Instruction Book
for the
Thomas Flyer

The E. R. Thomas Motor Company

Buffalo, N. Y.

Directions for Operating the Thomas Flyer

Made by

The E. R. Thomas Motor Company,

Member of the Association of Licensed Automobile Manufacturers,

Buffalo, N. Y.

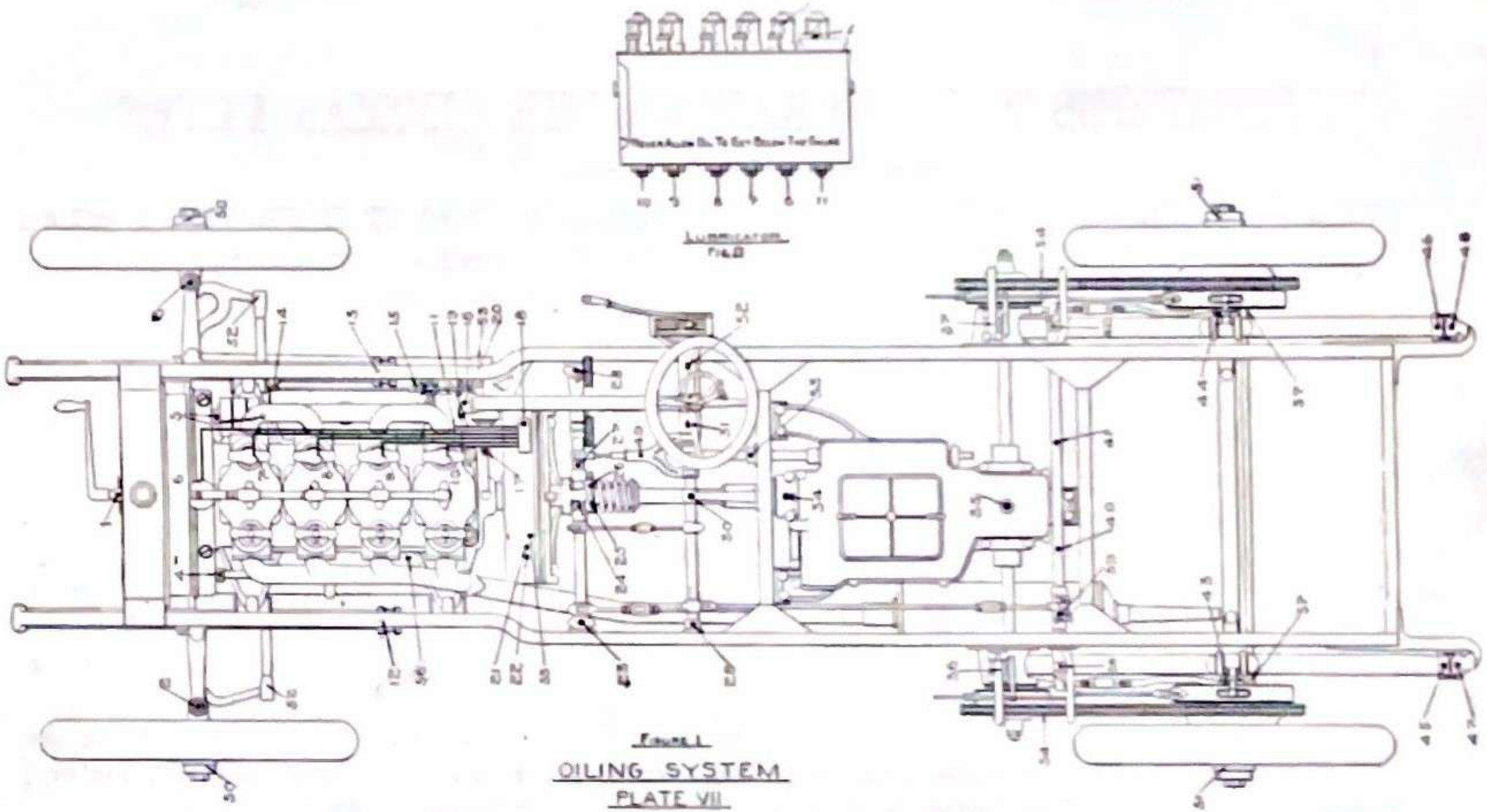


FIGURE I

OILING SYSTEM

PLATE VII

INSTRUCTIONS FOR OILING THE THOMAS FLYER.

Grp No.	Location	Lubricant	Quantity.	Grp No.	Location.	Lubricant.	Quantity.
1	Starting Crank Bracket	Machine Oil	Few Drops Weekly	30	Control Shaft Bracket	Machine Oil	Few Drops Weekly
2	Knuckle	Light Grease	One Turn Daily	31	Control Shaft Tube	Machine Oil	Few Drops Weekly
3	Knuckle	Light Grease	One Turn Daily	32	Control Shaft Tube	Machine Oil	Few Drops Weekly
4	Water Pump Shaft	Light Grease	One Turn Daily	33	Shifter Shaft Bracket	Machine Oil	Few Drops Weekly
5	Magneto	Dynamo Oil	Keep Pocket ½ Full	34	Transmission Sleeve Gear Journal	Grease	Two Turns Daily
6	Fan	Cylinder Oil	One Drop every 2 Min.	35	Transmission Case	Non Fluid Oil	Semi-Monthly Cover Gear ⅛
7	No. 4 Cylinder	Cylinder Oil	Tank Full ev. 125 Miles	36	Counter Shaft Bearing	Machine Oil	Few Drops Daily
8	No. 3 Cylinder	Cylinder Oil	Tank Full ev. 125 Miles	37	Counter Shaft Bearing	Machine Oil	Few Drops Daily
9	No. 2 Cylinder	Cylinder Oil	Tank Full ev. 125 Miles	38	Rear Shaft Bracket	Machine Oil	Few Drops Weekly
10	No. 1 Cylinder	Cylinder Oil	Tank Full ev. 125 Miles	39	Rear Brake Shaft Bracket	Machine Oil	Few Drops Weekly
11	Crank Case Oiler	Cylinder Oil	Tank Full ev. 125 Miles	40	Rear Brake Shaft Sleeve.	Machine Oil	Few Drops Weekly
12	Front Spring Shackle	Machine Oil	Few Drops Weekly	41	Rear Brake Shaft Sleeve.	Machine Oil	Few Drops Weekly
13	Front Spring Shackle	Machine Oil	Few Drops Weekly	42	Rear Shaft Bracket	Machine Oil	Few Drops Weekly
14	Throttle Shaft Bracket	Machine Oil	Few Drops Weekly	43	Radius Rod.	Machine Oil	Few Drops Weekly
15	Throttle Shaft Bracket	Machine Oil	Few Drops Weekly	44	Radius Rod.	Machine Oil	Few Drops Weekly
16	Throttle Shaft Bracket	Machine Oil	Few Drops Weekly	45	Rear Spring.	Machine Oil	Few Drops Weekly
17	Chain Oiler Filling Cup	Machine Oil	Fill Semi-Monthly	46	Rear Spring.	Machine Oil	Few Drops Weekly
18	Lubricator	Cylinder Oil	Never Let It Get Empty	47	Rear Spring Hanger	Machine Oil	Few Drops Weekly
19	Oil Pump Bevel Gear Case	Machine Oil	Few Drops Daily	48	Rear Spring Hanger	Machine Oil	Few Drops Weekly
20	Steering Post Base	Machine Oil	Gun Full Semi-Monthly	49	Lock Sector Pin	Machine Oil	Few Drops Daily
21	Generator (Inside)	Sperm Oil	Few Drops Daily	50	Front Hubs	Grease	Fill Hubs Monthly
22	Generator (Outside)	Sperm Oil	Few Drops Daily	51	Rear Hubs	Grease	Fill Hubs Monthly
23	Pedal Shaft Bracket	Machine Oil	Few Drops Weekly	52	Steering Cross Tube	Grease	Fill Covers Once a Year
24	Pedal Shaft Bracket	Machine Oil	Few Drops Weekly	53	Steering Reach Rod	Grease	Fill Covers Once a Year
25	Clutch Shaft Oiler	Machine Oil	Few Drops Daily	54	Chains—Few Drops Oil Daily	Graphite&Grease	Once a Year Boil In
26	Clutch Shifting Collar	Light Grease	One Turn Daily	55	Contact Maker	Sperm Oil	Couple Drops Daily
27	Pedal Shaft	Machine Oil	Few Drops Weekly	56	Crank Case Filling Cap, Drain every 1000 miles.	Cylinder Oil	Two Quarts
28	Pedal Shaft Bracket	Machine Oil	Few Drops Weekly	57	Safety Pawl and Shaft	Machine Oil	Few Drops Daily
29	Control Shaft Bracket	Machine Oil	Few Drops Weekly				

