# INSTRUCTIONS

FOR OPERATING
AND MAINTAINING

BUTLER TRUCK

MOTOR COMPANY
MICHIGAN, U.S.A.

# Buick Model 10 Instruction Book

THE average purchaser of a motor car is naturally desirous of securing a great mileage at a comparatively low cost. Furthermore, he is anxious to avoid, as far as possible, the unwelcome and embarrassing roadside delays, which could in many instances be avoided. It is impossible for any book of instructions to diagnose in advance the problems which an operator may encounter. Complete knowledge of a motor car can only be gained by experience. The purpose of this instruction book is to give such points in the operation and care of the BUICK Model 10, as will reduce all difficulties to a minimum

# Instructions for Operating and Maintaining Buick Model 10

Before attempting to run the car, make sure that the radiator, gasoline tank and oil reservoir in the crank case have been filled. The water should be put through the fine screen which is in the top of the radiator. The gasoline should be strained by chamois skin, so that all water may be kept out of the gasoline tank. The oil should be put through a fine screen. Make sure that all of the oil cups on the machine are properly supplied with oil, or grease, as the case may be; also make sure that the transmission has been filled with oil. The motto of every motorist should be: "*Keep all motor car bearings well oiled.*"

After having made sure that the float chamber of the carburetor is filled with gasoline, insert the coil plug, make sure that the spark lever is in a retarded position (the spark and throttle levers are in the retarded position when both are on the extreme upper end of the sector), and that the throttle is advanced about one-third of the length of the sector, then crank the motor.

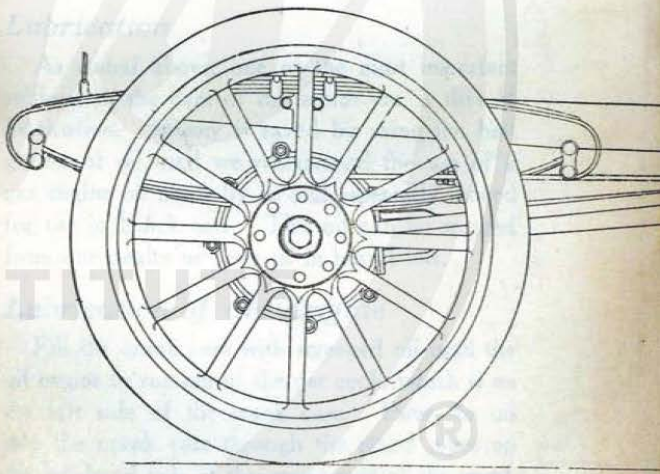
## *How to Operate the Car*

This car has two speeds forward and one reverse. By advancing the spark lever about one-third of the distance on the sector, and by slightly advancing the throttle lever, it will be noticed that the speed of the motor is considerably increased. Next push on the foot pedal, immediately to the left of the steering column, with the left foot, and the car will move forward slowly. You are now running on what is called the low gear. In order to engage the high speed clutch, push the hand side lever forward slowly, but firmly, at the same time releasing the foot pedal. The car will then be running on the "high speed." In order to vary the speed of the car, it is necessary to advance or retard the spark and throttle levers, according as one wishes to go fast or slow. One should always "run on the spark" (i. e., with the spark lever advanced and the throttle lever retarded) as much as possible, at the same time being careful not to cause the motor to "knock." If the motor knocks, retard the spark lever.

## *How to Stop the Car*

First release the high speed clutch by pulling the side lever backwards, and then apply the brake, which is controlled by the right hand foot pedal. In case one desires to stop the car very quickly, pull backwards on the outside hand





lever, which applies the emergency hub brake. In order to cause the car to move backwards, push forward with the left foot on the extreme left foot pedal.

## *Care of the Body*

It may happen that on the arrival of the car there may be dust and other kinds of dirt on the body of the car. Do not remove this dirt by any other means than cold water, which can be applied by a hose, the bare hands or a soft sponge, and then dry the body with a clean chamois. If mud has been encountered, be sure to remove the same from all varnished parts as soon as possible; otherwise spots will remain.

## *Lubrication*

As stated above, one of the most important subjects in the care of the motor car is that of lubrication. Money is saved by using the best grades of oil, and we recommend the use of a gas engine oil made by us and especially refined for use in Buick cars. This oil can be secured from our dealer or from us in barrel lots.

## *Lubrication of the Engine*

Fill the crank case with screened oil until the oil begins to run out of the pet cock, which is on the left side of the crank case. Pour the oil into the crank case through the stand pipes on the left-hand side of the upper part of the crank case.

A gear pump covered by a fine screen is located at the bottom of the reservoir. This pump forces a stream of oil to the fountain sight feed on the dash. The pipe leading from the fountain sight feed on the dash goes to the front compartment of the crank case, where a constant level of oil is kept. There is a small hole in the partition which separates the front and rear compartments of the crank case. This hole permits oil to pass from the front compartment to the rear compartment as rapidly as it is needed. This construction is used so that in climbing a steep hill both the front and rear parts of the motor will have lubrication provided for them. As the oil in the crank case overflows it returns to the oil reservoir below the crank case. All of the connecting rod bearings, crank shaft bearings, and cylinders are lubricated by splash. Funnel shaped cups, cast as parts of the crank case collect the oil which goes to the three crank shaft bearings. All one needs to remember is that as long as the oil is going through the sight feed on the dash, the motor is being properly lubricated.

