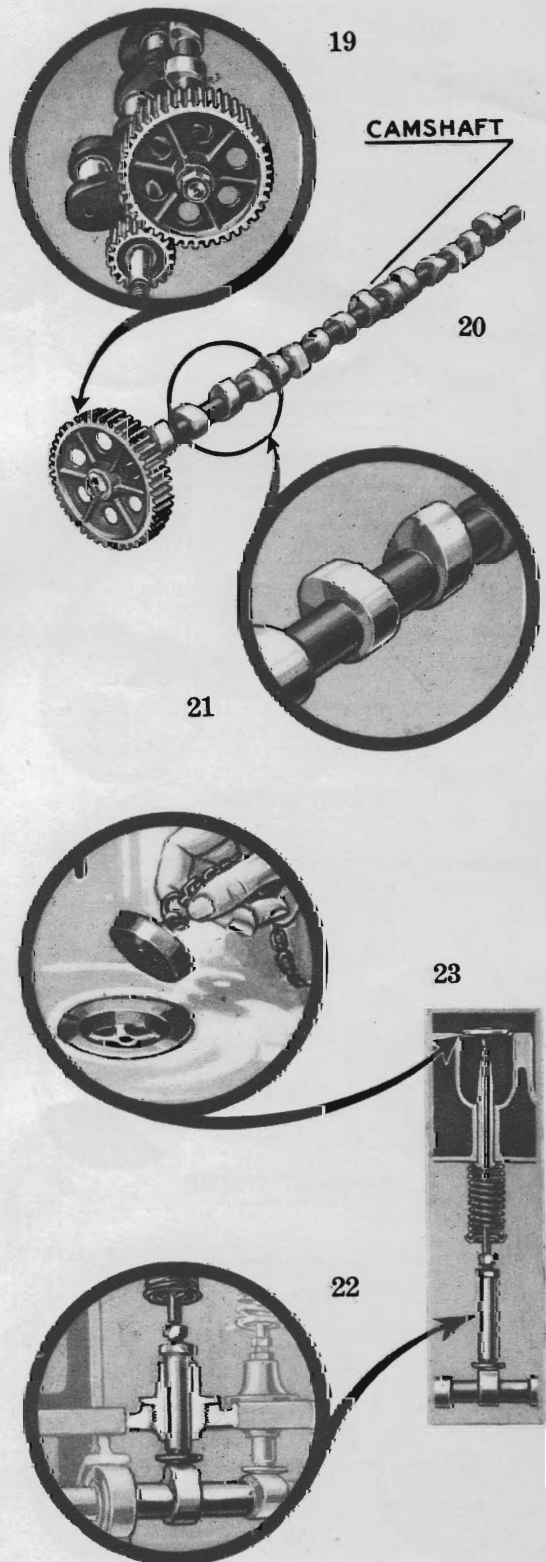
### 23. The Valve Mechanism

There are two types of valves—the "poppet" and "sleeve."

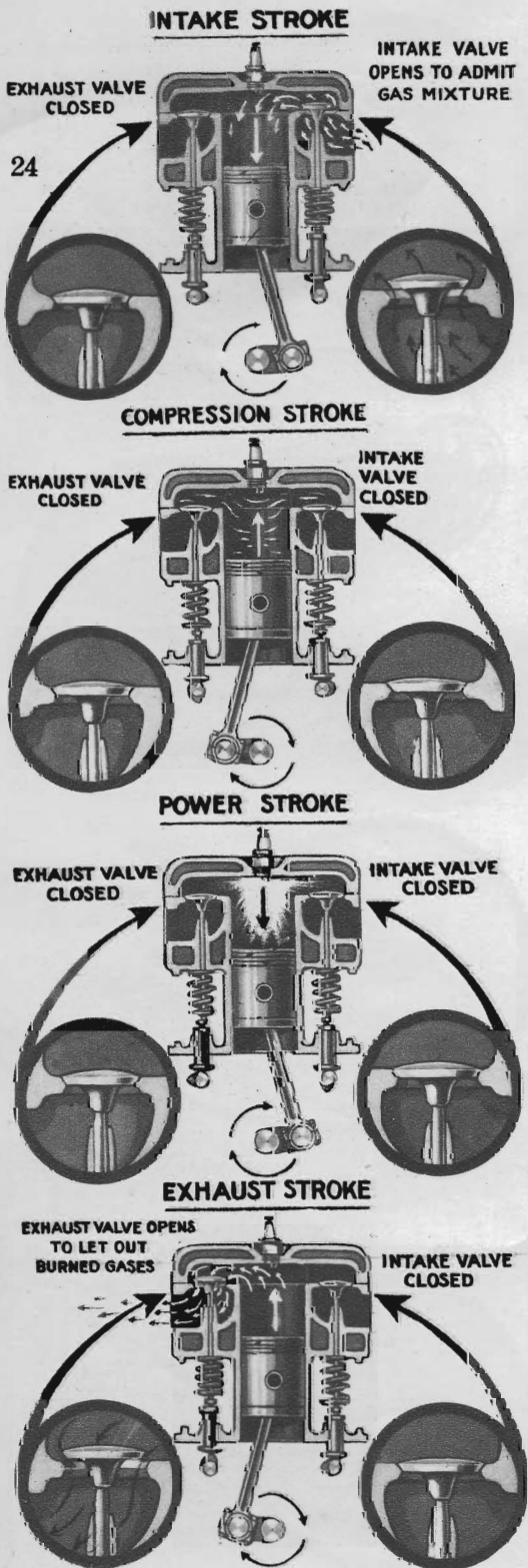
The "poppet" valves, the most commonly used type, act as gas tight "stoppers," alternately sealing and opening the combustion chambers to allow for the admission of fuel or expulsion of burned gases.

