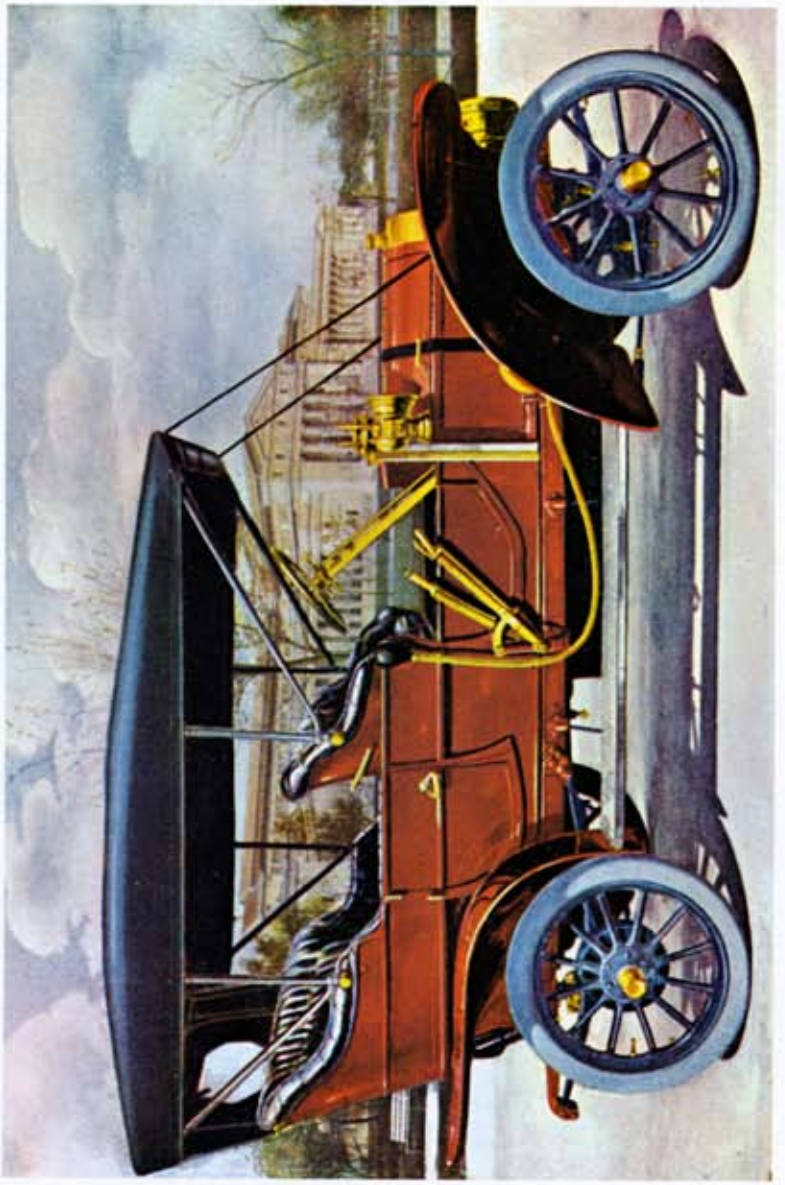
A BUSY MAN'S TEXTBOOK ON AUTOMOBILES

1907



A BUSY MAN'S TEXT BOOK ON AUTOMOBILES

Sec. Street

"CARRIAGES WITHOUT HORSES SHALL GO."
— MOTHER SHIPTON'S PROPHESY.

DESIGNED, ENGRAVED, AND PRINTED
BY
The Lakeside Press
R. R. DONNELLEY & SONS COMPANY
CHICAGO

PREFACE.

LIVING as we do in an age when nothing seems impossible, it is pleasing to note that our constantly increasing knowledge of natural forces and elements has been used, not to the detriment of civilization, but for the improvement of the conditions under which man and beast must work.

Man is indolent by nature, and therefore from his first creation he has constantly labored to make the rest of creation labor for him. His superior mind and will enabled him to subject to his control the lower animals. Thus, logically enough, the horse was made his first beast of burden, and through the early years was the sole means of transportation known to primal man. With the years, however, came machinery, and with machinery came steamboats, railroads, and numerous other means of transportation. But now, at last, we find ourselves on the eve of a revolution which promises to release the beasts of burden from their bondage.

With the introduction of the modern motor vehicle we have had placed at our command a strong, untiring servant, able to do our work with safety and dispatch. No wonder that the whole world is unhesitatingly adopting this form of transportation.

Notwithstanding the instant acceptation of the motor vehicle, it is a striking fact that people in general have very little knowledge of the machinery they are using, and it is, therefore, with the hope that the following pages may throw some light on the seeming mechanical mysteries of "motordom" that this book is submitted for the consideration of its readers.

ADDENDUM

This 1907 booklet is reproduced from the original, of which only two are known, owned by Curved Dash Olds owners.

The original booklet cover was embossed on heavy brown paper. This booklet is reproduced by other methods to save costs, however is an exact copy of the embossing on the original booklet.

The booklet was undoubtedly written and printed in the year 1906, to introduce the 1907 models. The author, F. L. Faurote, a most talented individual must have been very familiar with mechanical details, together with excellent photos available in 1906-1907

We believe that the 1907 touring car in color was hand colored, perhaps in a larger size, then reduced to fit the page space. Color photos as known today were not available at that time.

This copy is a very fine reproduction of the original and you will refer to it many times. The clear explanations of the mechanics and parts used in the 1907 Olds cars are very educational and most interesting.

Don't you think it is a real treat to have such a booklet reproduced for your reading and reference?

For additional copies contact:

"Bob" Huxtable, D.P.E.
2220 Raymond Drive
Lansing, Michigan 48906
(Curved Dash Olds owner)

R. E. Olds Museum Assn., Inc.
P. O. Box 14030
Lansing, Michigan 48901

THE GAS ENGINE.

The Four-Stroke Cycle Motor.—It is a very surprising fact that the average person has very little knowledge of the theory upon which a Gas Engine works, especially as this type of engine is becoming more and more universally used for power purposes in Motor Cars.

It will, therefore, be the object of this book to explain in as few and as simple words as possible the functions of the various component parts of a gasoline motor vehicle. Nothing could be simpler in operation than a Gas Engine; in fact, most of you, no doubt, are familiar with its action, although you have probably never realized it.

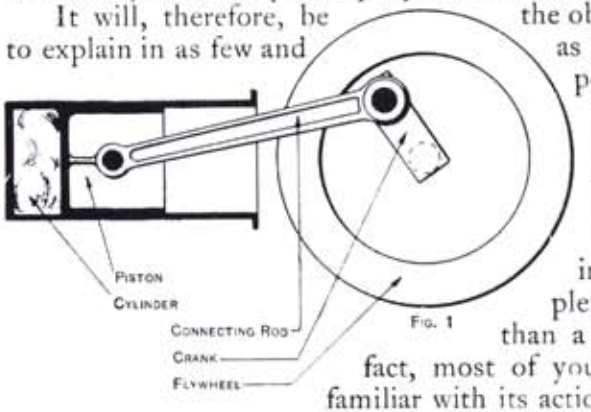


Fig. 1

A gun, for instance, is nothing more or less than a four-stroke cycle motor. As you know, it requires four operations to go through one set of changes, or "cycle," as it is technically termed:

Introduction of charge.	Explosion of charge.
Compression of charge.	Cleansing of barrel.

This same set of conditions is effected in a gas engine by the four strokes of the piston.

Suction stroke - - -	Introduction of gas.
Compression stroke -	Compression of gas.
Working stroke - - -	Explosion of gas.
Exhaust stroke - -	Removal of burnt gases.

Now, to carry the comparison further, let us assume that the bullet in the gun is connected with the ramrod, and that the other end of the ramrod is fastened to a crank connected

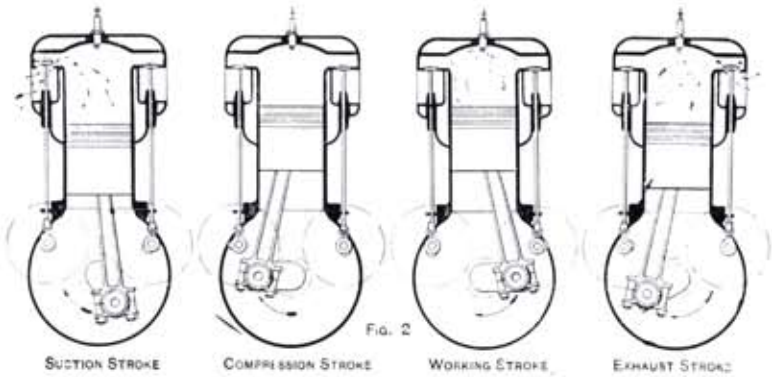


Fig. 2

to a wheel, and that the travel of the bullet is limited, so that the bullet does not leave the barrel.

If, now, we assume that the gun is a repeater, and equipped with a device which will introduce and fire charges at regular intervals, we will have virtually a typical Four Stroke Cycle Motor. In order to fix the succession of changes in your mind more thoroughly, refer to the diagram shown in Fig. 3. You will note that once around the circle brings you back to the starting-point; the first quarter representing the suction stroke; the second, the compression stroke; third, the working stroke (indicated in black); and fourth, the exhaust stroke.

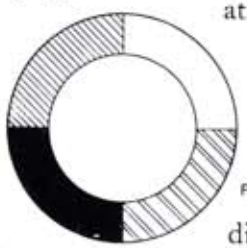


Fig. 3

Keeping this in mind, it is an easy matter to make a diagram which will show exactly what is happening in each cylinder of a four cylinder engine. Fig. 6 represents such a diagram, and from it you can see at a glance just when the working stroke occurs.

For instance let us consider that the charge is being burned in cylinder No. 4. Noting the cross sections which are used to represent the various strokes, you will see that in cylinder No. 3 the exhaust

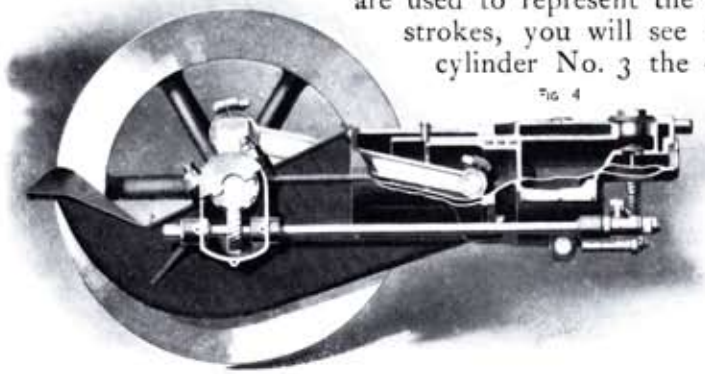


Fig. 4

gas is being expelled, in cylinder No. 2, the new gas is being compressed, and in cylinder No. 1 the fresh charge is just being drawn into the combustion chamber.

Another very interesting feature which is shown by this diagram is the order in which the four cylinders fire. Going around the circles in a clockwise direction, you will notice that the working stroke occurs first in the fourth cylinder, next in the second, then in the first, and finally in the third, after which the various strokes are repeated in the same order. In other words, the firing of a four cylinder motor is 4-2-1-3.