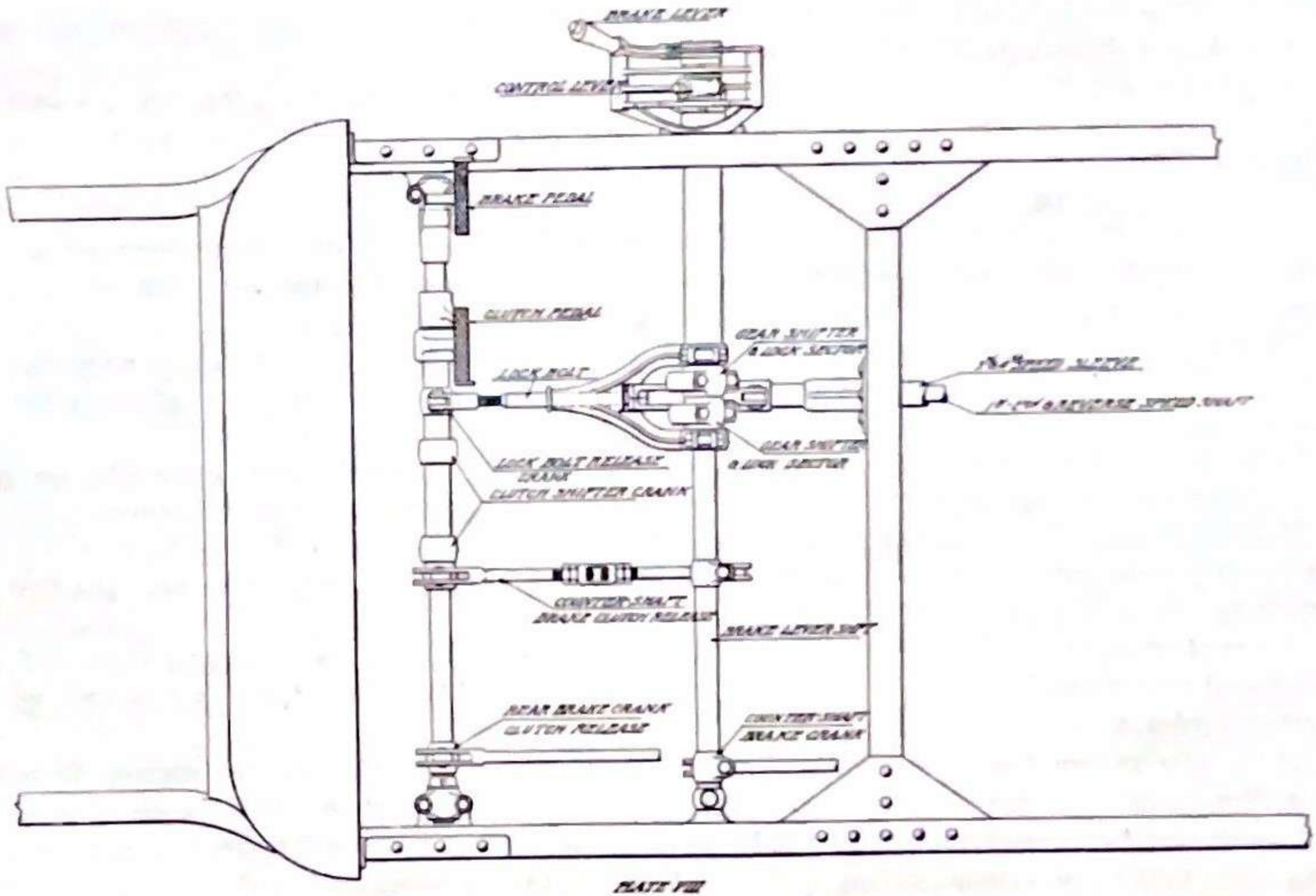

BRAKE LEVER
CONTROL LEVER
BRAKE PEDAL
CLUTCH PEDAL
GEAR SHIFTER & LOCK SECTOR
LOCK BOLT
LOCK BOLT RELEASE CRANK
CLUTCH SHIFTER CRANK
COUNTER SHAFT BRAKE CLUTCH RELEASE
BRAKE LEVER SHAFT
REAR BRAKE CRANK CLUTCH RELEASE
BRAKE CRANK

PLATE VIII

INSTRUCTIONS FOR OPERATING THE THOMAS FLYER.

DO NOT RUN YOUR CAR UNLESS YOU SEE PERSONALLY THAT IT IS PROPERLY OILED IN EVERY PART, AS OUR GUARANTEE DOES NOT COVER REPLACEMENTS AND REPAIRS MADE NECESSARY BY FAILING TO OIL OR KEEP THE PARTS PROPERLY ADJUSTED.

SUGGESTIONS.

Never lose confidence in your ability to handle the vehicle or the motor. The only way to secure this confidence is by a thorough study of every part until you know the entire car.

The satisfaction you will derive from the car depends largely upon the care given and the intelligent operation of it. We therefore trust that you will study the following carefully, to familiarize yourself with the different parts and their functions, as a thorough knowledge of the car is indispensable.

Any piece of machinery requires more or less attention and lubrication. The automobile is no exception. Many times, we find cars have been run without proper lubrication and adjustment, which not only results in the loss of power, but the damaging of parts affected as well.

While we do not advise dismantling the car to learn its construction, we do strongly urge the careful study of all the working parts. An invitation is extended to all customers to visit the factory, and thoroughly learn the construction as well as the operation of the Thomas cars.

You should study the principle and theory of each system at times when you are not using your car, in order that it may be applied in time of need.

MOTOR TROUBLES.

The two main points to look after on a gasoline engine are the gasoline flow and the electric spark. If these are working properly the engine is bound to do its work. Troubles come from:

1st.—Using too little or too much gasoline, or gasoline of a poor quality.

2d.—Loose wire connections.

3d.—Corroding of the points on the ignition plug.

4th.—Weak batteries.

5th.—Improper contact at the circuit breakers.

6th.—Water or dirt in the gasoline, which stops the flow at the mixer.

7th.—Loss of compression; in this case examine the valves.

GENERAL INSTRUCTIONS.

When the motor does not respond to the throttle, it is usually caused by the carburetor not feeding enough gasoline, or too much, or perhaps some dirt has lodged in the carburetor that may have caused the float chamber to overflow. The best remedy is to take out the float, clean out the small valve chamber and adjust the needle valve on bottom until the motor runs properly.

LOSS OF POWER is usually caused from leaky valves, lack of lubrication, or too rich or too rare a gas mixture, or from brakes binding.

BACK-FIRING is sometimes caused by leaky inlet valves, or too rare a gas mixture.

BLACK SMOKE from the exhaust indicates improper mixture, that is, too much gasoline. Examine the carburetor to locate the difficulty, usually caused from dirt under needle valve, at the gasoline inlet, which will cause it to overflow.

Never use a lighted lamp or candle where gasoline is exposed, as it may cause an explosion. A pocket electric flashlight is much safer and more convenient.

Always use the speeder or throttle wide open when ascending heavy grades, and use this on approaching the grade. Do not wait until you are part way up and the motor commences to labor.

If you come to a bad place in the road or when your motor slows up from overload, throw out the clutch quickly to prevent the motor stopping and shift the gears to one of the lower speeds.

Never leave the car with the motor running, unless the control lever is in the neutral position.

Before starting the engine be sure that the spark lever is at the starting point, which is as far back as it will go, or a few notches forward.

Should you be ascending an extremely stiff grade or passing over rough, sandy or muddy roads, and your engine slows down almost to a standstill, throw out your clutch quickly, allowing the engine to again obtain momentum, and at the same time shift to one of the lower speeds.

In ascending steep hills, it is wise to put in the ratchet and pawl safety device before starting up hill. Never wait to apply this device until after the car has gained momentum backward.

If the car runs slowly and with a jerky, bumpy motion while the clutch is in, relieve it for an instant by throwing out the clutch to allow the motor to pick up again, then start with the first speed, working into the second, third and then high.

Never start your car through the use of high speed gear. Never try to ascend very stiff grades on high speed unless you have sufficient momentum at the foot of the grade to carry you well up before your speed slackens.

If for any reason the drive chains should be taken off the car, be sure to replace them in the same position as when taken off, that is, always have the cotter pins of the chain on the inside.

In ordering parts from factory, order by number, as a complete record is kept of every car under number. The number is located on the right front end of the frame rail.

WHITE SMOKE at the exhaust is caused by too much oil in the cylinder head. The relief cocks at the heads of the motor should be opened to relieve an overdose of oil before starting.

Many automobile owners fail to realize the fact that their car depreciates very rapidly in value by not being properly cleaned or cared for. Mud allowed to dry on the paint leaves spots; it should be washed immediately after it is returned to the coach house. It is well when a car is first received, and before being used to sponge it off well several times with cold water to harden the varnish, and to prevent spotting when first splashed with mud.

The motor gets coated with grease and dust and rapidly puts on a dirty and second-hand appearance. On the other hand, there are cars, which, after running several thousands of miles, look almost as well as they did the day they were turned out. The reason is the first gets no care, and the second is never neglected.

To remove dust from the paint a common large-sized painter's brush is as good as anything, but in muddy weather a soft sponge should be used. The sponge should be frequently plunged into water and daubed on the mud; DO NOT ATTEMPT TO WIPE IT OFF, as this will scratch the varnish. When every vestige of dust is removed, the car may be wiped down with soft chamois leather.

The brush, sponge or chamois used as above, should not touch any greasy part, as it will spoil the gloss of the varnish. Separate cloths or chamois should be used for the motor and gearing, and these parts being cleansed last, care should be taken that no grit or dust is wiped into the bearings. It is almost needless to say that all lubricators, tanks, etc., should be closed during the cleaning process. Much trouble has been caused by neglecting this. A single drop of water in the gasoline will cause trouble.

A little kerosene on the cloths used in cleaning the engine greatly facilitates the removal of grease. To clean the chain, use kerosene and apply it with a common paint brush.

After having removed all the dirt and water from the car, wipe the bright parts with a rag, having a little vaseline on it, and give the chain a coating of tallow and graphite which can be mixed and applied with a brush.

All dirt should be washed off the tires, and having dried them carefully. cuts and bad places should be cleaned out with benzine and then plugged and cemented with pure rubber and solution in order that they may be allowed to harden before being used again.

ON NO ACCOUNT SHOULD A DEFLATED TIRE BE ALLOWED TO SUPPORT THE WEIGHT OF THE CAR. If it is not convenient to repair the tire at once the weight of the car should be taken off with a jack or other support.

There is nothing worse for the tires than to allow them to stand on greasy patches, and as it is almost impossible to prevent oil from dropping on the floor, it is advisable to get a sheet iron tray about five feet long by three wide, having sides about one inch high, and slide it under the car as soon as it is brought in; or a piece of linoleum tacked on a wooden frame may be used.

If your car is not working as it should, do not try to run it, but stop and locate the cause at once. If your motor does not start readily, do not continue to turn the crank, and waste time and energy. There must be something wrong, and you will locate the trouble by going over each system in a careful manner.

E. R. THOMAS MOTOR COMPANY,

Buffalo, N. Y.

Member of the Association of Licensed Automobile Manufacturers.

TO START THE CAR.

Assuming that the tank has been supplied with gasoline, that the radiator is full of water, that the oiling system has been gone over, according to instructions (Plate VII. and Index 1), and after making sure that the switch is thrown in and the spark lever retarded as much as possible for starting on the generator, or advanced somewhat for starting on the magneto, and the gasoline valve open, we are then ready to start the motor.

Release the compression by pulling out the rod at the bottom of the radiator, engage the starting crank by pushing it toward the car, and that when engaged it will be in such a position as to turn the motor by an upward pull. It is well to observe this precaution so as to avoid any accidents from back firing. Thereby one or two quick quarter turns of the crank, the motor should start.

In case the motor does not start readily, flush the carburetor by pressing down on the needle point which comes up through the float chamber. Occasionally the motor will not start readily from too rich a mixture—(too much gasoline in proportion to air), in which case, the compression cocks should be opened and the motor given a few turns to force gas out.