The above description of the oil circulation is given so that one may understand what to do if anything should go wrong. We cannot imagine anything going wrong unless one were to continually fill the oil reservoir with dirty oil.

The one looking after the car should be sure to let all of the old oil out of the crank case, at



least every five hundred miles, and re-fill with fresh, strained cylinder oil.

## *Lubrication of the Fan*

As the fan is obliged to travel at a high rate of speed, it is important this bearing should receive frequent attention. Non-Fluid K-00 Special Oil is made by the New York-New Jersey Lubricants Co., 14 Church St., New York City, or it can be had from almost any automobile supply house. It is an excellent oil for this place. If this oil cannot be had, a very good substitute is No. 600 W. Steam Cylinder Oil, or No. 0 Albany Grease.

## *Lubrication of Transmission*

The lubrication of this mechanism is highly important, unless one is anxious to pay needless bills. By removing the plug in the side of the transmission case, K-00 Special Non-Fluid Oil can be injected, or if none of this can be had, any good cylinder oil can be used until the place is reached where a good heavier oil can be secured.

The frequency of oiling the transmission depends upon the condition of the transmission bushings. As a general rule one pint of heavy oil every two hundred miles is sufficient, but if the bushings permit an annoying leakage, so that it is necessary to put in oil every twenty to twenty-five miles, one might better have the transmis-

sion rebushed so that he will run no risk of destroying the transmission gears.

The bushings will not get into this bad condition unless the operator allows the transmission to run dry.

## *Lubrication of the Front and Rear Transmission Bearings*

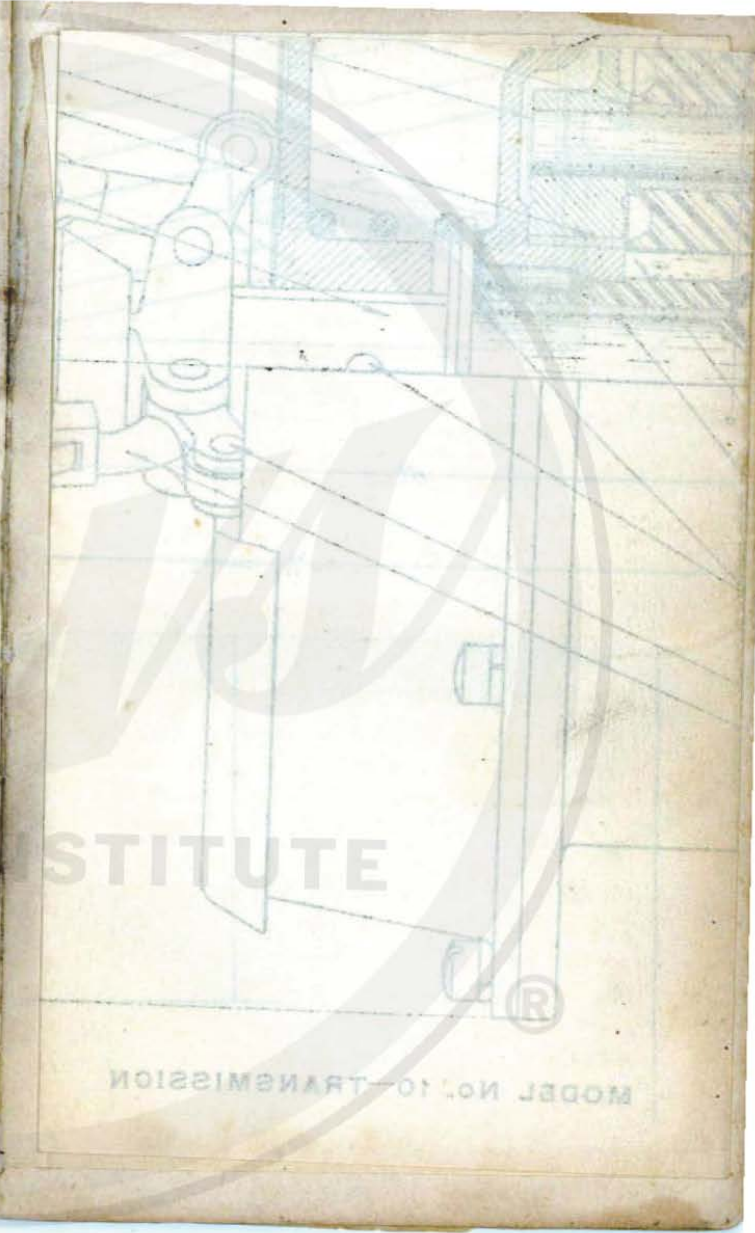
Below each of these bearings is an oil reservoir which holds between three and four ounces of oil. In order to fill each reservoir, one must pour the oil through the oil cup above each bearing. These reservoirs should be filled, at least, once each week.