If you will refer to the description of the ignition system you will see that the commutator for a four cylinder motor is

equipped with four points equally distributed around the circumference of the insulating circle. Each of these points acts as a contact which completes the electric circuit for a particular cylinder.

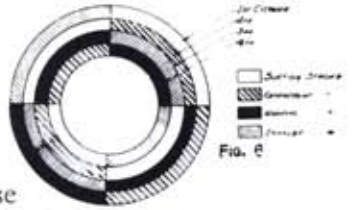
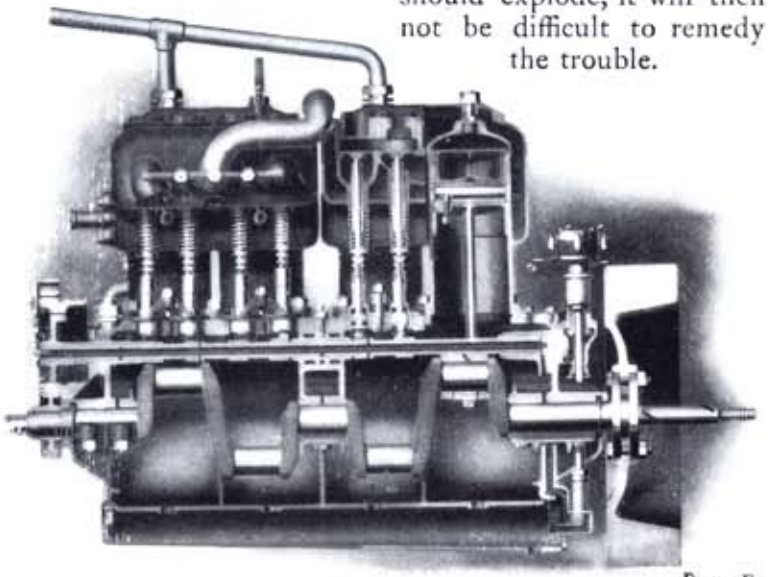


Fig. 6

By following the wires leading from these points you will also see that they are connected to an individual induction coil. Thus each cylinder is practically provided with its own ignition circuit. In case you suspect that one or more cylinders are not "firing" properly it is an easy matter to locate the trouble by opening the "pet cocks" on the top of the combustion chambers. If the charge is igniting properly a flame will spurt out of the opening. Knowing the order in which the various charges should explode, it will then not be difficult to remedy the trouble.



Valves.—Having acquired an understanding of the general theory upon which the motor works, the next step is to learn how the charge of gas is introduced, used, and discharged. The simplest way to do this would be to cut a hole in the side of the cylinder wall, and cover it with a plate which could be lifted when it is desired to introduce or remove the gases. This is virtually what is done, only, of course, the location of the opening, and mechanism for raising and lowering the plate, or "valve," as it is called, varies according to the ideas of the designer. The usual mechanism employed consists of a valve made in some such shape as that shown in Fig. 7, which is held on its seat by means of a spring, and raised, when the occasion arises, by means of a cam operated by the engine itself. Fig. 8 shows three positions of the cam; the first,

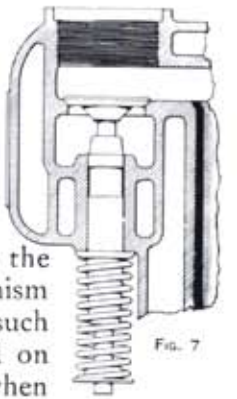


Fig. 7

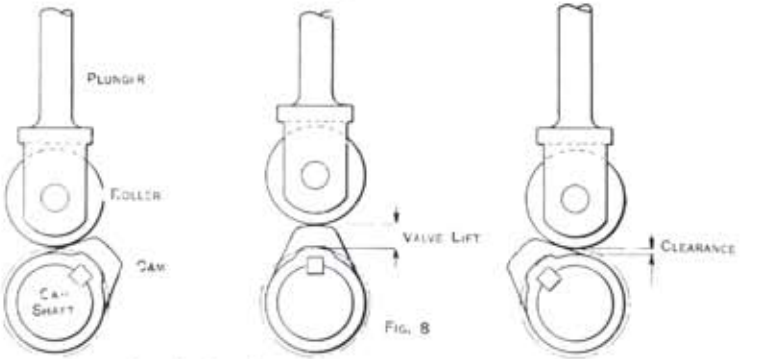


Fig. 8

just as the valve is beginning to open; the second, its position when the valve is at its maximum opening; and third, after the valve has just been closed.

Two valves are used for each cylinder, one for admitting the fresh gas, and one for allowing the burnt products of combustion to escape. Their time for opening and closing determines the amount of gas admitted, and it affects very materially the power of the motor. It is, therefore, a subject which requires careful consideration, and can only be determined by accurate calculation and exhaustive experimental work. When both the points of opening and closing have been definitely decided, two marks (H-C) are first made upon the fly-wheel, in such a position that when one of them is immediately over the center of the crank-shaft the piston will have reached the limit of its travel in one direction;

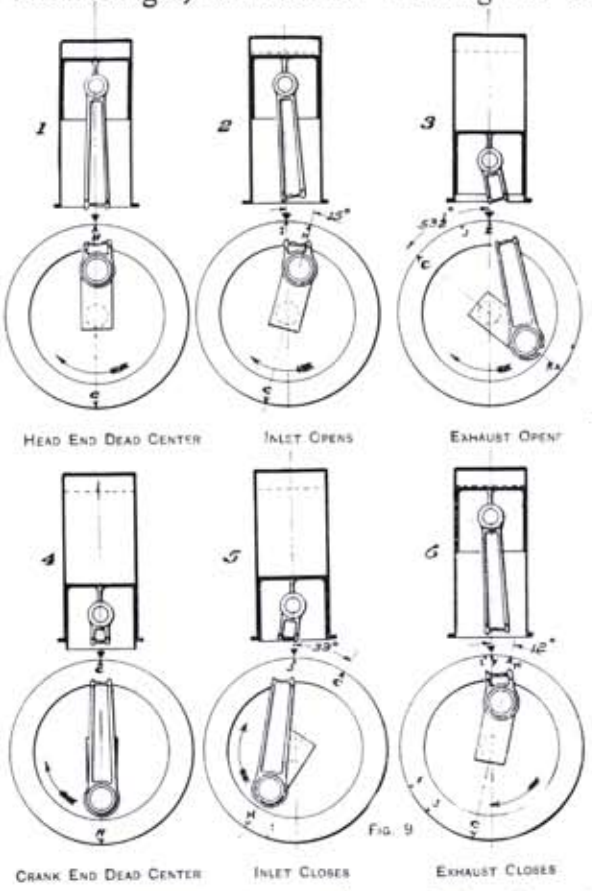


Fig. 9

similarly, when the point diametrically opposite arrives in this position, the piston will have reached the other end of its stroke. These two points just determined are known technically as the "head end" and "crank end" "dead centers." Referring to Fig. 9, you will note that when point H is directly above the center of the shaft, the piston has reached the head end of the stroke, and likewise when the point C has arrived in this same position, that the piston is at the crank end of its stroke.

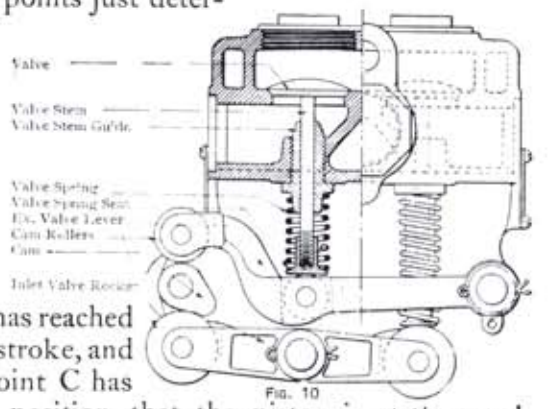


Fig. 10

Having now located these two points upon the fly-wheel, it is an easy matter to lay off around the circumference angles which will represent proportionately the piston travel.

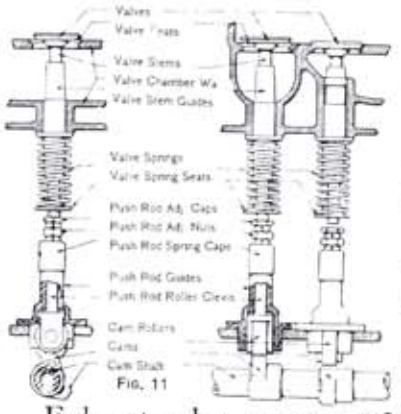


Fig. 11

To cite a concrete case, let us assume that the timing for a motor is as follows:

Inlet valve opens—15° late after H E "dead center" is passed.

Inlet valve closes—33° late after C E "dead center" is passed.

Exhaust valve opens—53½° early before "dead center" is reached.

Exhaust valve closes—12° late after H E "dead center" is passed.

Knowing these facts, it is now an easy matter to lay off, around the circumference, the angles given. Fig. 9 shows how this is done. When point I arrives opposite the pointer, the inlet valve should just begin to open, and likewise when point J passes the same position the valve should have just closed. Similarly, points E and F show respectively the time of opening and closing of the exhaust valve.

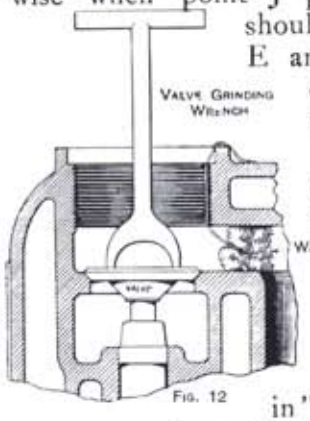


Fig. 12

Care of Valves.—As the power of the motor depends greatly upon the action of the valves, it is absolutely necessary that care should be taken that they will "seat" properly; in other words, they should fit perfectly. In order to insure that they will do this, they should be carefully "ground in" occasionally with a mixture of fine emery powder and oil. To do this the valves should be taken out and both the surface of the valve and the port covered with emery. The valve is then placed back in its seat and twirled around by means of a small wrench, until an absolutely perfect fit is obtained.

Fig. 12 shows how this is done.

The rollers and cams and other working parts should be carefully lubricated, and great care should always be taken to prevent any abrasive substance from finding its way between any of the bearing surfaces.

It is advisable to occasionally take out the valve mechanism and inspect it carefully for the reason that the moving parts wear very rapidly if the plungers are not kept lubricated.

The Cylinder.—The cylinder, which represents in our comparison the barrel of a gun, is made up in many forms, depending upon the type of motor for which it is to be used. It is made of cast-iron. Besides the openings or "ports" which are covered by the valves, there is always an opening made for the introduction of a spark plug or other ignition device. The general form and structure may be readily seen from the illustration, so that no detailed description need be given.


Fig. 13

There are several points in cylinder construction, however, which should be considered by one in selecting a car.

One of the most important of these is accessibility. It is absolutely essential that the valves shall be in such a position as to be readily examined and "ground in" when necessary.