The motor started, the ignition system may now be changed from the batteries to the magneto by throwing in the magneto switch and throwing out the battery switch. Grasp the steering wheel with the left hand, advance the spark lever (14), Plate 1, Fig. 2, so that the motor will have some momentum before throwing in the clutch. Press forward on the clutch pedal (13), Fig. 1, with the left foot so that the clutch will be disengaged (as it is impossible to make any gear changes until clutch is thrown out). Take hold of the control lever (2), with the right hand and swing it to the inside path (9), Fig. 3, of the quadrant. Now push lever forward with a quick motion until you feel the first speed gears come into mesh, allowing your foot to gradually release on the clutch pedal (13). The clutch will be thrown into engagement. The car will start up and be running in first speed. Having gained

CONTROL SYSTEM

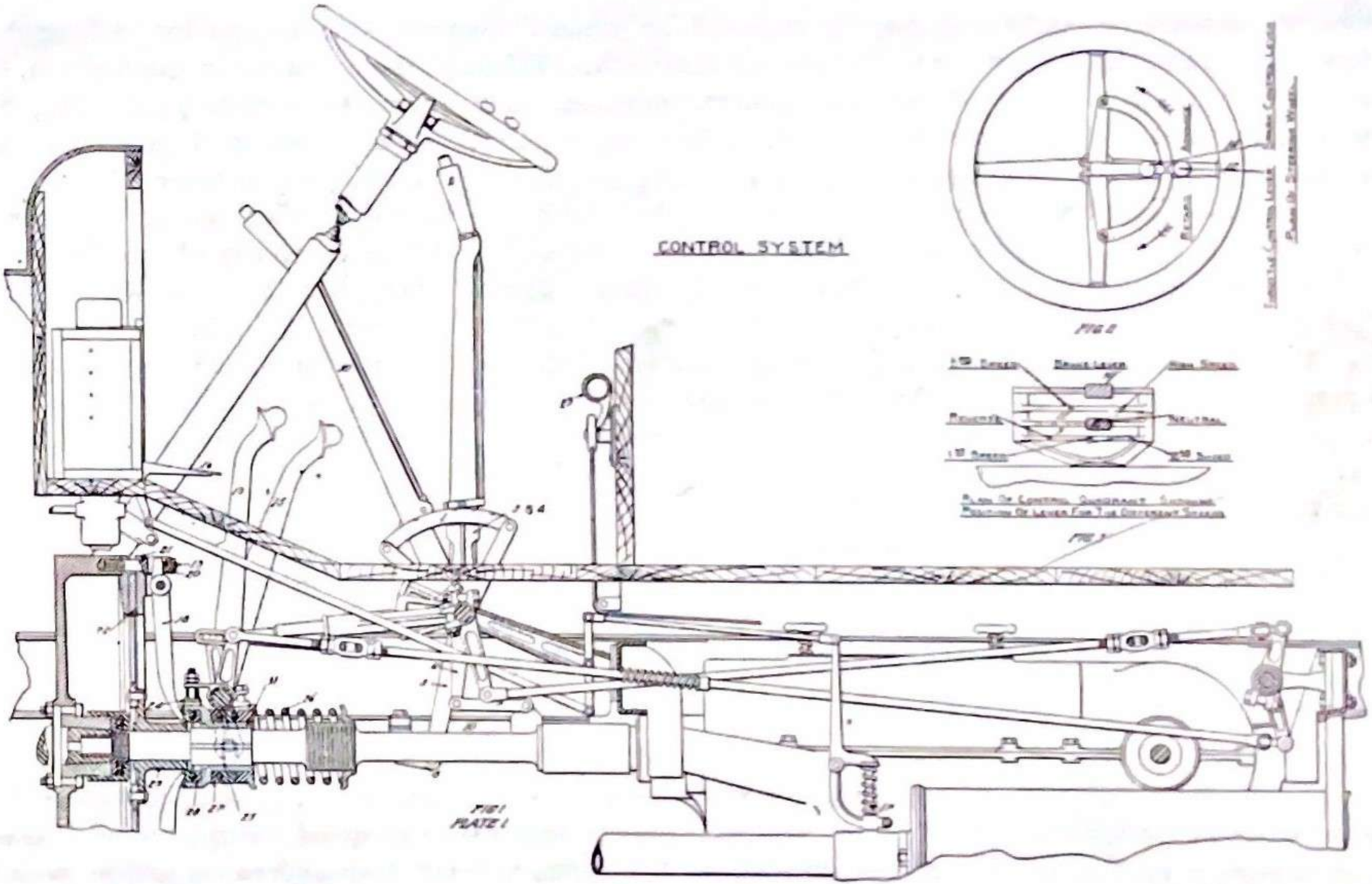


FIG 1
PLATE I

FIG 2

FIG 3

sufficient momentum, second speed may be engaged by again disengaging clutch and by putting the control lever in a backward direction to the end of the path. Having gained greater momentum, again throw out clutch, swing lever (2) back to neutral position, then across to outside path (11), Fig. 3, and with a forward motion enter third speed. Allowing clutch to engage, you will now gain greater speed and be running in third speed. Again throwing out the clutch and pulling lever (2) as far back as it will go, allowing clutch to engage, the car will be running in fourth, or high speed. Greater speed is now obtained by advancing both spark and throttle levers (12-14) located on top of steering post.

To reverse the car move the control lever (2) back into the inside path (9), and swing as far forward as it will go. It is better always to start the car with control lever (2) in the neutral position. Do not try to start the car until sufficient momentum of the motor has been gained, as this would create a severe shock to the whole mechanism. Release the foot gradually from the clutch pedal (13) in order to allow the car to pick up slowly. After you have made the gear shift, increase the speed of the car. Advance the spark by moving lever (14) gradually toward the front, and at the same time moving the throttle lever (12) backward to decrease the amount of gas, unless you are climbing a very steep grade or a very hard road where more power is required.

Never advance the spark too far at one time or too quickly, as the engine will not pick up as rapidly under load, but instead it will start to pound. The correct way to advance the spark lever (14) is gradually, a notch at a time, as the speed of the car increases.

TO STOP THE CAR.

Close throttle, place the foot on the clutch pedal (13), release the clutch, apply the brake gradually with the right foot and move control lever (2) into neutral position. It is well to bring the car to a stop when throwing the control lever (2) from reverse into forward speed, or vice versa. Never allow the engine to race after the car has stopped as this tends to heat it up and cause undue wear.

The motor may be started by simply throwing on the battery switch, and by giving button (7), Fig. 2, Plate II., a quick tap. Do not hold the button down as it will cause back firing, and will rapidly weaken the batteries.

OILING SYSTEM.

On page 3 will be found Plate VII., Fig. 1, showing our lubricating system in detail, on which every oiling point is located and numbered. Accompanying the diagram is an index, each number of same corresponding to a number on the diagram. After each number of the index will be found instruction as to whether that point is for grease or oil, and the proper amount of same required.

Oil is fed to the four cylinders, crank case, and fan bearings by a force feed lubricator (Fig. 2) located in the dash. The lubricator is positively driven from the inlet cam shaft through a flexible shaft and bevel gears, gears incased. A sight feed glass (1) figure (2) is provided on the lubricator for each feed, thereby enabling the driver at all times to see if the proper amount of oil is being fed. Each feed is also provided with a regulating screw (2), whereby the oil flow may be increased or diminished.

Instructions for the amount of oil necessary for each feed of the lubricator will be found under its respective number in the index.

We advise the owner to use the best grade of cylinder oil for the lubricator and crank case, preferably 700 to 800 degrees fire test, a heavier grade of oil for the transmission and other oiling points, and a good grade of grease for the cups.

If you cannot secure such oil as we advise, we will supply the Thomas gas engine oil, put up in gallon cans or in larger quantities.

Besides the two oiling points on the timer, oil should be applied to the contact maker. This may easily be done by removing cap on top of timer. To avoid any trouble at this point in the ignition system we advise the use of a light grade of oil or preferably sperm oil.

These instructions have been carefully worked out by us from practical experience, and we earnestly ask the users of our cars to follow them out to the letter. Particular attention should be paid to the oiling of the car, as it will determine the life of the car, the cost of maintenance and the amount of pleasure derived.

IGNITION SYSTEM.

The Ignition System, like other factors of the Thomas "Flyer," has been given the most careful attention, and after practical tests it was proven that the Thomas system of ignition is as near perfection as money and skill are able to produce.

The car is equipped with a magneto (Fig. 3, Plate 2 and Plate 12) of the Bosch make, and batteries acting through an Atwater-Kent Generator (Fig. 2, Plate 2). Each system is of the jump spark type, acting entirely independent of the other, and through its own set of plugs in the cylinders. Each system is provided with a switch 1-2 (Fig. 1), enabling the driver to bring into use either system or both, as he may see fit. Both systems are controlled by the one spark lever (14, Plate 1) on top of the steering post.

The magneto (Fig. 3) is placed on the right forward end of the crank case. It is directly driven through a pinion on the armature shaft by the inlet cam shaft gear.

The wiring system may easily be traced out from diagram shown (Plate 2, Fig. 1).

The Bosch magneto differs from all others hitherto placed in automobiles in that it dispenses entirely with an induction coil, the high tension current being generated in the armature winding. The spark produced by this magneto is of much higher intensity than that produced by any other system of high tension ignition, as proof of which attention is called to the fact that whereas the spark produced by means of the ordinary accumulator system of high tension ignition will ignite a mixture of petrol, vapor, and air in the proportion of 1 to 15, the spark produced by the Bosch magneto is capable