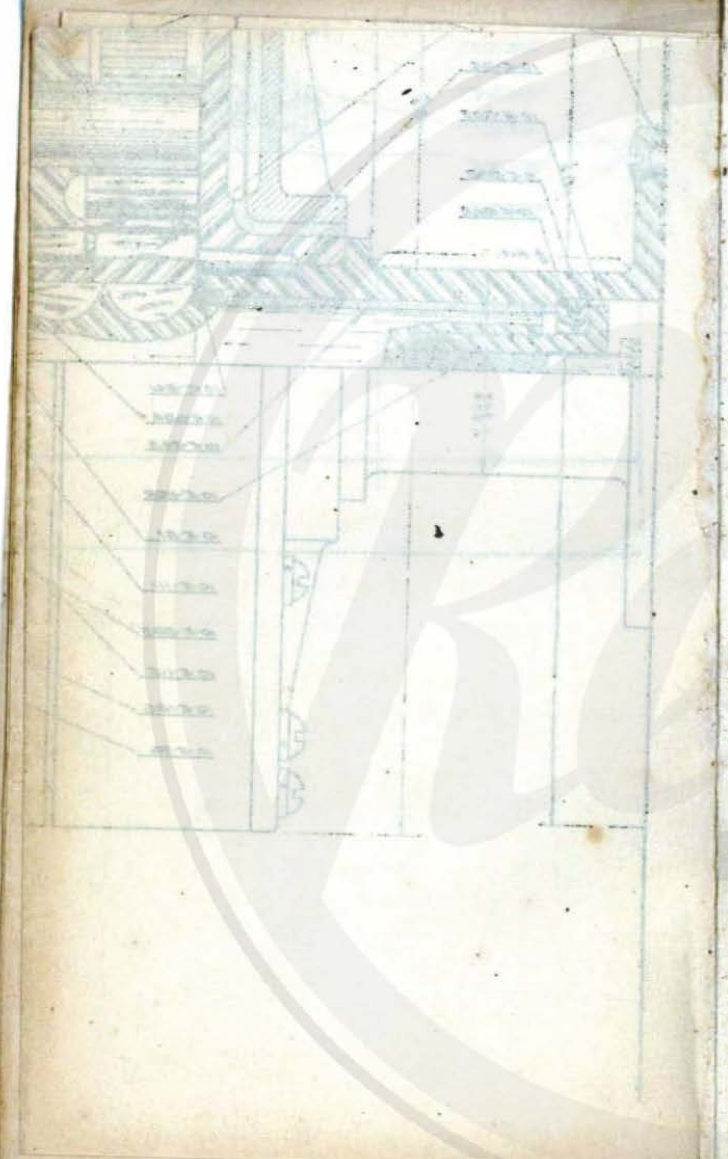
The oil from the reservoir is brought to the bearing surfaces by a wick. Therefore, the bearing receives a constant supply of oil as long as any of the lubricant remains in the reservoir.

## *Front and Rear Axle Lubrication*

For the front axle bearings the use of K-00 Non-Fluid Oil is recommended. The front wheels should be taken off about every thousand miles, the bearings thoroughly cleaned with gasoline and again packed with a heavy oil. Grease cups are provided for the steering knuckles upper rear spring hangers and for the rear axle bearings. Care should be taken to give the grease cup covers one turn every hundred miles. Be sure that the grease cups are full to the cover.







## *Lubrication of Differential and Shaft*

The drive and differential gears are placed in the middle of the rear axle. The differential housing is provided with a plug on the top of the case, so that oil can be readily supplied to the differential. The driving shaft should also be frequently lubricated. Grease cups are provided for this purpose. One turn of the grease cup cover every hundred miles should be sufficient.

The universal joint also occupies a prominent place in the subject of lubrication. This joint can be packed with Non-Fluid Oil. We recommend K-00 or K-000 Non-Fluid Oil.

In order to pack with oil, remove the plug on the side of the universal joint case.

## *Steering Gear*

This should be packed with K-00 Non-Fluid Oil, through a plug which is provided for this purpose. Whoever has the care of the car in hand should go over same very thoroughly until he becomes acquainted with all of the bearings needing lubrication. Of course where there is friction between two metal surfaces, a lubricant of some kind should be used. The consistency, quality and quantity depend upon the work which is to be performed.

## *Gasoline System*

As stated earlier in this booklet, care must

be taken in filling the gasoline tank, to see that no water is admitted. Furthermore, the gasoline tank and carburetor, as well as the feed pipe, should be inspected frequently to see whether or not there is any leakage. Nothing is more dangerous, especially if the owner and his friends are smokers. Great care is taken in the construction of these parts, but an unknown accident may occur.

### *Obstruction in the Feed Pipe*

In order that the carburetor float chamber shall have at all times a sufficient amount of gasoline, it is necessary that the feed pipe shall have no obstructions. Partial obstructions in the feed pipe will be noticed, especially when the motor is running at high speed. A popping noise in the carburetor shows that too little gasoline is being had. Of course this popping noise is sometimes due to other causes than an obstruction in the feed pipe. The best remedy for removing obstructions is to remove the feed pipe, and if compressed air is handy, attach the hose to the feed pipe and force out any dirt, afterwards washing out with gasoline.

### *Adjustment of Carburetor*

First, so adjust the screw which regulates the tension of the spring in the auxiliary air inlet that the valve head is just held against the seat. Do not get the spring so tight that the valve will not open easily.



Before attempting to adjust the needle valve, put the spark lever in the most retarded position and open wide the throttle; then so adjust the needle valve that the motor runs at the highest possible speed. When this point is reached you will then be feeding such an amount of gasoline that the most power will be obtained for every kind of speed.

If a popping noise takes place in the carburetor at intervals, it will show that, too weak a mixture is being had. If the carburetor is feeding too much, the engine will miss explosions and a black smoke from the exhaust will be seen.