The two illustrations show respectively castings for a single and multiple cylinder engine. You will note that in both cases the valve chambers can be easily reached.

The water jacket also should be of ample size and permit of thorough inspection, as it sometimes becomes necessary to remove foreign substances which are occasionally deposited between the walls. The water inlet and outlet pipes should be perfectly free and so situated that no "air space" or "steam pockets" which would interfere with the circulation of the cooling liquid, can be formed.


Fig. 14

The inside of the cylinder also should receive careful attention. It should be accurately "bored out" round and ground to exact size, otherwise the piston will not fit and a leakage of the gases past the rings will result.

The Piston.—The piston, as you will remember, forms, in our comparison, the projectile in the gun, but instead of leaving the barrel is made to travel back and forth inside of

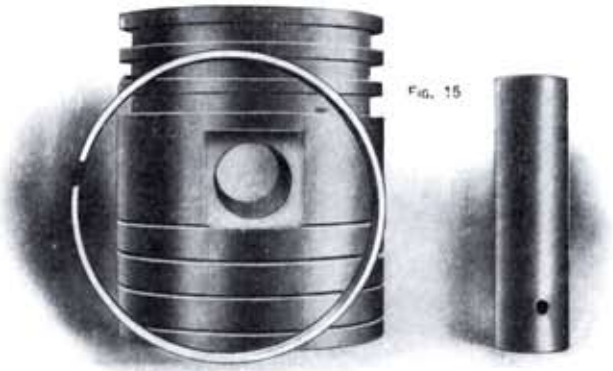


Fig. 15

the cylinder under the action of the explosive gas. It is turned up from an iron casting, and after being carefully machined is ground to fit the inside of the cylinder. Owing to the expansion at various temperatures, however, it is impossible to make a piston which will be an absolute air-tight fit at all times. It is, therefore, necessary to equip it with a set of piston rings, which, owing to their elasticity, will maintain a sliding air-tight fit at all times. These rings are made up in a form similar to that shown in Fig. 15, and are cut at one point to allow the diameter to increase or decrease as occasion demands.

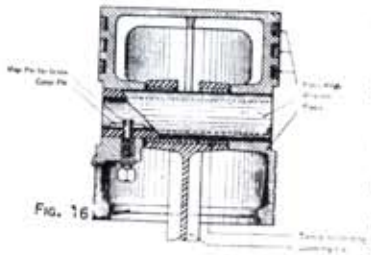


Fig. 16

A small shaft, known as the piston or "wrist pin," is placed across between the walls inside of the piston, and firmly secured at both ends.

The Crank Shaft.—The crank shaft is one of the most important parts of a gasoline motor, for the reason that it is the member which converts the reciprocating movement

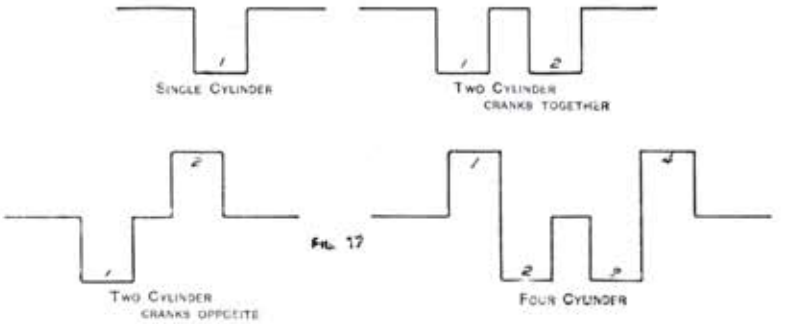


Fig. 17

of the piston into the rotary motion of the fly-wheel. It is subjected to various forces, and should, therefore, be made of the best material possible to be obtained. Crank shafts are forged from steel, and after being machined to nearly their proper sizes, and subjected to a special hardening process, are finally ground to the required diameter.

Fig. 18

The conventional drawings shown in Fig. 17 represent the common forms of crank shafts used in present practice.

No. 1 is the form used in a single cylinder motor.

Nos. 2 and 3 show two forms of two cylinder crank shaft, the former having the two crank pins on the same "throw," the latter opposite, or 180° apart, as it is technically termed.

No. 4 is the regular form used for a four cylinder motor, crank pins 1 and 4 being on one throw and 2 and 3 on the other. Fig. 18 is a completed four cylinder crank.

Connecting Rod.—The connecting rod, as its name implies, forms the connecting link between the piston and crank shaft, transferring the energy of the gas acting behind the piston to the crank shaft, from which it is transmitted to the driving wheels of the vehicle. It consists simply of a steel or bronze member of I-beam section, having a bearing at each end, one of which surrounds the piston pin, the other the crank pin. Both of these bearings are generally lubricated by oil splashed up from the crank case. Fig. 20 shows the two halves of a connecting rod bearing. You will note that a slot has been cut in the metal in such a way that when the crank shaft dips into the oil the crank pin will be thoroughly lubricated.

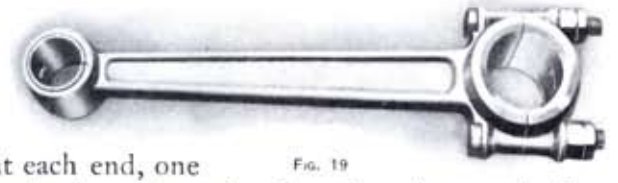


Fig. 19

The piston pin bearing is lubricated by the oil which is thrown up into the piston and which afterward drips down on to the bearing through a hole in the top of the forging. In the case of the larger bearing, canals are cut into the surface of the bearing metal so that the oil will distribute itself uniformly over the entire surface.

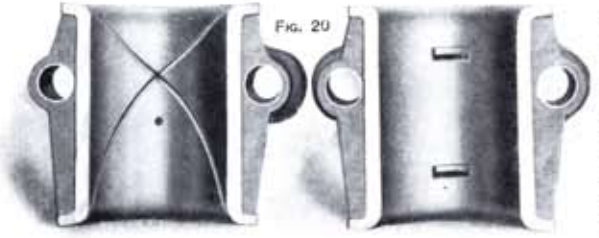
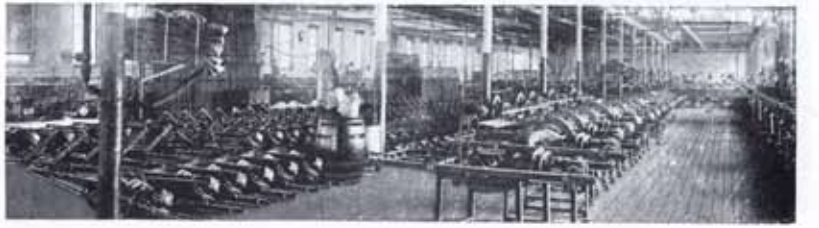
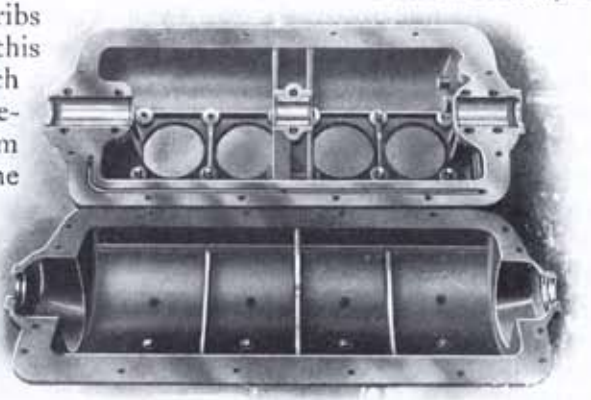


Fig. 20

Sometimes both bearings are made adjustable, but it is becoming current practice to make the piston pin bearing of hardened steel and not adjustable.



Crank Case.—The crank case of a motor serves as a foundation for the engine, furnishes a support for the main bearings in which the crank shaft runs, and encloses the working parts in such a way as to provide for their lubrication, and protect them from the dust and other substances which would materially hinder their working. The case itself is made of iron or aluminum, and should be put together so that all parts are readily accessible. Provision is made for the maintenance of a certain level of oil in the lower half, or oil pan, and ribs are cast across this section in such a way as to prevent the oil from draining to one end when the car is running up or down a grade, thus "starving" one or more of the bearings.



A very novel lubrication system is shown in the illustration. Absolutely no piping is used, the oil traveling through groves cut into the casting itself. The lower part of the crank case is provided with an oil reservoir from which the oil is pumped to all the bearings by means of a gear pump. Each of the crank shaft bearings is connected by means of a hole drilled through the casting with the canal, which, you notice, runs along the side of the upper half of the crank case. An excess of oil is furnished, but in no case is it wasted, as it is allowed to drain back into the "oil pan," from which it is again pumped through the system.

Carburetor.—The Carburetor, or mixing chamber as it is sometimes called, is simply the device used for obtaining an explosive mixture of gasoline and air. It consists, as shown by the accompanying drawing, of two principal parts, an air pipe and a gasoline pipe, the latter running through the wall and discharging into the center of the former. In order to insure that the flow of gasoline shall be constant, it is necessary to provide an auxiliary reservoir in which a certain level of gasoline is maintained at all times, and it is for this reason that the float chamber, shown in Fig. 22, is used. When this device is employed the pressure on the gasoline is practically the same whether the main tank is full or nearly empty, owing to the fact that a valve attached to the float in the float chamber does not allow the amount of gasoline to materially increase or decrease in this reservoir. The amount of air entering the mixing chamber is controlled by changing the area of the air inlet, and the quantity of gasoline admitted is regulated by means of a needle-valve in the gasoline pipe. In addition to this, up-to-date carburetors are equipped with auxiliary air inlet valves which automatically provide for changes of condition caused by varying speeds of the motor. A throttle valve, for controlling the amount of fuel entering the engine, is furnished and so connected that it may be operated by means of a small control lever placed within easy reach of the driver. A foot lever is also sometimes provided which can be used when the driver's hands are occupied in driving.

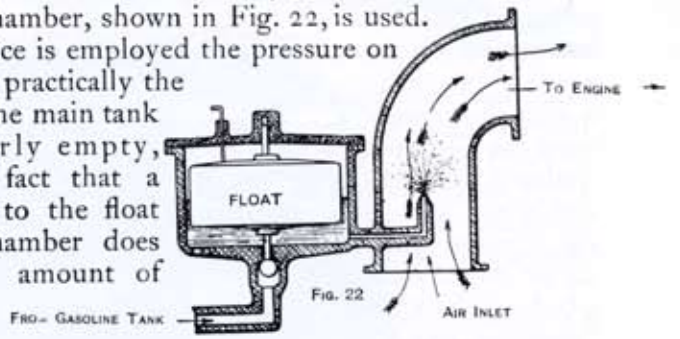


Fig. 22

Although the carburetor represented in figure 22 is only a conventional one, yet it shows clearly the theory upon which nearly all of the modern carburetors work.