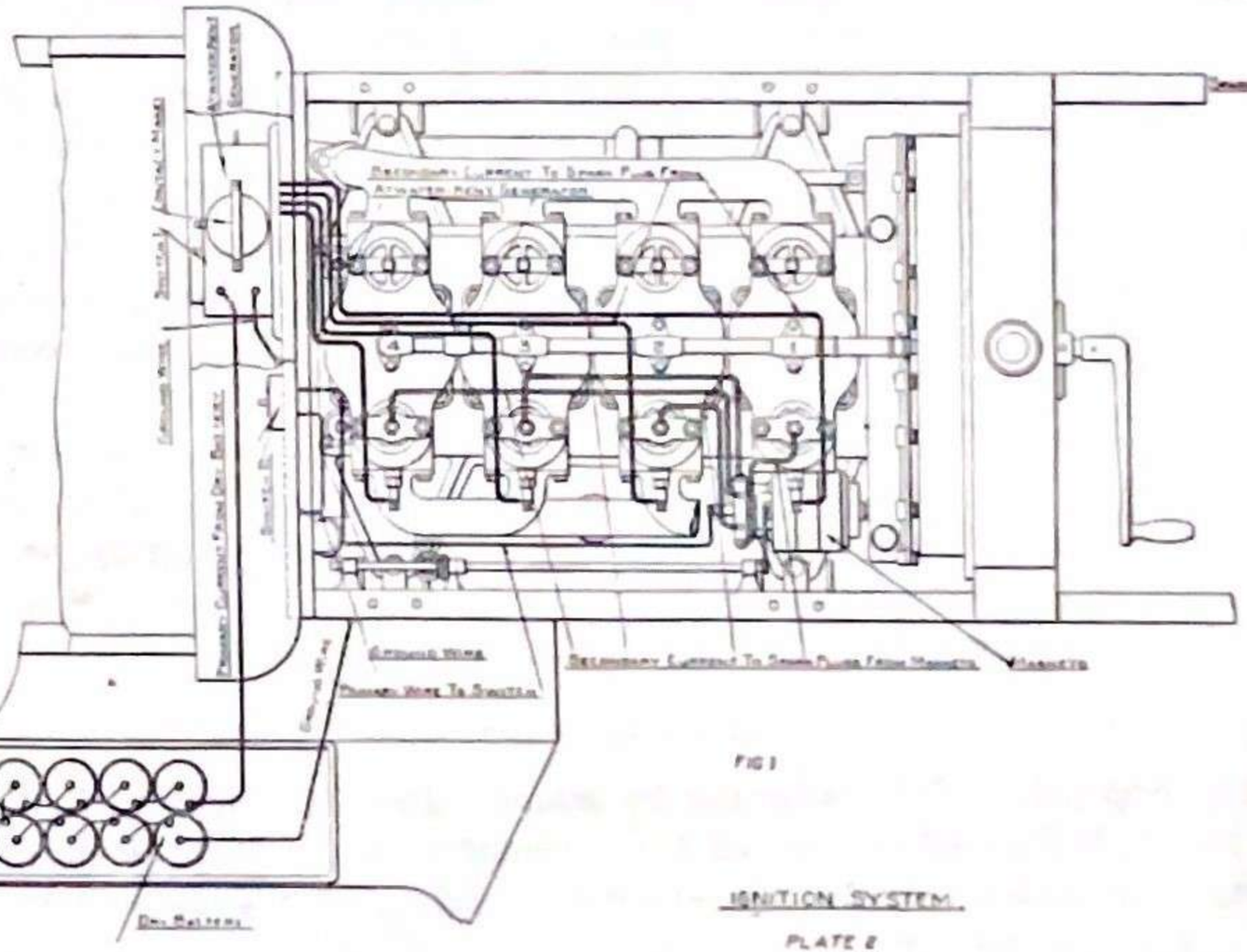
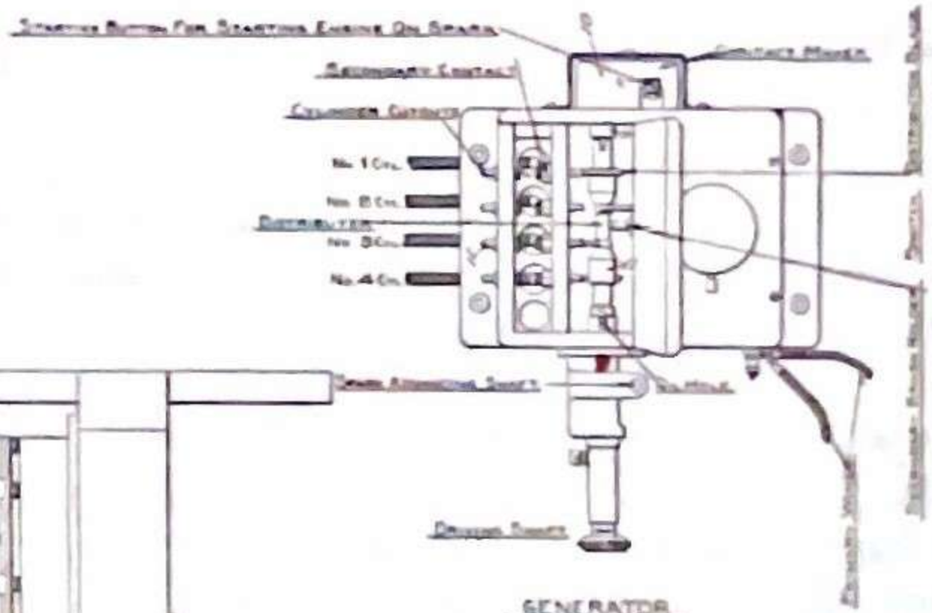
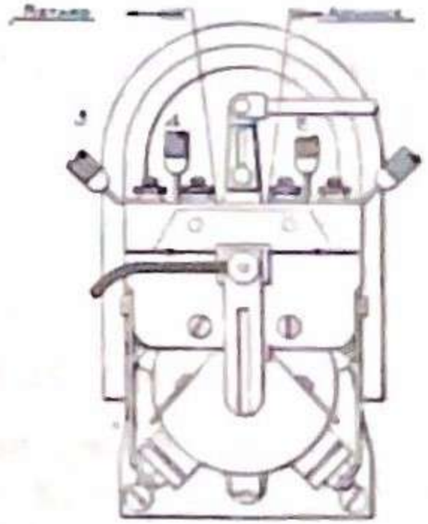


FIG 1



GENERATOR

FIG II



MAGNETOS

FIG 3

IGNITION SYSTEM.

PLATE E

of igniting a mixture of 1 to 19, a fact which has been proven by exhaustive experiments and actual practice.

To prevent the machine from being subjected to too high currents when for some reason the connection between it and the sparking plug is interrupted, whilst the machine is in motion, a safety gap (7, Plate XII.) is placed in the circuit between the bent carbon holder and the conductor bar. This safety sparking gap, however, is only able to stand the discharge of the machine for a limited time, and great care should be taken when operating a motor having a double ignition system, that the discharges are not constantly passed across the safety sparking gap during the time the magneto ignition is not in use. Under these conditions, it is absolutely necessary to cut out the magneto ignition altogether by short circuiting the primary current. For this purpose an insulated wire is attached to the conducting bar (1) by means of the nut (8) and connected with an ordinary switch, the second pole of which is connected with the body of the machine; as soon as this switch is short circuited, the sparking will cease.

Should any irregularity occur in the running, it is necessary in the first place to ascertain whether it is due to the magneto or to some defect in the ignition plugs. If one and the same cylinder misses continuously, while the others continue to work properly, it may, generally speaking, safely be assumed that the defect is due to the ignition plugs. Of course, the only way to make certain of this is to replace the particular ignition plug by a new one.

The following are the principal troubles that may occur in connection with ignition plugs:

I. Short circuiting at the terminals. This is caused by a small globule of metal which, in consequence of the intensity of the spark, is formed on one of the electrodes, and which electrically connects it with the other electrode. This defect can be easily noticed and quickly remedied by the removal of the globule.

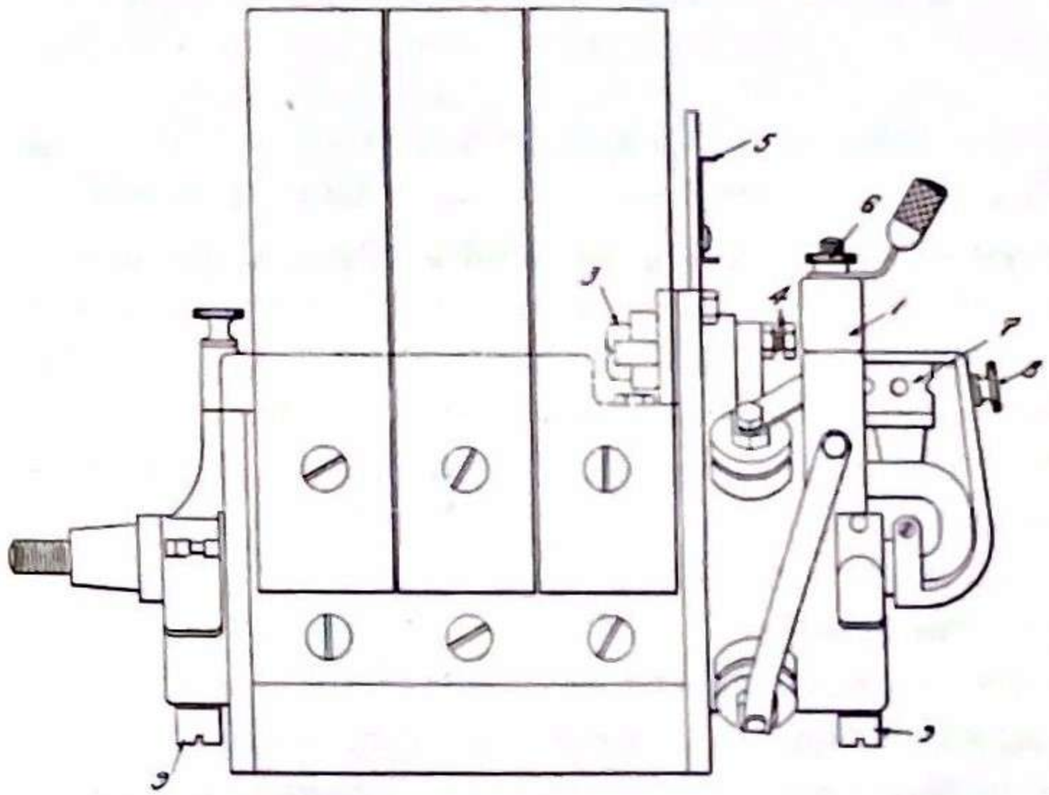


FIGURE I

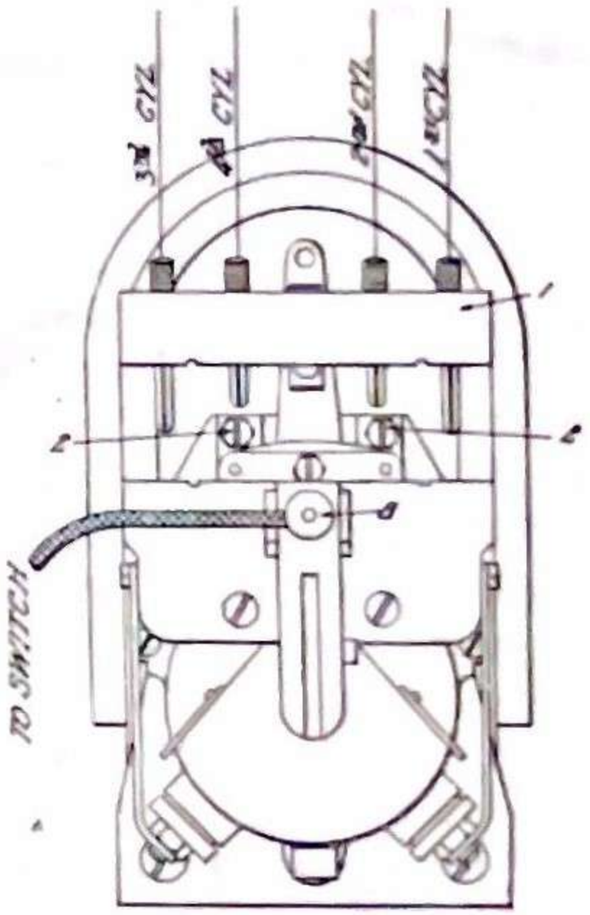


FIGURE II

MAGNETO

PLATE XII

II. Too great a distance between the spark points. The normal distance between the spark points of the spark plug is about 1-64 of an inch. It is always possible to regulate the distance by carefully bending and adjusting the nickel terminals.