### *Flooding of Carburetor*

Sometimes the carburetor will flood because the needle valve is not properly seated, or else dirt has reached a point between the needle and the valve seat. In either case, gasoline will be drawn through in too great quantities. If dirt is the cause the obvious remedy is to remove it. If the needle is not properly fitted, it must be ground so that it will exactly fit the valve seat. Further detailed information concerning the adjustment of the carburetor can be had from the maker of the carburetor.

### *Loose Intake Pipe*

Sometimes the motor begins to miss and no adjustment of carburetor, coil, or anything else will cause the motor to run perfectly. In such

cases always examine the connection between the cylinders and intake pipes. If there is a leak, too much air will be admitted and a poor mixture will be had.

## *Ignition System—Current Supply*

The electric current for this system is supplied by means of a Remy magneto. A reserve set of dry cells is also supplied.

Briefly stated, the low tension current coming from the magneto goes to the switch and coil and from the coil to the circuit breaker on the magneto. The secondary high tension current induced in the secondary coil goes to the distributor and is there distributed to the spark plugs in cylinders one, three, four and two in the order named.

The first and most important fact to remember about a magneto is DO NOT attempt to take the magneto apart. If the following adjustments mentioned do not remedy the trouble, then send the magneto to the manufacturer.

Second: Be sure that the wires are securely fastened at the terminals.

Third: When replacing the wires be sure that the same are securely fastened along their courses, as well as at the terminals.

Fourth: Put a few drops of cylinder oil in the oil cups about every five hundred miles. Here there is danger of oiling too much as well



as not enough. Getting the magneto covered with oil allows short circuiting.

Fifth: If the motor skips and the circumstances indicate that the trouble is in the ignition system, then remove that part which protects the circuit breaker and see if the trouble is in this locality. If the platinum points are pitted get them smooth by means of a fine file. If good contact is not being made so adjust the platinum screws that proper contact will be had. If one has had occasion to disconnect the cables leading from the coil to the magneto, one must remember when making connections that the green cable from the coil goes to the terminal at the right side of the magneto. The red cable goes to the left side of the contact breaker and the yellow cable to the right side of the contact breaker. The other large cable coming from the coil goes to that part of the magneto which acts as the distributor.

There are four terminals on the magneto through which the secondary current is conveyed from the distributor to the spark plugs. When making connections with these terminals remember that the terminal at the right should connect with cylinder number one; the second terminal from the end, with cylinder number three; the third terminal from the end with cylinder number four, and the fourth, that is the one at the extreme left, should be connected with cylinder number two. In other words, the explosions in

the cylinders are in the order one, three, four and two, counting cylinder number one as being the one at the front of the car.

## *Spark Plugs*

In order that a motor shall run evenly and powerfully, it is necessary that the spark plugs shall be clean. If the piston rings do not allow too much oil to get into the combustion chamber, if there is a proper adjustment of the carburetor, if the coil is properly adjusted and if the current supply is good, a spark plug will remain clean; on the other hand, if spark plugs become dirty quickly then an investigation of the above mentioned possible causes should be made. Unless one is absolutely certain of all these adjustments, it is well to clean the spark plugs each morning before beginning to run. The points of the spark plug should be between 1/64 and 1/32 of an inch apart. Always carry at least one extra spark plug.

## *Cleaning Spark Plugs*

A tooth brush and gasoline is a good outfit for cleaning a plug, and sometimes it is necessary to use emery cloth on the porcelain portion of the plug. We have found that the ordinary aqua ammonia, which one can obtain at any drug store, is also a very good solution for removing soot from the plugs. This can be applied by means of a cloth.



## *Circulation*

The motor in this car is kept cool by means of water which circulates around the cylinders through water jackets. This water is kept in motion by a gear pump. The water is forced through the jackets to the top of the radiator. The water becomes cool because it passes through the radiator tubes around which the air freely circulates. From the bottom of the radiator the water is carried through a pipe to the pump. In order that the best results be obtained it is important that no foreign matter of any kind be allowed to get into the circulation, unless the foreign substances are put in there for the purpose of preventing the water from freezing. Partial or complete obstruction at any point in the circulation, immediately causes trouble and while a motor can be run for a little distance without water, yet one does so at great risk. It is a very good practice to flush out the whole circulating system by means of a hose, every three or four weeks. Directions for filling the radiator have already been given.

## *Anti-Freeze Mixture*

What can be more aggravating than to discover some morning that a cylinder has been cracked because the water in the water jackets has been frozen? To guard against this, one should either let the water out of the circulating

system completely, each evening, or better still, if one intends to use the car during winter, a suitable anti-freezing mixture should be employed. Probably one of the best mixtures is 15 per cent wood alcohol (methyl), 15 per cent glycerine together with 70 per cent water.

To ascertain the exact amount of water which the circulating system holds, measure all of the water which is let out. It must be remembered that the wood alcohol evaporates to quite an extent and alcohol should be added from time to time. The above mentioned preventive consisting of alcohol, glycerine and water, will prevent freezing down to 15 degrees above zero, Fahrenheit. As the temperature decreases, increase the percentage of alcohol, so that when eight to ten degrees below zero is reached, the alcohol will be increased to 25 per cent and the percentage of water decreased accordingly. Those who have used alcohol prefer it to other mixtures, because it does no injury and is not very expensive.