Figure 23 is an actual drawing of the carburetor used on the four cylinder motor (Fig. 5). If you will study the drawing carefully you will see that it is essentially the same in construction as the one shown in figure 22, except that instead of having the float-chamber independent of the mixing chamber, the former surrounds the latter. A slightly different form of needle valve is used, but the same effect is obtained by the use of a lever, one end of which supports the float, the other raising or lowering the float-chamber valve. One feature, however, which is not shown in the conventional drawing, is the auxiliary air inlet valve, which you will notice on the left of the drawing (Fig. 23). An auxiliary air inlet, as said before, regulates the amount of additional air which it is necessary to supply to the carburetor, in order to maintain a proper mixture under all conditions. The adjustment of the spring determines when and how far the valve will open, but after the spring is once adjusted it requires no changing.

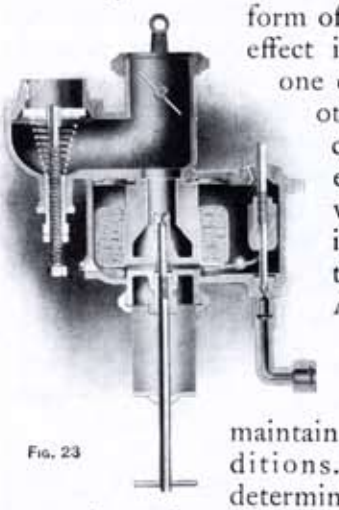


Fig. 23

In order to regulate the amount of gasoline which is fed into the mixing chamber, another needle valve capable of adjustment is introduced into the "spraying nozzle." If this is once set properly it requires no further adjustment unless atmospheric conditions change, a difficulty which is seldom encountered except in mountain climbing.

Ignition System.—Having now considered the working parts of a motor and the production of the fuel, we will turn our attention next to the method of igniting the mixture. Various systems are used, but the one which is possibly the most universally employed is known as the "jump spark" system. The electric current for such a system is generally furnished by a dry or storage battery, but as this current is very low in pressure, it is necessary to introduce an induction coil into the circuit in order to raise the voltage.

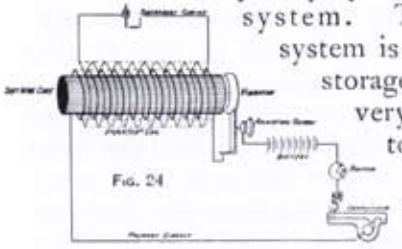


FIG. 24

An induction coil consists merely of a bundle of soft wires around which is wound two separate coils of wire. The first, known as the primary winding, is of coarse wire, and the second, known as the secondary winding, is of fine wire. When the current flowing through the primary coil is rapidly made and broken, another current of very high voltage is created in the secondary circuit. When the current starts to flow through the primary winding the bundle of wires immediately becomes a magnet and attracts the vibrator. As soon as this occurs, however, the flow of the current is interrupted, and the vibrator resumes its former position, and the action is repeated. Thus you can see that the coil automatically makes and breaks its own circuit. The rapidity with which this is done may be changed at will by adjusting the vibrator screw.

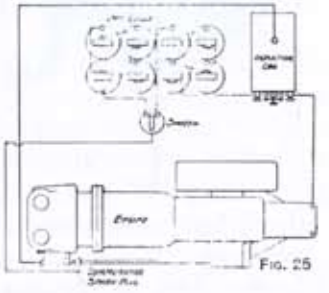


FIG. 25

Having thus obtained an electric current of sufficient strength to fire the mixture it is necessary to supply a device

which will automatically open and close the electric circuit at the proper time. Such a device is called a commutator, and consists of two parts; one a rotating part, actuated by the engine, which makes a metallic contact with one or more points on the secondary or stationary member, the points being so located that contact occurs at the proper time for igniting the charge in any particular cylinder.

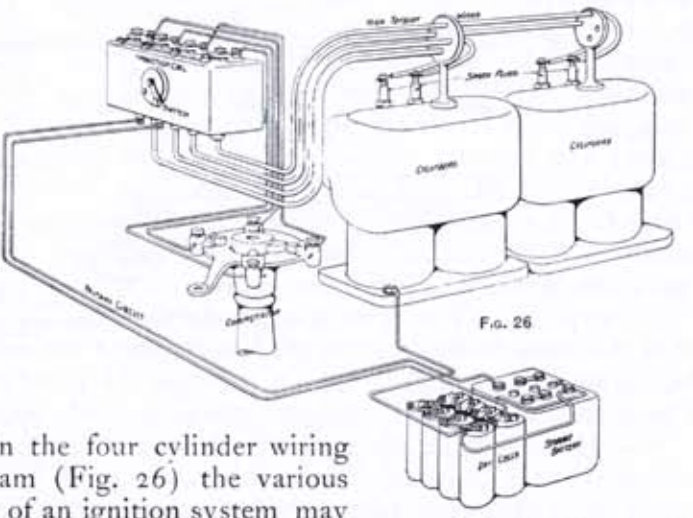


FIG. 26

In the four cylinder wiring diagram (Fig. 26) the various parts of an ignition system may be easily seen. The electric current is furnished either by a set of dry cells or by a storage battery. Four individual coils and a four point commutator are used. The commutator is driven by means of beveled gears from the engine itself. A single switch controls the whole circuit, it being provided with two points, making it possible for either battery to be used at will. The various connections are plainly shown so that a detailed description of the method of connecting up a four cylinder motor is not necessary.

Cooling System.—In order to prevent the walls of the cylinder from becoming red-hot it is necessary to cool them by some means, and this is done by surrounding the cylinder with a water-jacket through which the cooling water is forced. It is necessary, further, in order to prevent the water from boiling and evaporating, to introduce into the system a radiator which will maintain the temperature of the cooling water below the boiling point. The system is arranged so that the water is drawn from the lower part of the radiator by means of a pump, and forced up through the water-jacket and back to the radiator. A gear pump is used, which is driven by the engine itself. As you will see by the drawing, it consists of two gears in mesh with each other, which revolve in the direction indicated by the arrows. The water entering through the inlet pipe is drawn around the outside and forced out through the outlet at the top. This style of pump is very positive in its action, and therefore absolutely insures the circulation of the cooling liquid. During the winter months an anti freezing solution may be added to the water, which will prevent it from freezing.

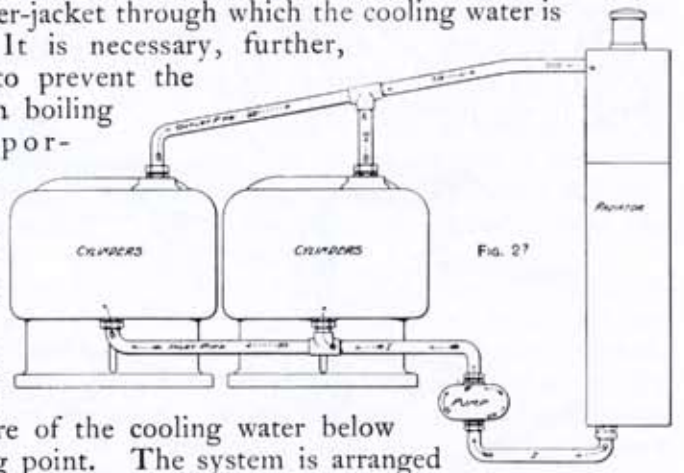


FIG. 27

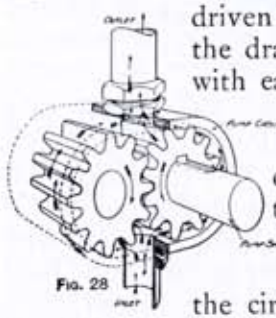


FIG. 28

Transmission.—Several devices are used for transferring the power from the motor to the driving wheel of the vehicle. The two most common, however, are known as the chain drive and bevel gear drive. Figs. 29 and 30 show respectively conventional drawings of these systems.

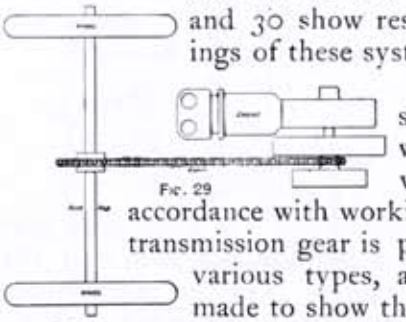


FIG. 29

On all vehicles it is necessary to provide some means whereby the speed of the vehicle may be changed in accordance with working conditions, and therefore a transmission gear is provided. These, also, are of various types, and an attempt will only be made to show the sliding and planetary gears.

If we consider two gears of the same size, A and B, running together, you can easily see that if A is running 1,000 revolutions, B will also be revolving at a similar speed. On the other hand, if the gear B is only one-half the size of A, it will under the same conditions be revolving 2,000 revolutions. It is thus a very easy matter, by varying the diameter, to work out a set of gears to give any speed desired. Having done this, it is a simple matter so to arrange the gearing that the various changes in speed may be controlled by means of a hand lever within easy reach of the driver. Figs. 33 and 34 show a sliding gear transmission, and the following diagrams indicate the location of the various gears in the different speed positions.

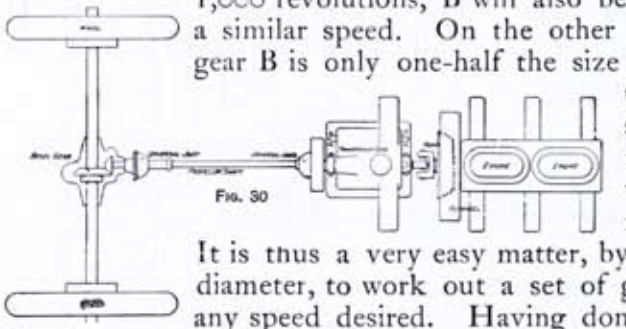
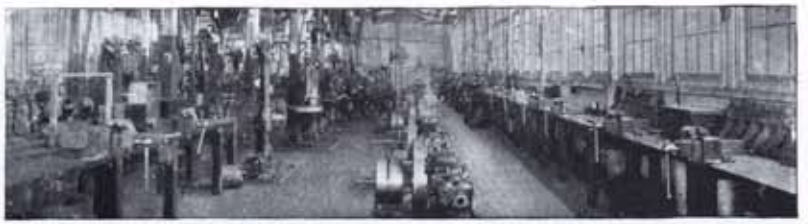


FIG. 30

The gearing consists of two parallel shafts, I and S, the



former having keyed to it the gears B, C, D, and E, the latter, a "squared" shaft carrying the gears H and F. Gear G is an "idler," used for obtaining the reverse. S is a driving shaft directly connected with the engine through the

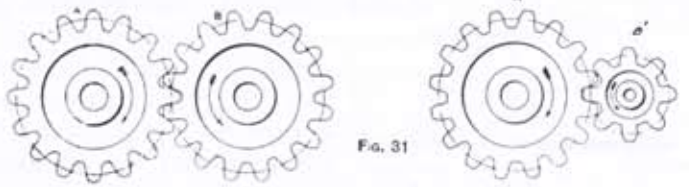


FIG. 31

clutch. A runs free on the shaft S, and is in mesh with gear B. Taking first the low speed position, we note that the drive is from F to D to A through B. On the intermediate speed, F is thrown out, and H is thrown into mesh with C. For high speed, the gear H is slid into mesh with an internal gear cut into the rim of A. The drive in this case is "direct," going from S directly out through A, the gear H simply serving as a clutch. For the reverse, the gears E, G,

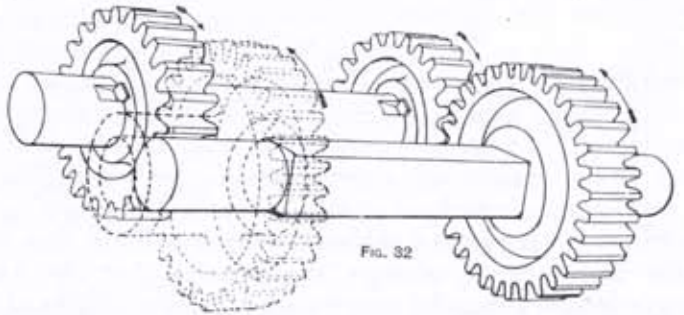


FIG. 32

and F are in mesh, and as G makes the fifth gear in the system, the direction of rotation is reversed.