The "sleeve" valve, as its name implies, consists of two sleeves surrounding the piston, and moving up and down within the cylinder. As the sleeves move and the ports cut in them come opposite each other, passages are created into the cylinders for the admission of fuel or expulsion of burned gases.

Poppet valves are securely held in their tapered seats by stiff valve springs, Fig. 23. When our motor is started, these valves "intake" and "exhaust" in proper sequence due to the movement of the cams.







## Concerning the Principle Under Which Our Engine Operates

24.

Our automobile engine operates under the four-cycle, or four-stroke principle. By "stroke" we refer to an upward or downward movement of a piston in its cylinder. Each upward or downward stroke of a piston is made possible by a half turn of our revolving crankshaft.

Naturally then, there are two strokes to every revolution of our crankshaft. And there are four strokes or two revolutions of our crankshaft per cylinder to each explosion, regardless of the number of cylinders. Each of these four strokes performs a definite function in the operation of our engine.

To operate our motor we first need fuel. Therefore, at the first half turn of our crankshaft, the piston in our cylinder travels downward. The "intake" valve is opened and the exhaust valve is closed. A mixture of gasoline and air is sucked through the open intake valve into the cylinder. This completes the first, or "intake" stroke. Our piston is now at the bottom of its cylinder.

As our crankshaft revolves on its next half turn, our intake valve closes. Both valves are now closed. Our piston travels upward and the mixture of gasoline and air in our cylinder is tightly compressed. This is the second, or "compression" stroke. Our piston has now almost reached the top of its cylinder.

A spark, and our highly compressed gasoline-air mixture is quickly ignited in its cylinder. Power is produced. As a result our piston is forced downward, thereby completing the third half turn of our crankshaft. This is the "power" stroke.

Now we must quickly expel the burned gases from our cylinder to clear the path for the next "intake" stroke. Up comes the piston again. The "exhaust" valve opens; the intake valve remains closed. This is the fourth, or "exhaust" stroke and completes the sequence by forcing the burned gases through the exhaust valve.

Intake, Compression, Power and Exhaust is the basis upon which our four-stroke automobile engine operates.

## We Continue with the Assembly of Our Automobile Engine

### 25. The Fuel System

Let us carry on with the assembly of our engine. The next step is to install the units which comprise the fuel system. First let us add the intake manifold.

Our intake manifold may be described as a piping arrangement whose function it is to distribute equal quantities of fuel to each cylinder. This is of utmost importance. Quite often an intake manifold is so designed as to heat the gasoline before it enters our cylinders. Heat is a great aid to efficient combustion of our fuel.

The carburetor is the next addition to our fuel assembly. We bolt our carburetor to the lower end of our intake manifold. The sole purpose of our carburetor is to mix gasoline with air in the proper proportions before it is burned in our cylinders.

Now comes the vacuum tank—an ingenious device which permits gasoline to flow uphill. The function of our vacuum tank is to supply our carburetor with gasoline, drawn from the fuel tank.

And last but not least in our assembly of the fuel system we install the gasoline tank into which we pour the best of fuels when we fill with Socony.

### 26. The Electrical System

It takes but a short time to install the electrical units which are a part of our motor assembly. First comes the starter which mechanically cranks our engine. We next add the generator which "generates" electricity. Into the cylinder heads we screw the spark plugs which ignite our fuel.

We now add the distributor which "distributes" electricity to our spark plugs. And we complete the electrical unit assembly of our motor with the horn.

In building our automobile let us not forget to install the lower half of our engine crankcase. This is the metal housing which protects the bottom of our motor.

The lowest part of this half of our crankcase includes the "sump"—a reservoir for our Socony Motor Oil which we now pour into our crankcase through the filler pipe.