III. The coating of the ignition plugs with a sooty deposit. This can be remedied by washing the plugs thoroughly with gasoline. If the entire system fails to work satisfactorily, that is to say, if more than one cylinder misses continuously, it should, in the first place, be ascertained whether the sparks are passing at the safety gap (7). Should this be the case, it may safely be assumed that the spark points of more than one ignition plug are too far apart. If there is no sparking at the safety sparking gap, the contact-breaking disc should be examined. For this purpose the plug contact and the four wires attached to it must be removed and the two screws (2-2) loosened, when the contact-breaking arm can be lifted out from above. The platinum contact of the lever must then be examined to find out whether it is still in working order, and whether its contact surface is clean. If the machine has been in use for considerable time, it may be necessary after running 15,000 miles to replace the platinum contact screws by new ones. To remove the contact screw of the contact lever, it is necessary to first unscrew the screw cap (3), the removal of which sets free the head of the platinum contact screw. The contact lever should always rotate freely, as any stiffness would neutralize the effect of the ignition. When the contact-breaking arm has been replaced in its proper position it is necessary to ascertain whether the rotation of the sleeve causes the contact lever to make and break with the contact screw. By raising the slide (5) one may readily see whether this is the case or not. If it is not, the contact screw (4) must be suitably adjusted. The proper distance between the two platinum contacts should be about 1-64 of an inch when the lever is deflected. Should the ignition suddenly fail completely, it is first necessary to detach the wire which is clamped beneath the nut (8) and by means of which the ignition device is cut out, as the accidental short circuiting of this wire with a metallic por-

tion of the carriage, or motor, may be the cause of the failure of the ignition system. If the ignition still fails to act after the wire has been disconnected, it is necessary to remove the contact-breaking arm in the manner already described, and determine if the shaft of the contact lever has become jammed.

If none of these investigations lead to the location of the trouble, and, if the motor still refuses to run properly, it is advisable to forward the magneto to us and have it repaired.

HOW TO LOOK AFTER THE MAGNETO AND KEEP IT IN ORDER.

It is of the utmost importance that the bearings should be well lubricated. To insure this the oil reservoirs which are fitted to the bearings should be kept 1-3 full of oil (as per instructions for oiling system). These reservoirs are so constructed that it is impossible for the oil to run over. The lubrication is effected by means of felt wicks, which pass through the bottom of the oil reservoirs and are pressed by springs against the journals of the machine. It is advisable to wash out these reservoirs thoroughly with mineral oil from time to time, first removing the screws (9) by means of which the wicks are controlled. The contact-breaking arm should likewise occasionally be thoroughly cleansed. The platinum contacts should at the same time be examined to find out whether their metallic surfaces are clean, and any oil or dirt attaching to them must be carefully removed. If the contacts are found to be worn, they may be resurfaced by means of fine emery cloth. Do not unnecessarily tamper with the magneto, and under no circumstances should the magneto be taken apart. This, of course, does not imply that the contact-breaking arm should not be removed in the manner already described.

The other system installed in the Thomas car is also of the jump spark type, the current being generated by a dry battery of eight cells, contained in a box carried on the running board on the driver's side of the car. The timer and coil are of the Atwater-Kent improved type (Plate II., Fig. 2), both coil and timer being contained in a finished wood box located in the dash. The timer is driven directly

from the pump shaft through universal and sliding joints and through a pair of bevel gears; gears all encased.

The wiring system is shown in Plate II., Fig. 1. Fig. 2 shows a front elevation of the timer and secondary contact makers. The switch (8) is shown located on the outside of the box.

The primary contact maker is located in cup (10) and is mechanically operated by vertical shaft (9). There is but one adjustment in the whole outfit. This is located inside the cup (10), and in the primary circuit. This adjustment makes the spark equal for the four cylinders.

Button (7) is for starting the motor from the spark without cranking. In starting the car by the spark, do not hold the button (7) down; simply give it a tap, allowing it to spring back immediately.

Spark is advanced by the spark lever on the steering post, which causes timer (11) to be rotated either for advanced or retarded spark. Small push rods (12) are separate cut-outs for each cylinder, whereby the operator may ascertain which cylinder or cylinders are missing fire. The consumption of battery is extremely small because spark occurs in cylinders in rotation, and not in four simultaneously. The difference between the current consumption of our apparatus and the ordinary vibrator system can be readily seen by placing a low reading ammeter in the circuit.

The only trouble in this system will be due to loose wire connections, dirt on primary or secondary contact makers.

Should the motor refuse to work, see that each dry cell shows at least 1 volt on voltmeter; also, see that there are no loose wires. If the wires are found to be all tight and motor still does not work properly, look to contact maker. See that this is clean and properly adjusted, which can be ascertained by steering the motor and turning adjusting screw slightly to right or left, as the case may be, so that the motor will fire properly.

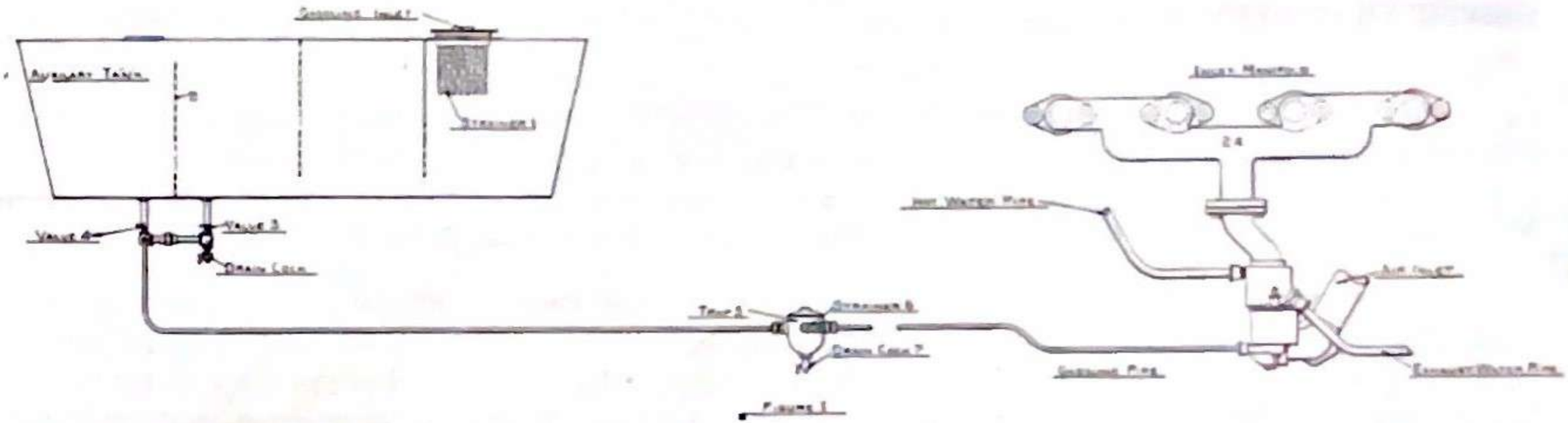


Figure I

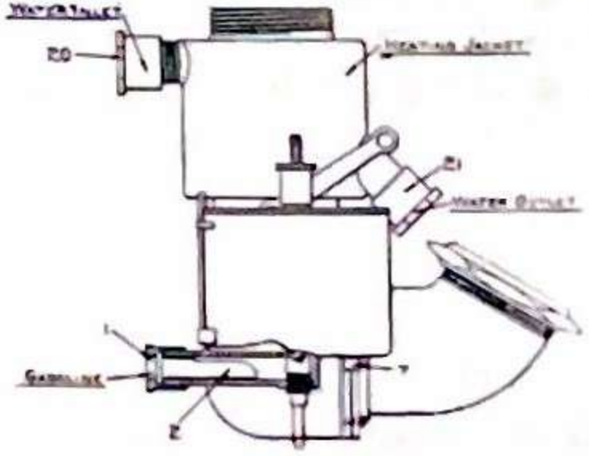


Figure II

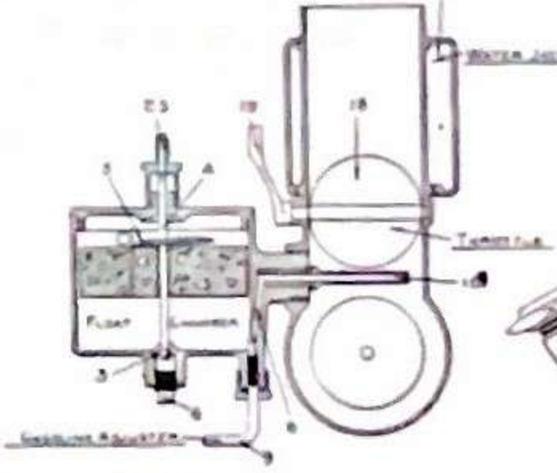


Figure III

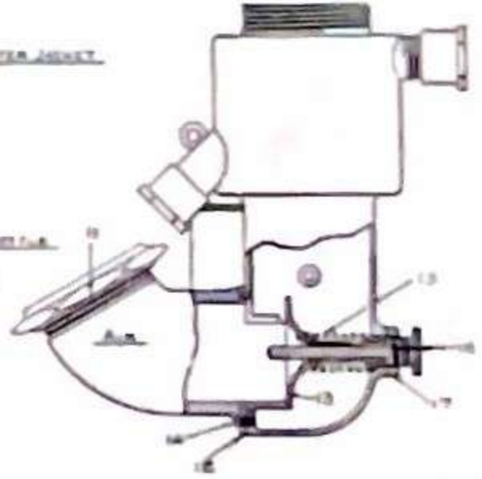


Figure IV

PLATE IV

CARBURETOR.

The carburetor is of the float feed type with automatic air control. Its design is of the simplest, yet insuring reliability and economy. The gasoline enters the float chamber at connection (1) Plate IV. Fig. II. At this connection is provided a strainer (2). which can easily be removed for the purpose of cleaning.

Float is of cork with a thin covering of a light composition, preventing the float from losing its buoyancy.

Gasoline being at the proper level in the float chamber, it is cut off at valve (3) by round head of pin (4), closing aperture by means of the buoyancy of the cork float which is fastened, yet adjustable on pin (4) by wire (5). The float is so adjusted on pin (4) when leaving the factory that the gasoline will be at the proper level in the float chamber, but should the carburetor start to overflow, do not change the setting of the float, for the trouble may be caused by some dirt or sediment on the valve seat (3). The valve seat may be examined and cleaned by removing plug (6). The float chamber may also be cleaned by removing plug (7).

In very cold weather it is possible that ice will form and freeze these parts; this is caused by water in the gasoline. Never attempt to thaw out with a candle or match.

Gasoline leaving the float chamber enters passage (8) governed by needle valve (9). Gasoline flows up passage (8), and passing through tube (10) in the mixing chamber, comes into contact with the air by flowing out through two small holes in tube (10).