The gears are shifted by means of one control lever, which is placed within easy reach of the driver. In the form

of selective control, which has been adopted by most of the leading American and European manufacturers, it is possible to go from one speed to another without passing through any other set of gears, that is, if it is desired to change from the slow speed to the highest speed it is not necessary to pass

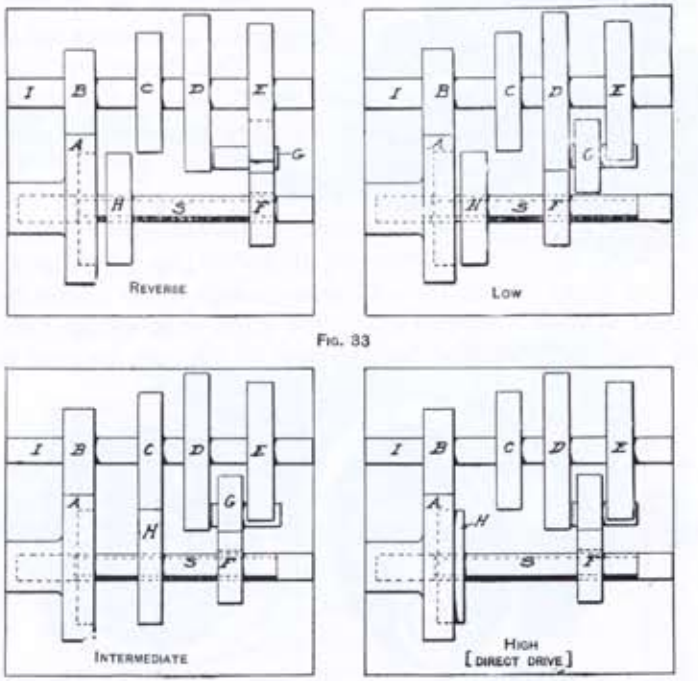


FIG. 33

through the intermediate. This feature of the control is appreciated by every one, because it makes the operation of changing the gears very simple and allows the car to be very easily handled in crowded streets and on difficult grades.

In the planetary system all the gears are mesh, and so arranged, "sun and planet" fashion, around the driving shaft

that by holding certain sets of gears or their axles the desired speed ratio will be obtained. You will note by referring to the photograph (Fig. 35) that the gears are mounted on short axles inside of drums in such a way that by holding a certain drum by means of a brake band the power will be transmitted through a given set of gears. The theory upon which a planetary gear works is very complicated and no attempt will be made to explain it, owing to the lack of space. Suffice to say, each speed may be obtained by holding a gear or set of gears in the transmission. The brake bands which are used are all connected to one control lever, so that any speed may be obtained by the use of the one control lever.

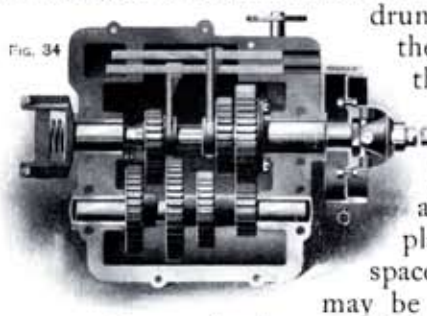


Fig. 34

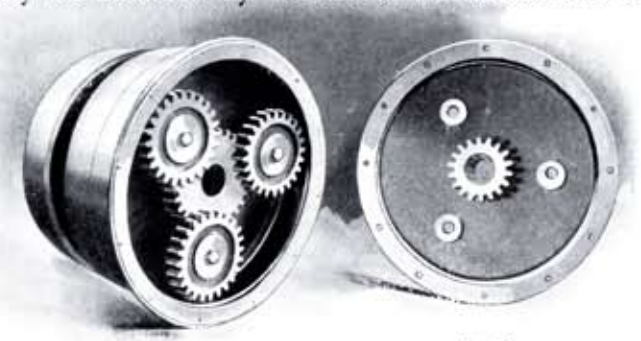


Fig. 35

For high speed a clutch is thrown in which binds the entire transmission together, thereby causing it to rotate with the main shaft, giving a "direct drive."

The planetary type of gearing is very compact and permits of easy lubrication.

Running Gear.—The frame which forms the foundation for the power plant, and furnishes a framework to

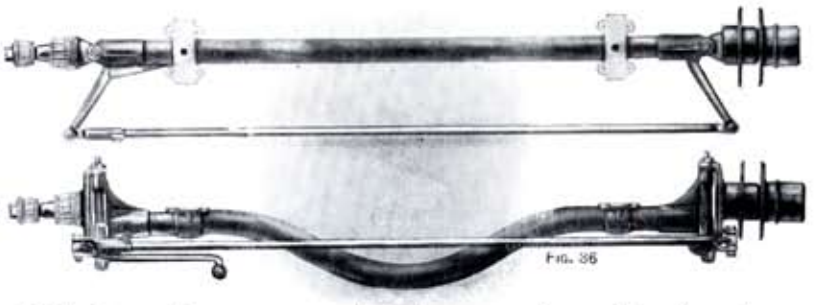


Fig. 36

which the springs are attached, is generally made of angle or pressed steel, riveted or welded together in a form best suited to the form of power plant used.

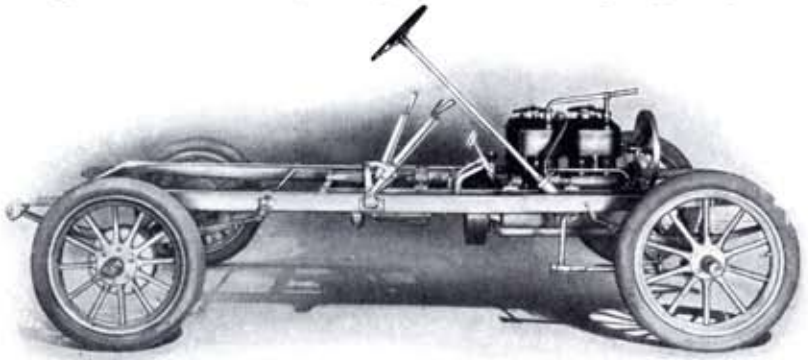
The springs are made of long, narrow strips of steel, so treated as

Fig. 37

to have strong elastic qualities. They are made in various forms, the most common being the half-elliptical, full elliptical, and full-length side spring.

Axles.—The axles and wheels form the running-gear proper, and as their form and structure may be so well seen from the illustrations, we will not attempt to go further into detail in their description.

General Design.—The general design of a car has much to do with its general appearance and riding qualities. Long wheel bases, long flexible springs and luxurious upholstering have done much to increase the comfort of those riding in the car. Body design, too, has changed greatly the



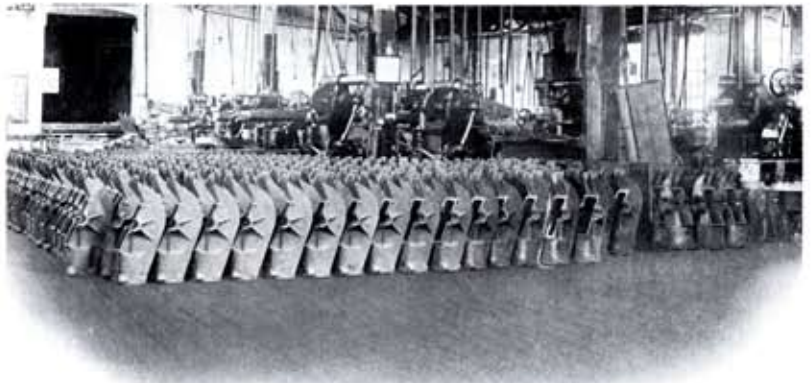
general appearance of the motor car, manufacturers now using a long "rangy" body which gives the car a very rakish appearance.

Not only have they considered the external appearance, but have also carefully worked out the internal arrangement. Everything has been designed with an eye to accessibility. In all of the four cylinder cars the motor is placed forward under a sheet metal hood in such a position that every part is quickly "get-at-able." The transmission also is so located that by lifting the foot board, the gears and clutch can be easily inspected. As much of the mechanism as possible is kept below the top level of the main frame, allowing nearly all of the space beneath the seats of the car to be utilized for baggage compartments. In fact, taken all in all, the general trend of motor car design is to make a machine which will be practical, comfortable and serviceable.

OUR FACTORY.

As a visitor for the first time at our Lansing factory you will notice that the various buildings composing "the works" extend for several blocks, covering a large portion of the area which was formerly used for the State Fair Grounds. Previous to 1906 two separate factories were operated, one in Lansing and one in Detroit, but during the summer of 1905 it was deemed advisable to concentrate at the former place, and therefore the entire office and works were moved. Additions have been constantly made until the present plant occupies a space of 56 acres. The immensity of the factory arouses your interest, and you are anxious to see how a modern motor car is designed, built and tested. Should you happen in on one of those busy times when everybody is hard at work "getting our next year's cars," you would be strongly reminded of a newspaper office just before the paper goes to press.

In order to begin at the bottom, your first visit is to the drafting-room. Here you will find a large number of draftsmen busily engaged in laying out the preliminary sketches and working drawings from which the experimental car is built. Passing through this department, we will next visit the experimental room, which is a miniature factory in which the first model



of each car is constructed. Here the accuracy of the various drawings is checked, the patterns and dies, which are later used for turning out the parts in quantities, are carefully verified. As soon as the "new model" is pronounced satisfactory by the chief engineer, it is sent to the factory for manufacture.

As the raw material is the next thing to be considered, you will next turn your attention to the iron foundry and blacksmith shop. The former is a long building, the floor of which is covered with molding sand and boxes called "flasks," in which the molds are made. In the blacksmith shop the steel and wrought-iron forgings, which are used in the construction of the car, are shaped. Following one of the trucks leading from these departments, we will next visit the machine shop, in which the unformed masses of iron and steel are carefully turned and planed into finished parts of an automobile.