Chemically pure calcium-chloride is commonly used. It is cheaper than glycerine and alcohol. Three pounds of calcium-chloride dissolved in one gallon of lukewarm water will prevent freezing at zero. For 20 degrees below zero, use four pounds to every gallon of water. If a handful of unslacked lime is added to the mixture and permitted to dissolve, and then the mixture strained before using, there will



be less risk of the calcium-chloride attacking the solder in the radiator.

## *Tires*

Michelin tires are used on these cars, but care must be taken of the best of tires. Proper inflation is one of the essentials. The tire should be so inflated that when the car is standing on a hard level floor there will be no noticeable flattening of any of the tires, even when the load is in. Do not run on a flat tire. The tire may be cut close to the bead and the inner tube is almost sure to receive injury.

Do not allow oil to come in contact with the rubber, for the reason that it causes the rubber to deteriorate.

Do not skid around corners; nothing strains the fabric more and besides, rapidly wears off the tread. Suddenly applying the brakes brings about the same results.

Remember that sunlight also causes deterioration of the rubber.

Be careful not to pinch the inner tube between the bead and the rim when putting the tire on the rim.

Remember that it is much cheaper to have a cut in the tire, which goes to the fabric, vulcanized at once, otherwise dirt will be forced in between the rubber and the fabric; and furthermore the fabric rots quickly when exposed to moisture.

## *Irregular Explosions*

Some of the causes of irregular explosions have been mentioned. In the greater percentage of cases the ignition system will be found at fault. Under this heading we may mention dirty spark plugs, poorly adjusted vibrator or pitted contact points in contact breaker, weak batteries, loose wire connections, short circuiting, and leaky valves.

## *Short Circuiting*

There is a great variety of ways that short circuiting may take place. Perhaps the most common causes for short circuiting are dirt on the outside of the spark plugs and poor, broken or burned insulation. At night time the place where the short circuiting is taking place can many times be located by a flash of light caused by the spark "jumping." Sometimes it is almost impossible to locate the point of trouble, although you may have proven beyond a doubt that short circuiting is responsible for the missing. If such is the case determine the cylinder affected and then replace the cable.

## *Loose Wire Connections*

Failure to securely fasten both ends of each and every cable may cause irregular explosions, especially when going over rough ground, so that contact is alternately made and broken.



So many times, in trying to determine which cylinder is missing, we see men not only unfasten the secondary wire from the spark plug, but they will hold it at some distance from the cylinder. When this is done, there is great danger of spoiling the coil or puncturing the cable at some point along its course.

## *Carbonization of Pistons and Rings*

Carbonization is caused by feeding too much oil or gasoline, or if the motor has been skipping, the charges will be imperfectly burned and in any case it simply means that there has been incomplete burning of the contents of the explosion chamber with the result that a deposit of carbon is formed. This deposit of carbon will cause the valves to work and fit imperfectly; the piston rings are not allowed to expand properly; the compression is reduced or almost entirely lost and there is a great decrease in the amount of power. Not only is there great loss of power but sometimes pre-ignition may result, due to the fact that a point of carbon gets so hot that when the charge has been partially drawn into the cylinder it will be exploded before the regular spark has been made.

In order to rid the motor of the carbon deposit it may be necessary to tear down the motor and thoroughly scrape it.

Another means of removing the carbon de-

posit is by taking the ordinary oil gun, filling the same with kerosene oil and throwing it through the spark plug hole into all parts of the inside of the cylinder. Let the motor stand over night or for several hours, then start it in the regular manner. It will be found that the carbon has been for the most part washed or burned off, that the sticky rings will expand, the compression will be increased and the motor regain at least part of its power.

Another very good remedy for carbonization is turpentine. Put one tablespoonful in each cylinder while the motor is warm and then let the motor run for one or two minutes.

## *Leaky Valves and Cages*

As was explained in the preceding topic, valves become leaky because of carbonization. They may also come to fit imperfectly because they have become overheated and warped. The same remarks apply to the valve cages. In either case they should be re-ground into place unless so badly warped that they are bound to leak anyway. It must be remembered, however, that valves will not become so overheated as this unless the motor has been run without proper water or oil circulation.

## *The Care of Valve Stems*

The valve stems sometimes carbonize. A few drops of kerosene applied two or three times a week will prove beneficial.



## *Valve Springs*

A weak or broken spring will cause a valve to close imperfectly or not at all, with the result that the motor will skip. It is a good plan when touring to carry an extra valve spring.

## *Knocking in the Motor*

Knocking in the motor can be caused by too early ignition, which is caused by advancing the spark lever too far. Another cause for pre-ignition and consequent knocking in the motor has been mentioned, i. e., pre-ignition by carbonization.

Loose connecting rod bearings and overheated cylinders also cause knocking.

Loose connecting rod bearings are generally due to insufficient oiling, causing excessive wear. In tightening up the bearings care must be used not to get them too tight as this would cause the bearings to heat and possibly cut out. The bearings should be tight enough so that there is no perceptible play when tested by the hand, but they must be loose enough so that the motor will turn over easily.

Overheating may be caused by lack of oil or failure of the circulating system. In either case the remedy is obvious.

Still another cause of knocking in the cylinders is lack of sufficient amount of oil, which in extreme cases will cause the pistons to "set" or scoring of the cylinders, may even take place.