The air enters at (11) and the amount entering the carburetor is regulated by collar (12) and by disc (13). Collar (12) regulates the amount of air for slow speed of motor, adjustment being locked by screw (14). Additional supply of air is obtained automatically by the suction of the motor, causing the disc to be moved, thereby increasing the air passage. The action of the suction or disc (13) is dependent

GASOLINE SYSTEM.

We urge that the gasoline be of the highest test, preferably 72 to 76 degrees Beaume, and also advise the use of waterless gasoline. When filling the tank use a large funnel with a piece of chamois skin covering the top. The chamois serves as a strainer, permitting gasoline to pass through and retaining sediment and water. This precaution is not absolutely necessary, but it is well worth the trouble. The gasoline system is shown in Plate IV., Fig. 1.

The gasoline tank is placed under the forward seat and contains twenty-two gallons. At the inlet of the tank there is provided a strainer (1) thus preventing any foreign matter entering the tank. The tank is separated by a partition (2) into two compartments. The smaller one, to the right, is used for an auxiliary tank. Should the gasoline become exhausted in the large, or main tank, the gasoline in the auxiliary tank may be brought into service by closing valve (3), leading from the main tank, and opening valve (4), allowing the gasoline of the auxiliary tank to flow to the carburetor. These valves will be found located on the under side of the tank. Always see that valve (4) is closed, for, if the valve is not closed during ordinary running, the gasoline will be emptied from both main and auxiliary tanks.

The gasoline after leaving the tank, passes through a short length of copper pipe to a small trap (5). The outlet from the trap is provided with a strainer (6) which is located in the upper portion of the trap, thus forcing any sediment or water in the gasoline to collect in the bottom of the trap. A drain cock is provided in the bottom of the trap. This cock should be opened occasionally, allowing any collection to run away. The gasoline, after leaving the trap is carried by copper pipe directly to the carburetor.

upon the tension of spring (15), which tension is regulated and locked by thumb screw (16) and locknut (17).

The gas on leaving the mixing chamber is throttled by butterfly valve (18) operated by lever (19) through connections to throttle lever on steering post. Gas passes to manifold (24) where it is equally distributed to the four cylinders.

A heating chamber (22) is provided in the engine tube. This will greatly aid in vaporizing the gasoline, especially in cold weather. Chamber is heated by hot water from water outlet manifold, water entering at (20), circulating the jacket and passing out at (21).

Carburetor may be primed by pushing down pin (23) located in the top of the float chamber.

WATER SYSTEM.

The water system on the Thomas is of the force feed type, and is as up-to-date in mechanical efficiency as money can produce. As shown on Plate X., the radiator or cooler is placed in front of the hood. Inside the water inlet to the radiator is provided a strainer, preventing any dirt getting into the system. This strainer can easily be removed for the purpose of cleaning. The upper as well as the lower compartments of the radiator form the only storage tanks in the system; the entire system being at all times full of water.

From the lower compartments of the radiator, a tube (1) is run to a small trap (2); this trap is made up of an aluminum casting in two parts. Between the two parts is held a small disc of wire gauze (3), which prevents the passage of any large particles to the water pump. In the lower part of this trap is provided a small valve (4), which drains the trap and pump. After the water passes through the trap it enters the pump (5). This pump contains two small gears which force the water through the system. The pump is driven direct through a pinion meshing with the exhaust cam shaft gear. The water is forced by the pump into the manifold (6); the water is here distributed to the four

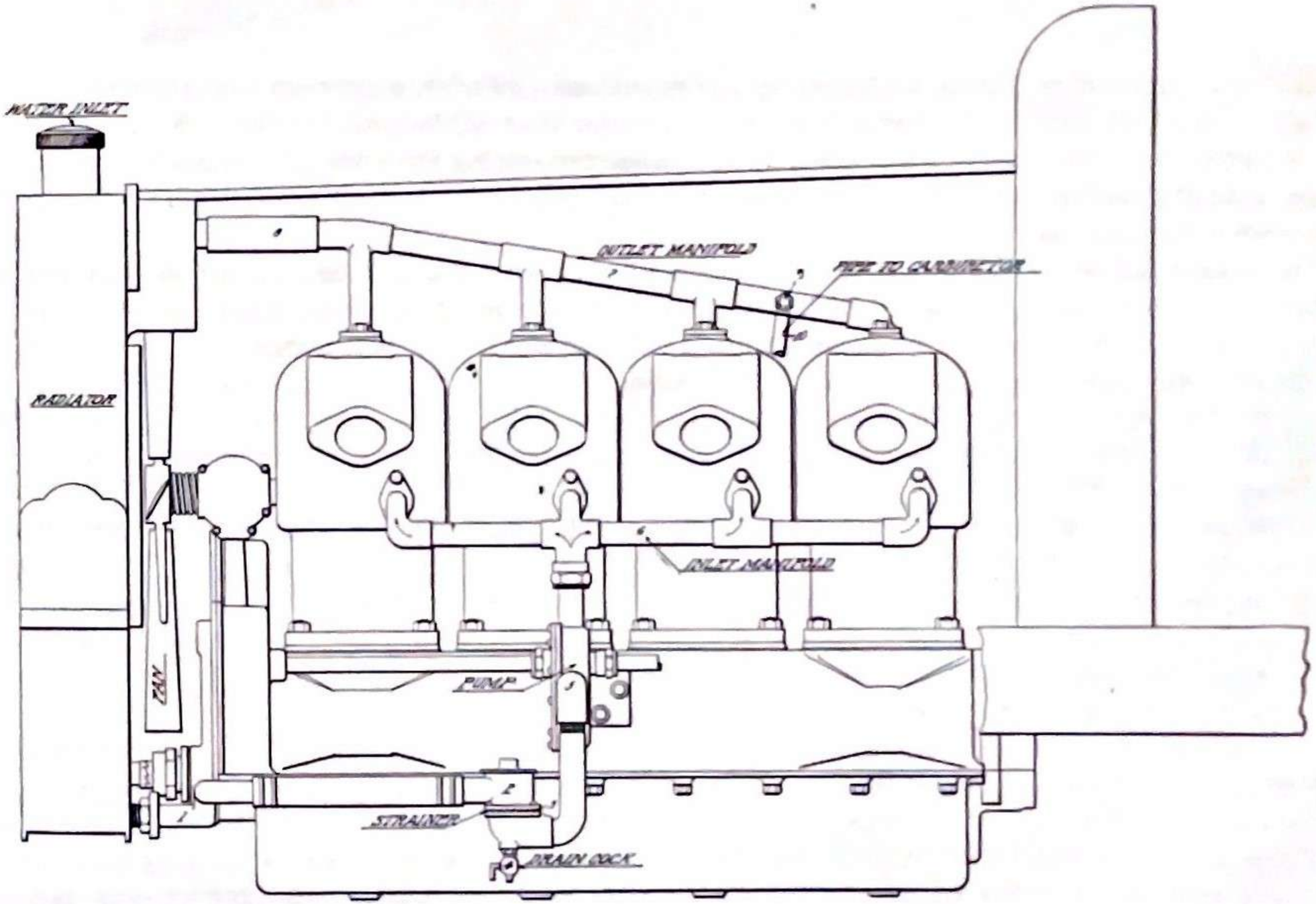

WATER INLET
OUTLET MANIFOLD
PIPE TO CARBURETTOR
RADIATOR
INLET MANIFOLD
FAN
PUMP
STRAINER
DRAIN COCK

PLATE X

cylinders and circulating through the water jacket of each cylinder, passes out into the upper manifold (7). This manifold carries the water back to the upper tank of the radiator through the tube (8). A small quantity of the water, which, having been heated by passing through the cylinder jackets, is carried down to the carburetor through connection (9) and pipe (10); circulating through the water jacket of carburetor back to radiator.

The water in the radiator is cooled by means of a natural draft caused by the motion of the car, and by a fan placed directly back of the radiator. The fan is driven direct by means of a short shaft and two pairs of bevel gears; all gears are incased. The operator may rest assured that the fan is at all times in operation, and that there is little or no danger of his motor heating, as has been the case heretofore with belt-driven fans. The fan has ball bearings which are absolutely oiled by force feed lubrication. No trouble will be experienced with the water system if a few of the following suggestions are carried out.

Use good clear water, free from sediment, dirt and alkaline matter. Rain water is better than well water. Dirty, muddy water will cause trouble. If you are obliged to use water that is not perfectly clear, always strain it, in fact, it is better to do this at all times whether the water is clear or not. Always carry a large funnel with a fine gauze screen in it, in your tool kit for this purpose. It is advisable to open the valve at the bottom of radiator occasionally and drain the whole system, which will help to keep the water clear. If you do not observe this precaution the result may be this: The small tubes in the radiator have only about one thirty-second inch space between them and all the water going through the system has to pass through these tubes before it can get to the lower tank. A very small quantity of dirt may clog these small spaces. More serious results might follow if dirt or small stones should get between the gears of the circulating pump. During the winter or cold weather, when the temperature is below the freezing point, never allow your car to stand for any length of time without draining the water system, as the water, if left in, may freeze and expand and perhaps burst the

seams in the cooler, and possibly the water jackets of the cylinders. If, for any reason, the system should freeze up, the best precaution is to thaw it out slowly. Do not try to start the engine, but pour hot water over the parts slowly until all the ice has been melted.

When draining the system, always open the valve under the cooler and the valve under the water strainer. If this latter valve is neglected all the water in and around the pump will not run out, but will freeze, and the result will be that when the engine is started this ice will be forced into the gears.

After all the water apparently has run out of the system, turn the engine over a few times while the valves are open to circulate any water that may have remained pocketed.

CONTROL.

The control of a car may be divided into four distinct divisions, namely: Gear Shifting, Brakes, Gas Throttle, and Spark Control. We will take up each of these subjects in the order enumerated, and will endeavor to give the owner a thorough as well as practicable understanding of the control of his car.

The gear shifting device is of the selective type, four speeds forward and one reverse, using two paths in the quadrant (Plate 1, Fig. 3) for their respective speeds. The shifting to all speeds is controlled by hand lever (2) through the small levers, 3-4 and 5-6, each fastened to its respective tube of the control shaft; small levers 5-6 being connected by links 7-8 to their respective shifter rod or tube of the transmission, as shown in the drawing.

The control shaft is made up of two tubes, one controlling first, second and reverse speeds, the other controlling third and fourth speeds.

Levers 3-5 are firmly and mechanically fastened to the outside tube, or the one controlling first, second and reverse speeds, while levers 4-6 are fastened to the inside tube, and the one controlling third and fourth speeds.