Instead of making each part separately, and assembling them immediately, the various pieces are made up in large quantities and deposited in storerooms until called for by the "assembling department." It is possible by the use of special tools to turn out hundreds of one part of the machine exactly alike, and you can see, in pass-

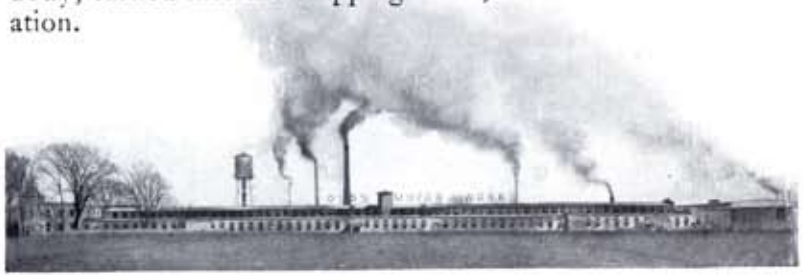
ing through the storeroom, tier after tier of bins containing the various parts which go to make up a complete automobile. It is this interchangeability of parts which distinguishes the large car manufacturer from the smaller manufacturer, and makes it possible to supply repair parts on quick notice, while the latter will be compelled to make each part separately and to order.

Following the guide still further, you will find yourself in the "assembling department." It is here that the machine is first put together. Here you can see machines in every stage of construction, from the frame and running-gear to the almost finished automobile. Having spent some time in watching the progress of this work, you will now, as the announcer would say, pass on to the next picture. This being, perhaps, the most grimy of them all, will yet prove the most interesting—the testing-room. Here you will see the proverbial "man under the machine"; some busily engaged in rebuilding some portion of the motor, others making a few final adjustments, and still others filling up the tanks preparatory to taking a "testing trip" on the road. As fast as the machines are completed they are turned over to these testers who "test" them out "standing still" and

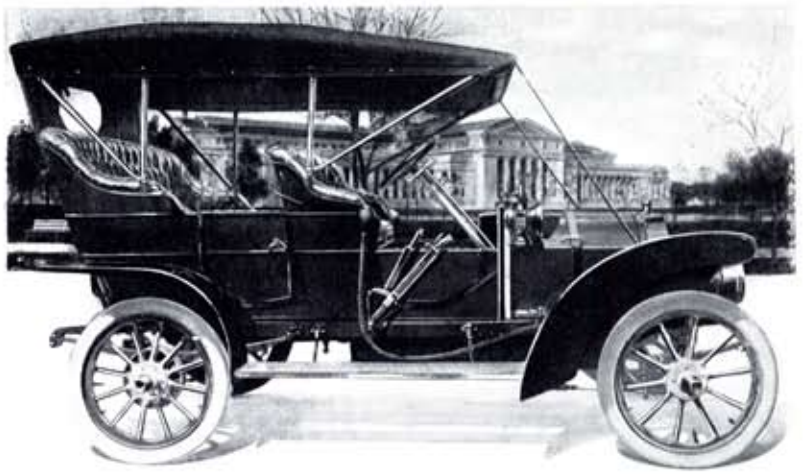
"running." You will, perhaps, have noticed the half-mile track which occupies a portion of the space just west of the works, and if you will take the trouble to follow one of these men you will see that he is headed for this track. The car is tested for several hours for speed and general "manageability," running it around the track, over inclines of various grades, and over rough country roads. A trip with one of these testers always proves interesting and instructive, and the machine is subjected to every possible condition which could possibly be met, even to running it backwards up an incline of twenty-three degrees.

After coming in from this preliminary run the car is again carefully inspected, and if any part shows excessive wear, or any defect, it is immediately removed and a new part substituted, after which another trial run is made.

When the car is finally pronounced perfect by the inspector, it is turned into the paint-shop, where it receives its final coats of paint and varnish, after which it is, together with the body, turned into the shipping-room, to be sent to its destination.



OUR CARS



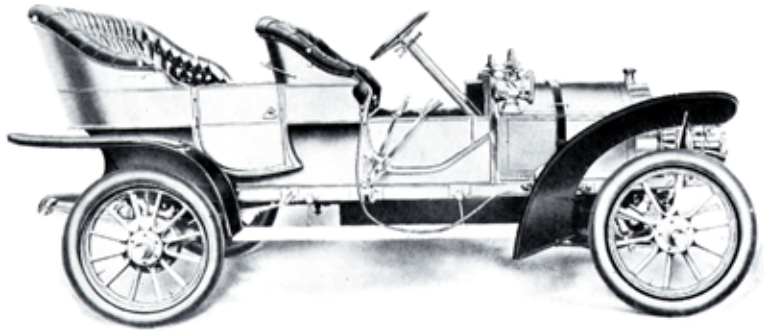
THE OLDSMOBILE PALACE TOURING CAR MODEL A

Foreword

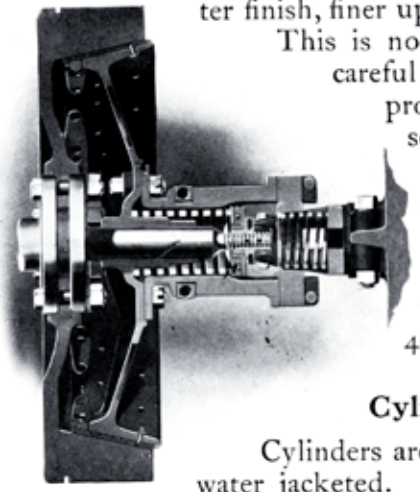
Motor Car manufacturers have for several years been attempting to design a model which will stand the test of time, or, in other words, will represent a standard machine — not in style one year and out the next — but one which can be purchased with the feeling that one is getting a practical, serviceable car of long life and enduring design.

In placing upon the market our Model "A," we feel that we have fulfilled these conditions. In order to suit the requirements of the trade, it will be put out in three styles, virtually the same in general construction, but differing in details, according to the type—the four-cylinder runabout, known as "The Flying Roadster," "The Palace Touring Car," and the Model "A" Limousine. We know that these cars will stand upon their own merits, and will, therefore, give you in the following pages simply the plain specifications.

This machine is a product which is not an experiment in



any way whatsoever. Following closely the lines of last year's car, which made such a remarkable showing in the 1906 Glidden tour and numerous other tests, we have spared neither time nor labor in making the new model as near perfect in every way as possible. We have a better car in every respect, improved spring suspension, insuring easy riding qualities, better finish, finer upholstering, and a perfect motor. This is no idle talk, it is the truth. A careful examination of the machine will prove it, and a demonstration will settle every doubt in your mind.



Motor

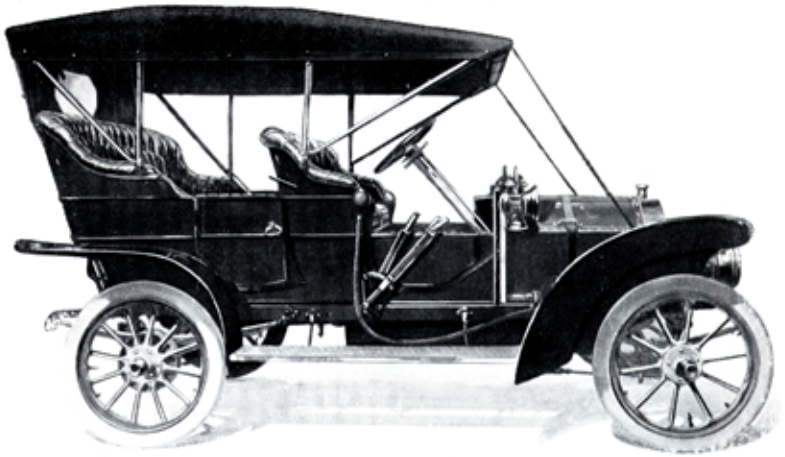
The motor is of the four-cylinder, vertical, water-cooled type, and develops from 35 to 40 horse-power.

Cylinders

Cylinders are of gray iron, cast in pairs, and water jacketed. Bore, 4½ inches; stroke, 4¾ inches. The compression is approximately 65 pounds per square inch. Spark plugs are in the cover plugs over the inlet valves. Cylinders are fitted with ⅛-inch compression relief cocks, screwed into the cylinder heads.

Valves

All valves are identical, and interchangeable. The heads



are cast iron, threaded, riveted and brazed into the stems. The stems are of machine steel. Valve springs are all alike, and interchangeable. Valves may be easily removed for adjusting or grinding by simply unscrewing the valve caps in the top of the cylinder. An index pointer, fastened to the crank case and extending over the fly wheel, is provided, so that the valves may be timed quickly and accurately.

Pistons

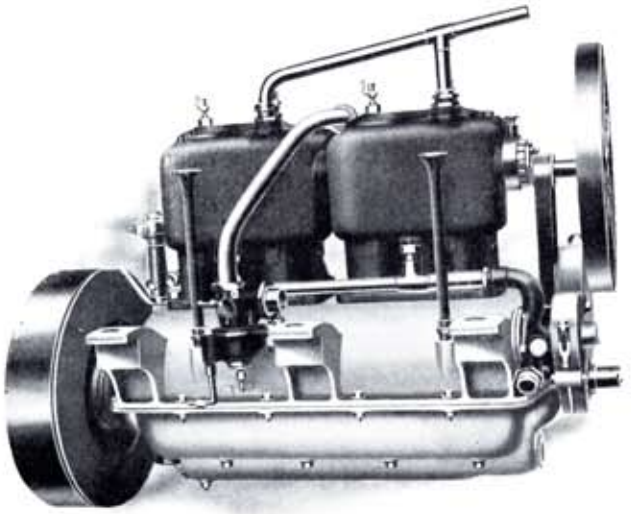
The pistons are made of cast iron, fitted with three rings and two oil grooves, the former being placed above the piston pin, and the latter below. They are finished by grinding, and are tapered in such a way as to reduce to a minimum the friction resulting from expansion.

Piston Pin

The piston pin is a hollow steel tube 1⅛ inches outside diameter, ¾ inch inside diameter, and 4¼ inches long. It is pressed into place and held by means of a dog pointed set screw which prevents it from turning or shifting endwise.

Connecting Rods

Connecting rods are of drop forged steel. Piston end contains hardened and ground steel bushing, oiled by splash



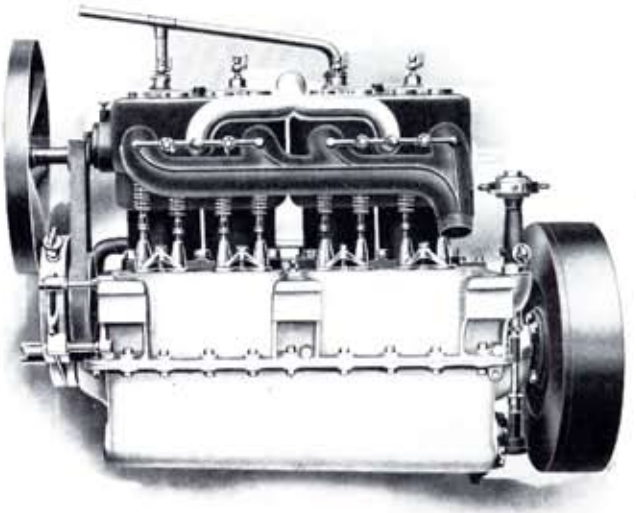
through a slot in the top. The connecting rod bearing is in two halves, held together by two 7-16-inch bolts, one on each side. These plates are lock-nutted and cotter-pinned to prevent loosening. Adjustment is by means of brass liners. Parson's white brass bushing, doweled into place, and oiled by splash through two slots in the bottom, furnish the crank end bearings. An I-beam section connecting rod is used, and the crank end bearing is offset from the center of the "shank" 3/8 of an inch.