## *Timing of the Motor*

The motor may be timed by taking as a guide the directions which are given on the fly wheel, or one may time the motor by simply remembering that the exhaust valve on each cylinder should close when the piston of that particular cylinder is 1/16 inch past center and that the intake valve of that particular cylinder should open 3/32 inch past center piston travel. The back lash on this motor is 10/1000 inch.

The push rods are adjustable. All of these rocker arm and push rod bearings should be oiled at the beginning of every run. If the rocker arm bearings become worn have them replaced at once as excessive play in any of these bearings makes it impossible to properly time the motor.

Remember at all times, in order to get the best out of your motor, it cannot be improperly timed or full of carbon deposit.

## *Timely Suggestions*

Do not run the motor fast when the car is standing still.

Always determine in what position the high speed lever is placed before attempting to start the motor.

Always make sure that the spark lever is in retarded position before attempting to start the motor. (By "retarded position" it is understood that we mean that the end of the lever is



as far towards the bottom of the wheel as is possible to get it.)

Do not crank the motor until you are blue in the face and the beads of perspiration have started. Find the trouble.

NOTE—On cold mornings the motor can be easily started if a clean dry cloth is put over the air intake of the carburetor. This will allow an excessive amount of gasoline to be drawn into the cylinder and the motor will start very easily. Immediately remove the cloth after the motor begins to run.

Get all of the power out of your motor possible by running on the spark. When this fails advance the throttle and gradually retard the spark lever, manipulating the levers so that at no time will there be any knocking in the motor.

Remember that too rich a mixture, valves being out of time, running on open throttle and a late spark will cause over-heating.

Remember that lubricating oil is much cheaper than anything which remedies the trouble caused by lack of lubrication.

Do not fill the gasoline tank when the lamps are lighted.

Back firing through the carburetor means that you are getting too weak a mixture either because of improper adjustment of the needle valve or because of partial obstruction in the feed pipe.

Firing in the muffler indicates that one or more

charges have failed to be ignited in the cylinders but have been ignited by a succeeding burning charge.

Observe road rules rigidly and take the trouble to find out the state or local laws of the section through which you are passing.

## *Timing the Motor*

Extraordinary care is used in the timing and one should not attempt to change the cams unless on the advice of an expert. Any variations due to wear or differences in seating of the cages can be compensated for by readjusting the push rods. As stated elsewhere, the back lash is 10/1000 inch, but this figure applies only on the "neutral" side, as at the time the cam is up there is a back lash of only 2/1000 inch. Directions on the fly wheel show exactly when the exhaust valves should close and the intake valves should open. Great care should be taken to see that the indicator points exactly at the marks on the fly wheel.

Under the subject of ignition system, the question of correct wiring was touched upon. We now wish to consider what should be done in case the proper relationship and gearing between the magneto and the cam shaft gear should be destroyed.

First. Remember that the lower right hand contact point in the distributor portion of the



magneto is the one where the secondary current for cylinder number one starts.

Second. Get cylinder number one at the height of compression, which on the fly-wheel is marked "center" and then turn the fly-wheel over for two inches on its circumference. In other words, the piston is started on its downward stroke.

Third. Get the mark on the segment in the distributor exactly opposite the contact point above mentioned. In order to do this it will be necessary to remove the idle gear between the cam shaft gear and the magneto gear.

After you have complied with all of the above requirements, put the idle gear into place and it will be found that [illegible] the spark begins when the mark on the segment is opposite the contact point, that the firing in the cylinder will take place at the proper time.

## *Removal and Replacing of Valve Cages*

Take off the drip apron, unfasten the brake have been given elsewhere. The valves are numbered, figures being placed on the bottom of the valve heads. One must see that the valve cages are put in the same ports from which they were drawn.

After the valve cages are in place, see that the back lash is correct, otherwise the timing will not give the best results.

## *Removal of Transmission*

Take off the drip apron, unfasten the brake and radius rods and pull the rear axle backwards so that the shaft is free from the universal joint. Remove the transmission band support springs and uncouple the device on the right of the transmission, which tightens the transmission bands. Free the transmission shaft from the two cross members, free the brake drum, get the Holdham coupling standing vertically, and the transmission, complete with shaft and brake drum, can be let down.