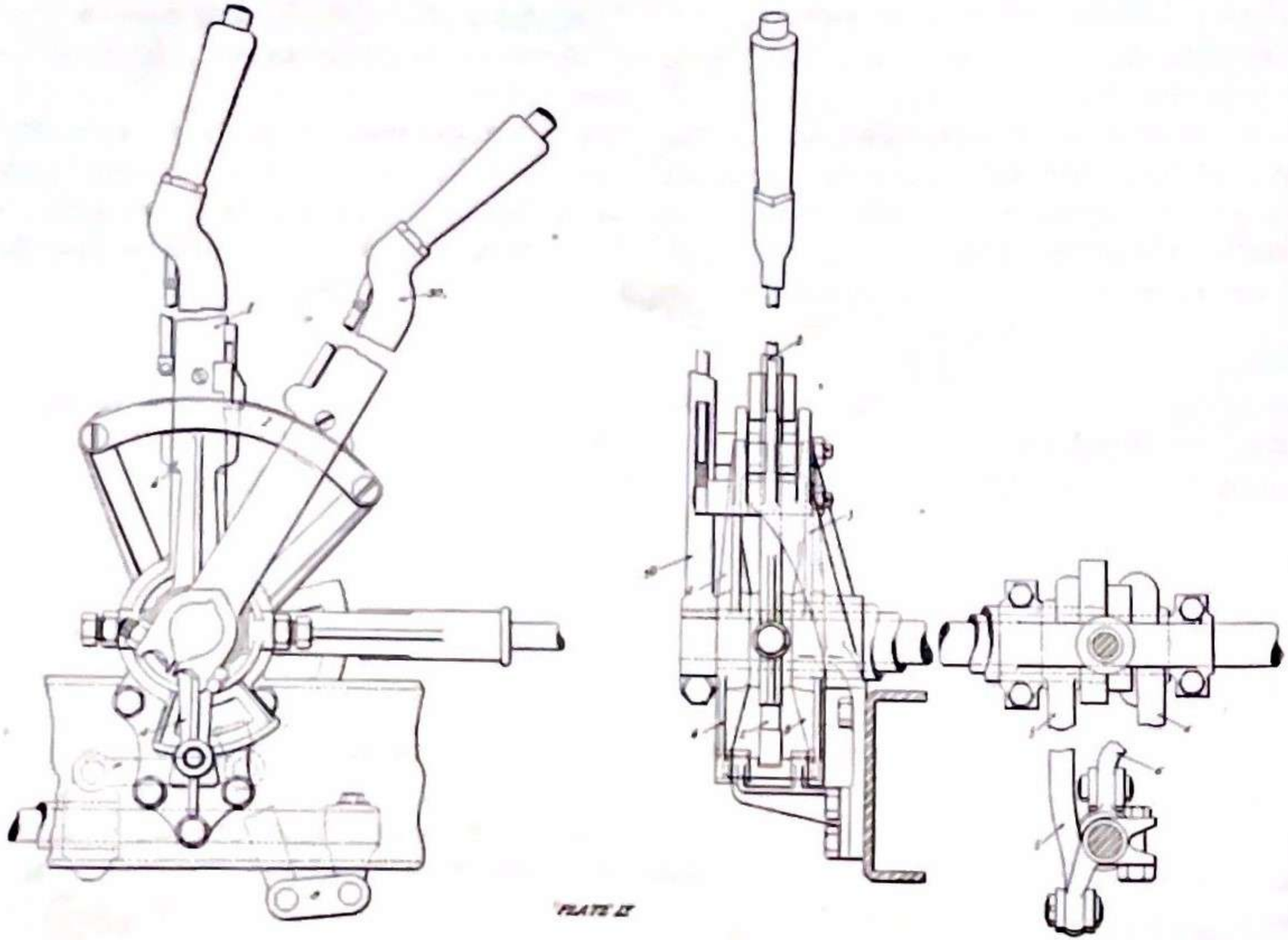


PLATE II

The control lever (2) is so constructed as to be pivoted at the shaft, allowing the lever to be swung longitudinally of the shaft, at the same time able to be swung in an arc concentric to the axis of the shaft, or, in other words, in the paths of the sector.

By swinging lever (2) toward the car, the lever is placed in the path (9) of the sector controlling first, second and reverse speeds, also having engaged itself in yoked end of lever (3). Now, by swinging hand lever (2) forward or backwards, small lever (3) is carried with hand lever (2). Small lever (3) being fastened to the tube, rotates said tube, thereby swinging lever (5) which is firmly fastened to the tube, and by means of link (8) causes rod (10) to be shifted.

By shifting lever (2) forward in this path we engage, 1st, speed, continuing in same direction we enter reverse, by bringing lever in a reverse direction we get second speed.

Hand lever (2) is in a neutral position when placed in the cut-out or position as shown in Fig. 3.

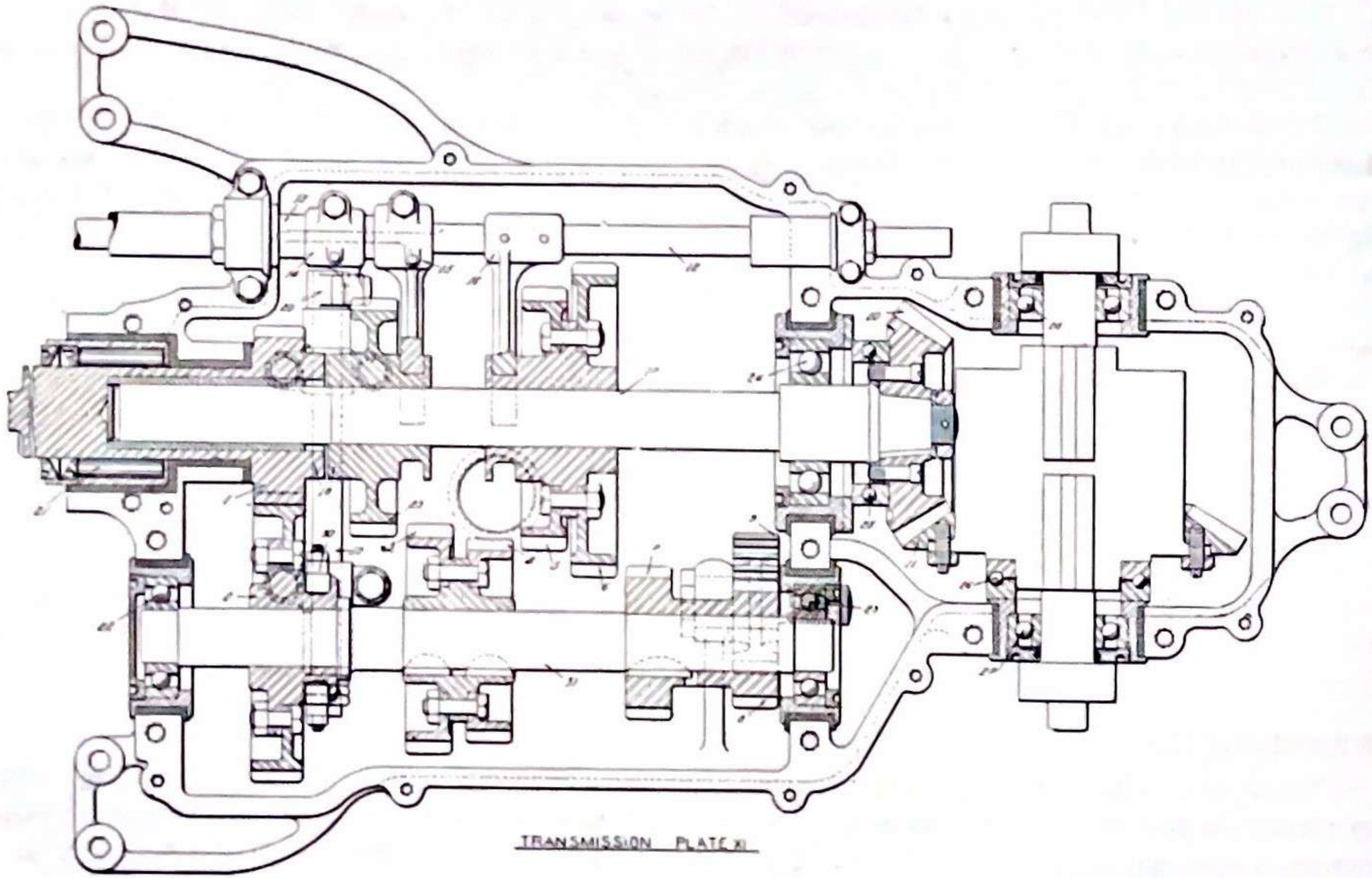
The third and four speeds are brought into operation by swinging lever (2) away from the car into the outside path (11). Control lever (2) engaging short lever (Plate IX.) by swinging lever in a forward direction we get third speed, and toward the rear of the car we get fourth or high speed.

An extension of the hand lever (2) is carried below the control shaft for the purpose of locking and unlocking levers, 3-4, which are also extended below the shaft. (See Plate IX.)

An anti-stripping device is provided whereby it is impossible to shift into any speed until the clutch has been disengaged. This is an important feature, as it prevents an injury occurring to the transmission gears by an application of the load when the gears are not entirely in mesh.

TRANSMISSION.

Transmission is of the shifting gear type, four speeds forward and one reverse. Gears are inclosed in an aluminum case and run in a bath of oil. Gears (29) (5) (6) and (2) are the shifting members, sliding on square parts of shafts (17) (3). Gears are shifted by yokes (15) (16) and (30) each firmly



TRANSMISSION PLATE XI

fastened to its respective tube or rod. Tube (13) controls third and fourth speeds; rod (12) controls first, second and reverse speeds.

First speed is obtained by shifting rod in a backward direction until gear (6) is brought into mesh with gear (7), the power transmission then being from gear (1) to gear (2) from gear (7) to gear (6) and back to sprocket shafts through bevel gears (10) and (11).

Reverse speed is obtained by continuing in the same backward direction with rod until gear (6) is brought into mesh with idler gear (9), the transmission then being from gear (1) to gear (2) from gear (8) to idler 9 then to gear (6).

Second speed is obtained by shifting rod forward until gear (5) is brought into mesh with gear (4), the transmission then being from gear (1) to gear (2) and from gear (4) to gear (5).

Third speed is obtained by shifting tube backward, thus bringing gear (29) into mesh with gear (3). Gears (1) and (2) are always in mesh when gear (29) is in a neutral position, or when gears (29) and (3) are engaged; this is done automatically through levers (14) (20) shaft (9) and yoke (30).

The fourth or high speed is a direct drive and is obtained by shifting tube forward; this engages the two halves of the clutch (18) and (18) and drives direct from bevel gear (10) to gear (11). Auxiliary shaft (31) is now stationary, gears (2) and (3) having automatically been thrown out of mesh.

Bearings are all of the highest grade. Bearing (21) being of the roller type, other bearings are ball bearings Annular type.

The valve timing of the Thomas motor is shown on plate XIV. The timing of the valves have been given special attention, and after making many tests at our factory for the purpose of getting the best results, both as to power and economy, the accompanying diagram was made.