Frame

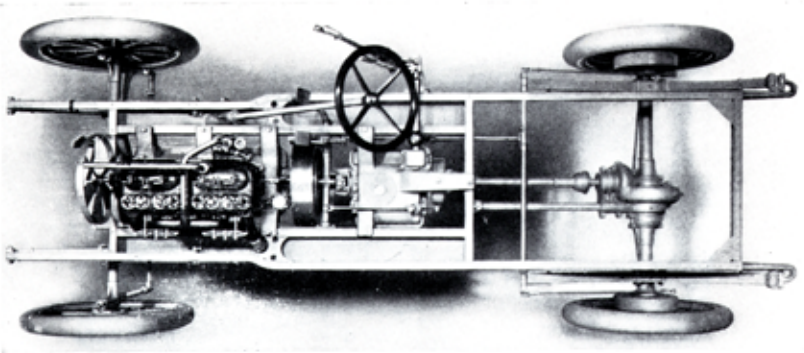
Frame is of 5-32-inch pressed steel, made up in channel sections, and carefully riveted together. All the working parts of the power plant may be removed without disturbing the hanging of the crank and transmission cases. A dust pan, protecting the whole working mechanism, is fastened on to the sub-frame, and may be easily and quickly removed if it is desired to examine the motor. Long two and one-fourth-inch semi-elliptical leaf springs are used, which are very flat in their construction.

Crank Case

The crank case is of cast aluminum, and weighs only 43 pounds. The crank shaft bearings are of Parson's white



bronze. Bearing dimensions, 3 1/2-inch front, 2 7/8-inch center, and 5-inch rear. Diameter of crank shaft through bearings, 1 3/4 inches. Crank case is stiffened by two cross webs, 5-16 inch thick, supporting middle bearing. The end bearings are strengthened by one cross web outside, and two inside. The case is made in two sections, the top serving as a support for the cylinder and crank shaft, the lower half acting as an oil pan. The main bearings are hung from the upper part, and may be easily adjusted by removing the oil pan, and tightening up the quarter box bolts, the adjustment being limited by the use of liners. Lubrication of the main bearings is by means of an oil pump actuated by the cam shaft. No piping whatever is used in the oiling system. Instead, a passageway is cut in the crank case itself, through which a constant stream of oil is kept flowing. As soon as it passes the bearings, it drops into the crank case, and from there into the oil reservoir. In order to maintain a constant level for the splash system used in lubricating the connecting rods and pistons, small holes are drilled in the lower portion of the oil pan, so that the oil can only reach the required



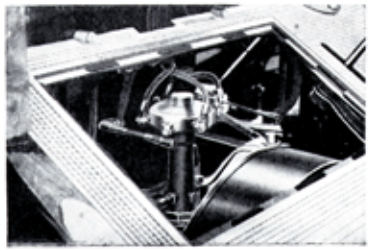
depth, the excess being allowed to drain into the main reservoir. A glass bull's eye placed in the front wall of the crank case shows the amount of oil present at all times.

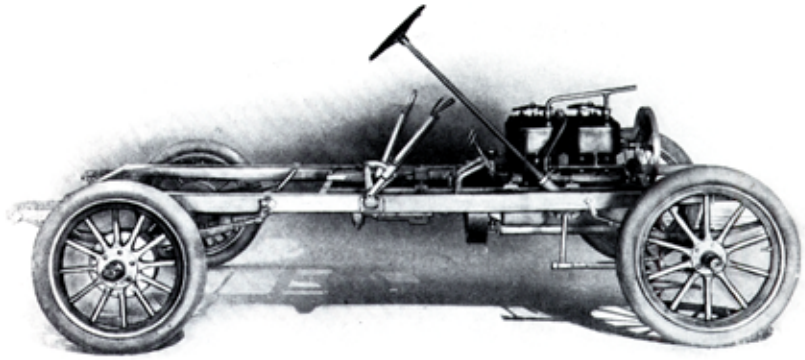
Carburetor

The carburetor used is one which was designed especially for this car. It is not affected by inclination of the machine, and is provided with all adjustments necessary for securing a proper mixture at all times. A copper gasoline tank is located under the front seat in a very convenient position for filling, and has a capacity of 14 gallons. A reserve supply of 2 gallons is maintained, so that the tank will never become empty through neglect, the additional supply only being used as a last resort after the main supply has been consumed.

Cooling System

Water is forced from the bottom of a vertical tube radiator placed in the front of the car by means of gear pump, into the lower part of the water jacket. The water is then forced out at the top of the cylinder, and conveyed by the means of a brass tube to the top of the radiator. The water system may be filled by unscrewing the filler plug on the top of the radiator. In order to insure the rapid cooling of the water, a fan, driven by the engine itself, is placed just behind the radiator. Every car is carefully tested for over-heating before it is allowed to leave the factory.



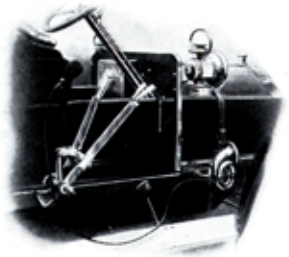


Ignition System

The Ignition System is of the jump spark type, source of electric current being storage battery and set of six dry cells. Batteries are carried in a sheet steel tool box placed on the left running board. Special cable and set of four spark plugs; a four-unit coil placed on the dash, complete the electrical equipment.

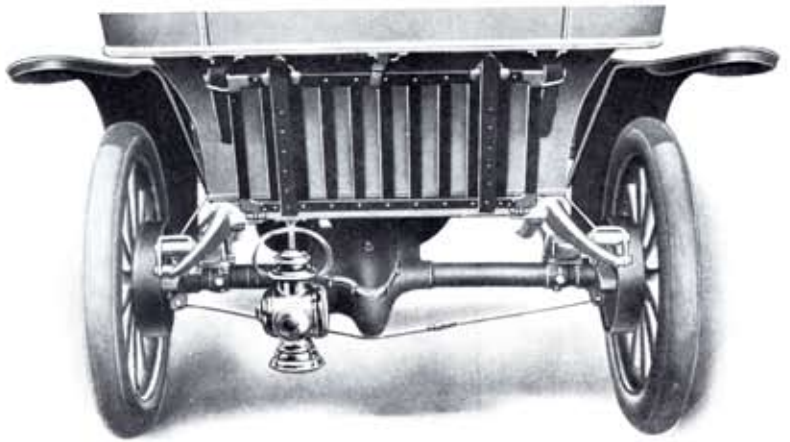
Commutator

Commutator is of the La Coste type, and is operated from the engine itself by means of bevel gears. It may be easily examined by raising a small aluminum door in the footboard



Control

The speed of the car is controlled by a single lever, the shifting of which into various notches brings into action different sets of sliding gears. In order to prevent jamming of the gears a latch is used, which makes it impossible to throw in the reverse without raising the pawl. The clutch may be thrown out by either foot pedal or emergency brake lever. Spark and throttle levers are placed upon the steering post just beneath the steering wheel. An auxiliary throttle footbutton is arranged conveniently for the right foot, and may be used when it is desired to instantly increase the speed for a short interval.

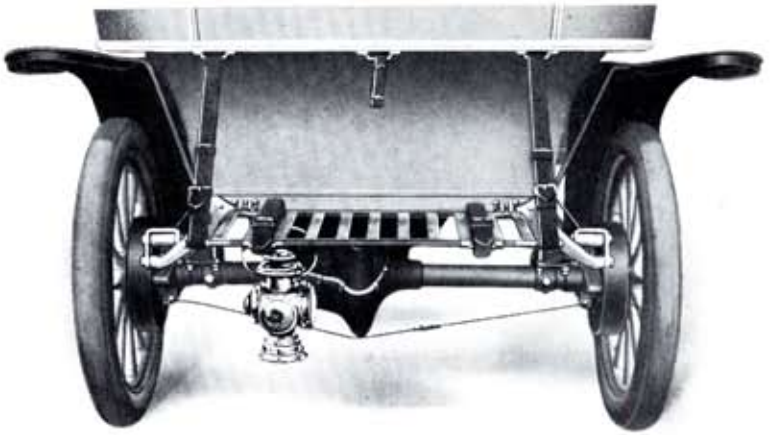


Transmission

Transmission is of the sliding gear type, having three speeds forward and one reverse. All the gears are of special drop forged steel, and are profiled on the teeth to prevent clashing. Gears on counter shaft are keyed by means of Woodruff keys, spaced and pinned. The gears of the main transmission shaft are key-seated at 90 degrees, and slide on four keys fastened to the main shaft. Transmission drive shaft runs in Parson's white brass bushing on the front end, and all end motion is prevented by means of an integral collar, which bears against this bushing. The bearing on the other end is of phosphor bronze. Counter shaft bearings are of Parson's white brass. Owing to the selective type of control which is used, it is possible to go from any one speed to another without passing through any of the intermediate speeds. This makes the process of changing the gears extremely easy and accurate.

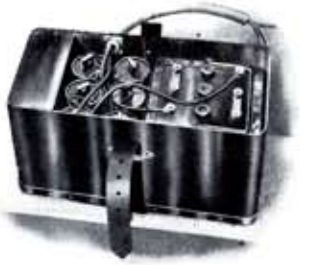
Clutch

The clutch is of the internal reverse cone type, made of



aluminum and covered with leather. In order to prevent any jerking movement in starting, a spring device is provided which allows the load to be taken on slowly.

Drive



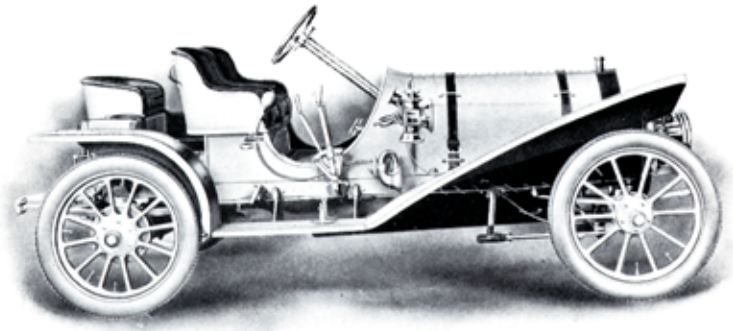
The drive is through a 1⅛-inch machined steel propeller shaft to the bevel gear on the rear axle. Universal joints are carefully protected by means of steel sleeve and heavy leather boot. They are packed in grease, one filling of which will last for several months.

Rear Axle

Rear axle is of the Timken type, driving shaft being carried on Timken roller bearings contained in the outer end of the rear axle tube. Gear ratio, approximately 3 to 1. Differential is of the spur gear type, and also runs on roller bearings. Driving shaft on other end rests on plain bronze inside of differential case.