## *How to Take Down the Transmission*

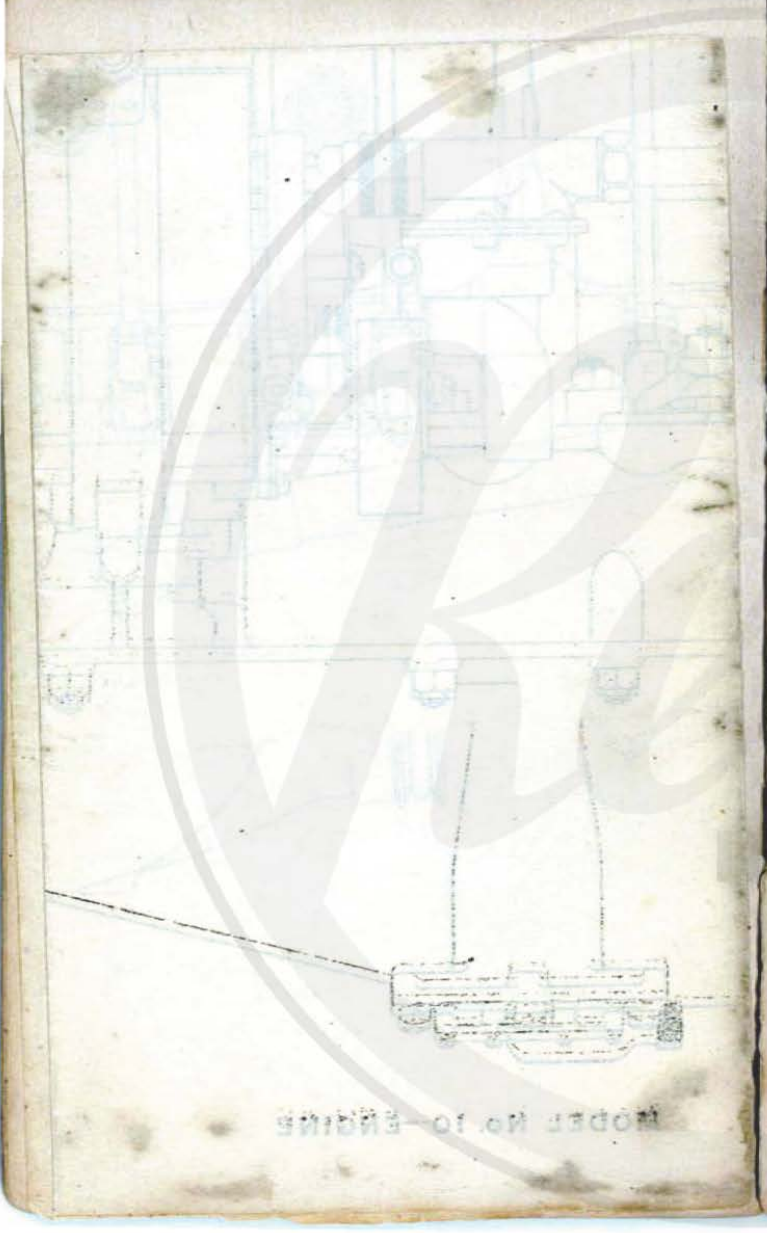
Beginning at the engine side remove the oil guard which is held on by screws. Throw the shifting collar up the shaft so that the cone is in —just the same as when running on high speed. Remove the clutch cone screw.

Turn the transmission over so that the rear end is uppermost. Remove screws of gear case (slow speed ahead drum). Remove bearing plug in drive sleeve, also the washer.

This permits one to get at the inside of the gear case and remove the gears from the pinions.

Pour out the oil, take off gear case and remove the drive gear with a puller. The drive gear is held by two Woodruff keys, which should be driven out. Remove the transmission





shaft. Drive pins out of clutch shifting sleeve, then slide the sleeve towards the engine end of shaft together with the cone and springs; this will allow you to remove the pins which hold the square collar.

When assembling the transmission there is just one point which needs emphasizing and that is, that after the washer has been put between the reverse and drive gears, the drive gear is not to be driven down close enough to the reverse gear so that the latter will be pinched.

Remember that if you have any doubt about your ability to correctly reassemble parts you should always prick punch or in some way mark the parts so that they can be put together as they were at first.