Brakes

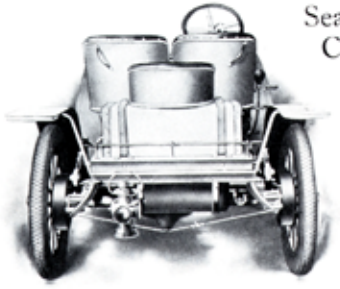
Car is equipped with three brakes, one on the transmission shaft, operated by means of a pedal, the other two on the rear wheels.



THE OLDSMOBILE FLYING ROADSTER MODEL H

This car represents everything which is desirable in automobile construction. It is modeled practically along the same lines as the touring car, but the seat is placed well to the rear, and in such a position as to give the car a very racy appearance. Coupled with this design, the fact that it has already attained a reputation as a pace-maker, has caused it to become a favorite with those who desire a car which is distinctive and sportsmanlike, and has plenty of reserve power and speed.

Body—Racing type, aluminum running boards and foot board.



Color—Red or French Gray.
Seating capacity—Two.
Clutch—Reversed cone.
Wheel base—106½ inches.
Wheel tread—55 inches.
Tire dimensions—Front, 34 x 3½ inches.
Tire dimensions—Rear, 34 x 4 inches.
Brakes, number—Two sets, hub and transmission.

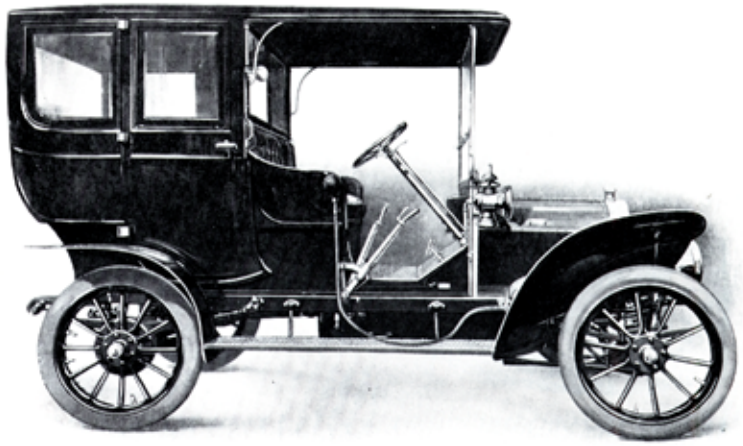
Horse power—35-40.

Number of cylinders—4. Bore, 4½-inch; stroke, 4¾-inch.

Ignition—Jump spark; storage and dry battery.

Drive—Bevel gear.

Transmission—Sliding gear; three speeds forward and one reverse. Selective control.



MODEL "A" LIMOUSINE

This car is the Limousine type of the Model "A" touring car, having the same chassis and power plant, but equipped with a very well appointed Limousine body. For winter use and for special functions this car has been rapidly gaining favor among the exclusive set, and no expense has been spared to make it acceptable to the most fastidious. The body is of the latest construction, fitted with beveled plate glass windows, which may be raised or lowered at will. The interior of the car is upholstered in leather and cloth, or cloth and satin, as desired. The regular Limousine equipment is provided, which includes electric light, the current for which is furnished by a storage battery, a speaking tube through which directions may be given to the chauffeur, and a full toilet set consisting of clock, perfumery bottles, card case, ash tray, etc. The driver's seat is divided, and is trimmed with leather. It is protected by means of a polished plate glass wind shield, a portion of which is stationary, the upper part being so hung as to permit of raising and lowering according to the weather conditions.

All the mountings are of brass, curtains on the inside are of silk. The painting and trimming depends on the current style, the usual combination of colors being dark green and black.

THE OLDSMOBILE STANDARD RUNABOUT. MODEL B.

You see them wherever you go;
They go wherever you see them.

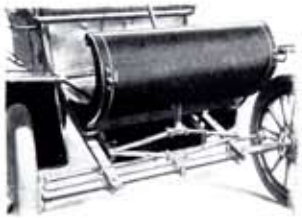
There is only one car that comes to mind when you read the words quoted above, that's the Curved Dash Runabout, known around the world as "The best thing on wheels."

New Features.

The Standard Runabout is now built with a straight, or "piano box," front, to meet the requirements of a certain class of drivers. The effect is very neat. We will, of course, continue to build the popular curved dash. Either shape is optional.

Motor.

The motor is single cylinder horizontal 5x6 inch, developing 7 horse power. The noise of exhaust is practically eliminated by a well designed muffler, with no back pressure. The carburetor, spark plug, valves and tanks are easily accessible by lifting the rear deck. A priming cup has been added, so that the engine may be started easily, even in the coldest weather.



Valves.

The valve levers have been changed from malleable iron to drop forged steel. The exhaust lever studs have been increased in size, and valve stem guides are made of drilled rod instead of cold rolled steel.

Crank Case.

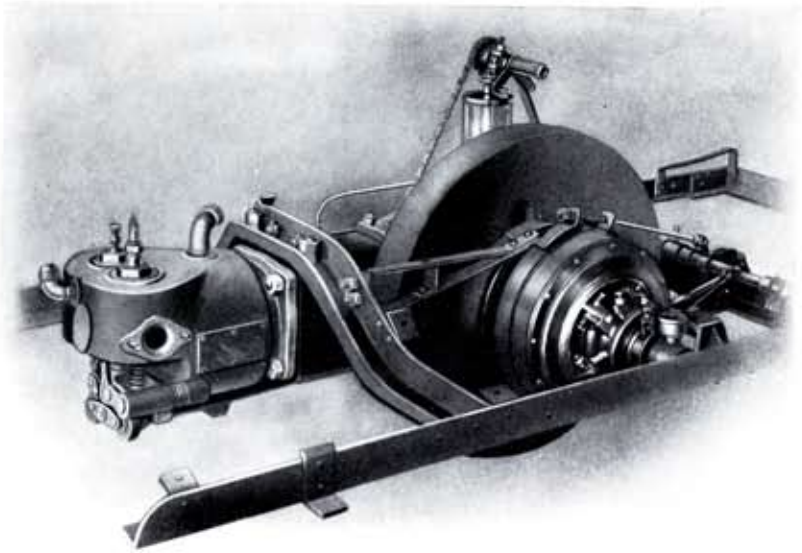
The motor is supported entirely by the crank case, so that the cylinder can be removed without disturbing any of the other important parts. Crank case cover can be removed to inspect crank case, connecting rod and piston. Crank shaft bearings are of large area to prevent wear, and are easily adjusted. They are set at an angle of 45 degrees, which absolutely prevents breakage of main bearing bolts.

Connecting Rod.

The marine type of connecting rod has been substituted for the hinged type. Connecting rod is drop forged. Both ends are easily adjusted from opening in top of crank case The crank end is lined with the best grade of nickel babbitt, while the piston end has a phosphor bronze bushing.

Piston.

Piston has four instead of three rings, and is ground perfectly smooth, round, and exactly to size.

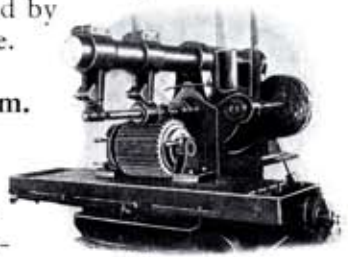


Carburetor.

The carburetor is a new design of the float feed type, provided with an auxiliary air inlet, which always gives a correct mixture at all speeds.

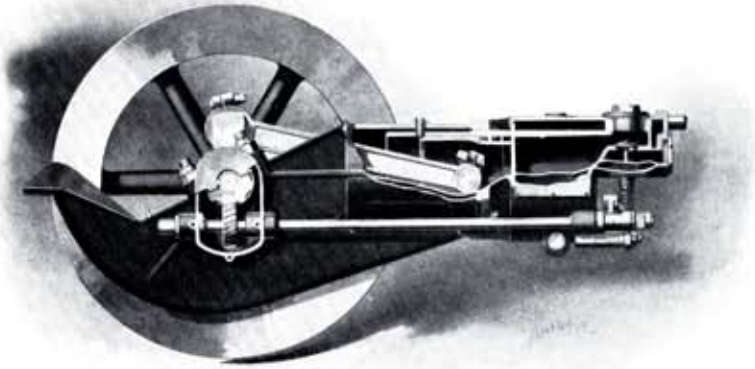
Ignition.

Ignition is by jump spark, two sets of batteries used, with convenient switch for throwing in either set. Special secondary wire is used, which is not affected by oil, as is common rubber covered wire.



Cooling System.

Cooling water is circulated by the positively driven gear pump. The radiator is copper flanged, and is provided with sufficient radiation surface to cool the motor properly for a long run without refilling the tank. The circulating pump has a capacity four times as great as formerly, and is driven direct from crank shaft by a silent chain, which removes all undue strain from the cam shaft, and greatly lessens the wear on the worm gear.



Transmission.

Transmission is planetary, having two speeds forward and one reverse, operated by single lever. All gears are either bronze or machine steel, and are so arranged that a bronze gear meshes with a steel one. Transmission case is oil tight, and all gears run in oil.

Running Gear.

The frame is forged angle steel, riveted together. The springs are of the well known Oldsmobile side spring type, and are very easy riding. Wheels are of the wood artillery type, with pressed steel hubs. The rear axle has a radius rod so arranged that the chain slots always keep in fixed relation to the chain so that in no case does the chain drag on the differential hub.

Control.

The spark control lever is placed in a handy position near the speed lever. Throttle is controlled by a foot lever, and there are two sets of brakes. The hub brakes are operated by foot lever. A ratchet brake which acts on a drum attached directly to the front sprocket has been substituted for the differential brake.

Storm Equipment.

The Standard Runabout, in either form, equipped with top and storm curtain with celluloid windows, makes a comfortable closed car for winter driving.

Model A Specifications

Body—Wood. Side door in both front and rear seats. Aluminum running boards and foot boards.

Color—Gray Brewster Green, or Red.

Seating capacity—Five persons.

Total weight—2,600 pounds.

Wheels—Wood Artillery.

Wheel base—106 inches.

Wheel tread—55 inches.

Tire dimensions—Front, 34x3½ inches.

Tire dimensions—Rear, 34x4 inches.

Steering—Wheel; irreversible.

Brakes—Three; cardan shaft operated by pedal; rear hub operated by lever.

Gasoline capacity—14 gallons.

Frame—Pressed steel; channel section.

Horse power—35-40.

Number cylinders—Four.

Cylinders arranged—Vertically under hood.

Cooling—Gear pump circulating water through long tube radiator.

Ignition—Jump spark with dry cells and storage battery.

Drive—Bevel gear direct.

Transmission—Sliding gear; one lever; selective control.

Speeds—Three forward and one reverse.

Style of top—Extension top or Limousine furnished on special order.

Equipment—A full set of tools, two acetylene head lights, two oil lamps, tail lamp, large horn, and a well designed luggage carrier.

OLDS MOTOR WORKS

LANSING, MICH., U. S. A.

MEMBER A. L. A. M

Canadian trade supplied from
Canadian Factory, Packard Electric Co., Ltd.
St. Catherines, Ont.