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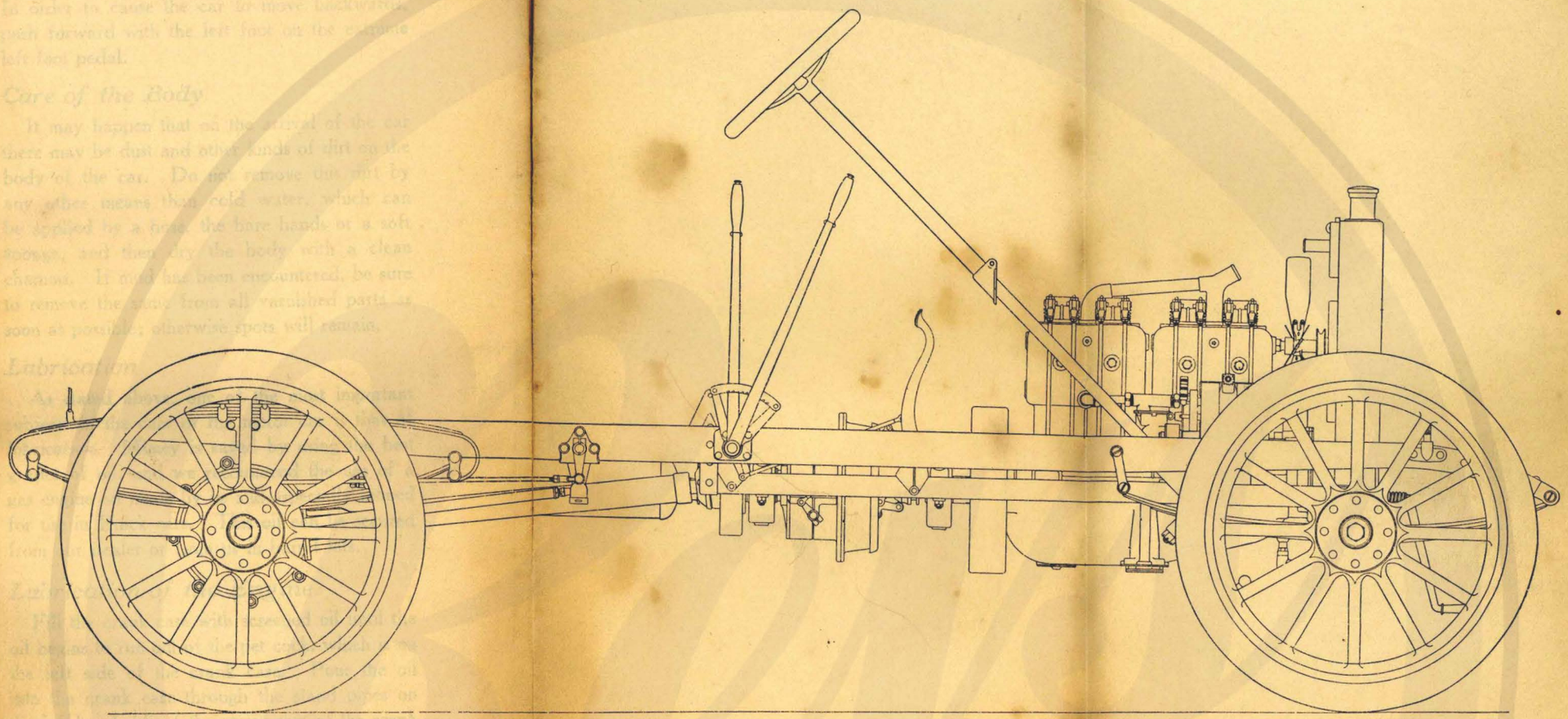
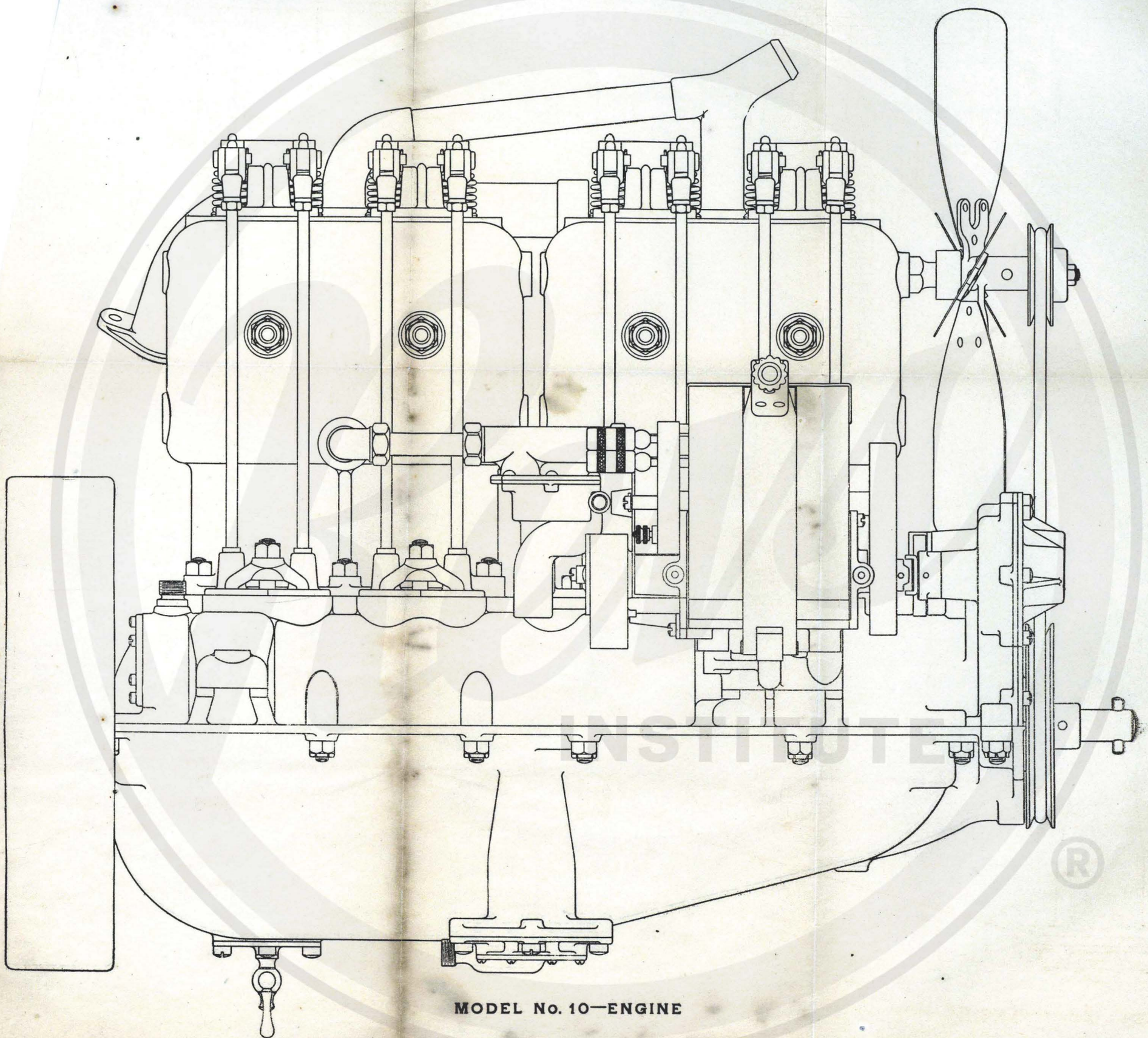


MODEL No. 10—CHASIS



MODEL No. 10—ENGINE