The motors are correctly timed on leaving the factory. Should it become necessary afterward to retime them the owner, by following the diagram, may easily examine the valve motion and adjust same, if necessary.

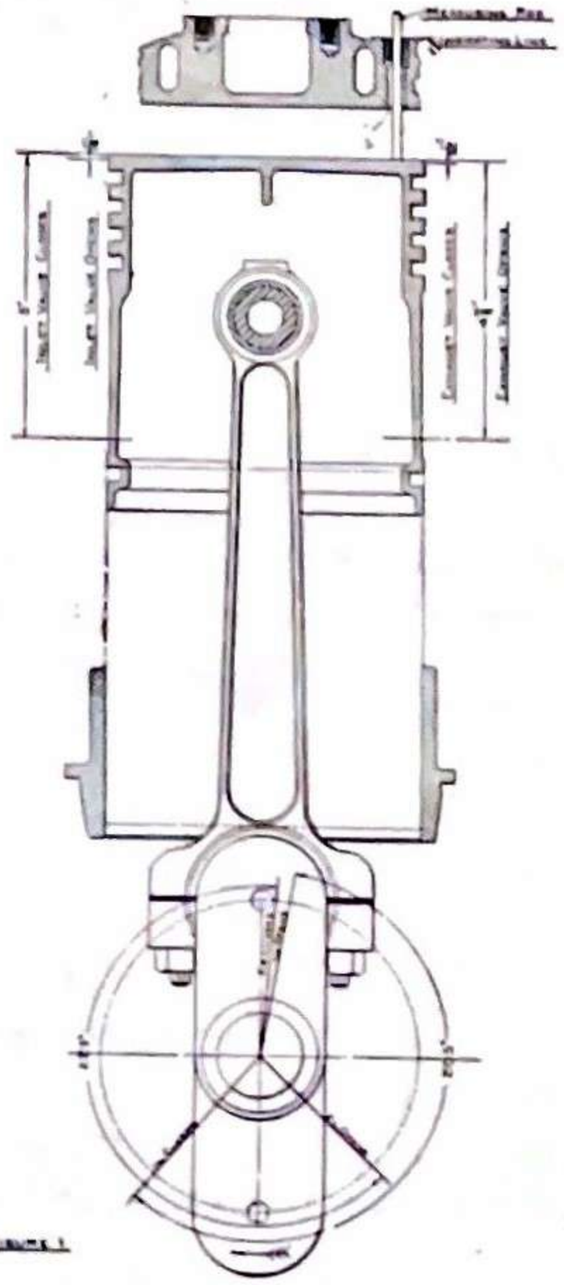


FIGURE 1

PLATE XIV

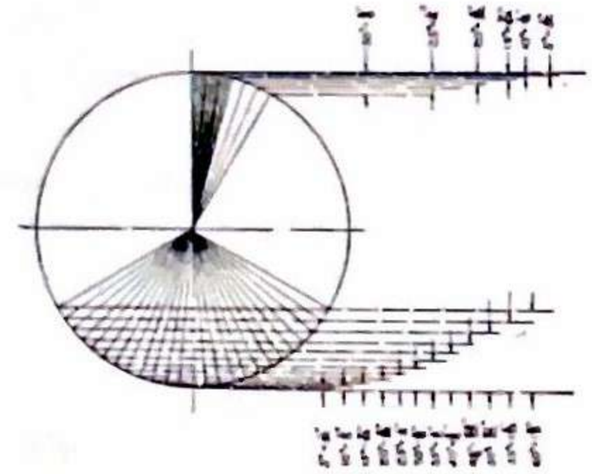


FIGURE 2

CHART SHOWING PISTON TRAVEL AT DIFFERENT ANGLES OF CRANK SHAFT

To test the valves, the piston should be placed at the end of the upward stroke, exhaust valve open, inlet valve closed. Now by placing a rod (1) through the cylinder opening (2) to rest upon the piston, a mark should be made on the rod at a point where the cylinder top cuts the rod, above this mark, a distance of (1-32″) should be measured off and marked, now turn the motor until the second mark lines up with the top of the cylinder, and at this point in the cycle the exhaust valve if properly set should have closed.

Again measure off on the rod a distance of (1-16″) from the first mark, turn the motor until this mark lines up with top of cylinder, now at this point the inlet valve should begin to open.

Again measure off on the rod a distance of 5 inches and proceed to turn the motor past the bottom centre until the mark lines up with the cylinder top. At this point the inlet valve should be closed. Now turn the motor over compression and down to the mark 4⅞ inches. This should be the opening point of the exhaust; should valves need adjusting, same may be done by screws on push rods, same being locked by jam nuts. There should at all times be some clearance between push rod and valve stem. This clearance upon leaving factory is about 1-32 of an inch.

CLUTCH.

The Thomas clutch is of a single disc type (see Plate 1, Fig. 1). The driving disc (22) is riveted to a drop forged hub (23), which slides upon the square of the coupling shaft (25), between the motor and transmission, as shown in the drawing.

When the pressure of the clutch spring (26) is relieved by means of the foot pedal (15) the driving disc (22) floats between the fly wheel and the outer disc (21). Fingers (18) are pivoted near the periphery of the disc (21), the short levers of the fingers (18) swinging in the slots of four studs (20) which pass through the disc (21) and screw into the fly wheel. All the pressure of the clutch spring (26) is exerted upon the clutch center (31) to the long ends of the fingers (18) through the thrust bearings

(27) and (28). The short levers of fingers (18) bearing on screws (19) cause the pressure to come upon the disc (21), the pressure now being increased by a leverage of six to one. This force applied to the disc (21) clamps the inner ring (22) and creates the necessary friction for driving the car.

The four studs (20) have castelated heads which are drilled and tapped for screws (19). These screws are used for adjusting the clutch fingers, this being the only important adjustment on the clutch. Especial care should be used to see that all four fingers are under the same tension for, if they are not, the pressure will be distributed unequally, causing more wear on one side of the disc (22) than on the other. Never forget to put the cotter pins back through the castellated studs (20). Keep bearings well oiled and always oil clutch-shifting collar each day before starting out. The clutch is also provided with a small shoe brake (24) acting on clutch; shifting brake is controlled by clutch pedal (15). The shoe is leather-lined and is held entirely free of center 31 when clutch is engaged.

We call your attention to this clutch brake as by it unnecessary wear on the clutch and transmission bearings is avoided. It renders the shifting of gears practically noiseless.

BRAKES.

The "Thomas" is provided with four efficient brakes; two on the rear wheels and two on the sprocket shafts, as shown in Plates V and VI.

The rear wheel brakes, or the foot pedal brakes, are of the band type, leather lined (1) and working on steel drums firmly bolted to the hubs of the wheels. When the foot pedal is in a released position, the brake bands are so supported at points 4 and 5 that they are held entirely free from the drums.

The brakes are of ample dimensions and will give satisfaction both as to efficiency and durability. Another feature of our braking system is that when the brakes are applied the clutch is disengaged, thus cutting off the motive power. This is done by means of the brake pedal through a simple mechanical arrangement.

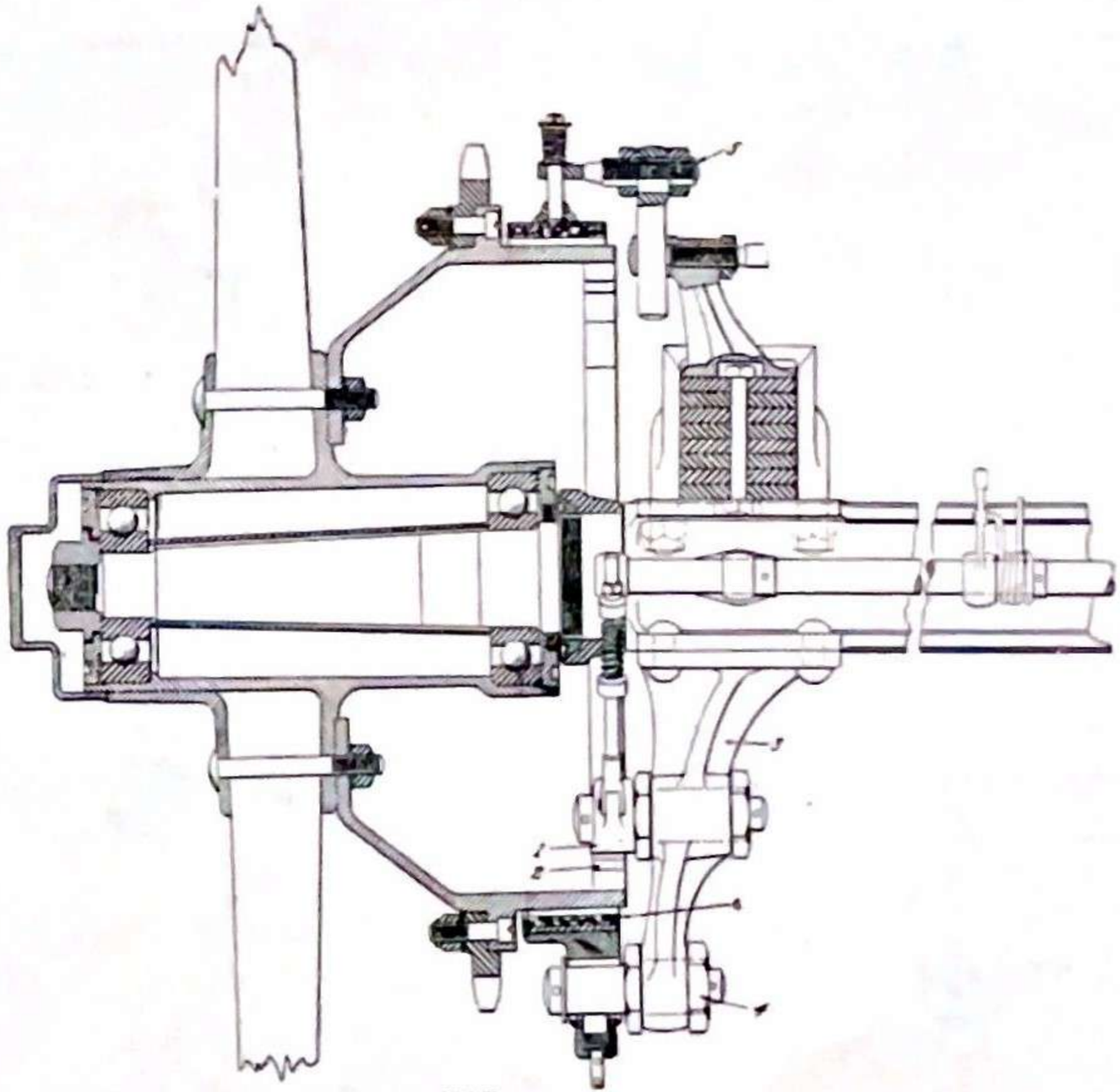


FIG 17
PLATE VI

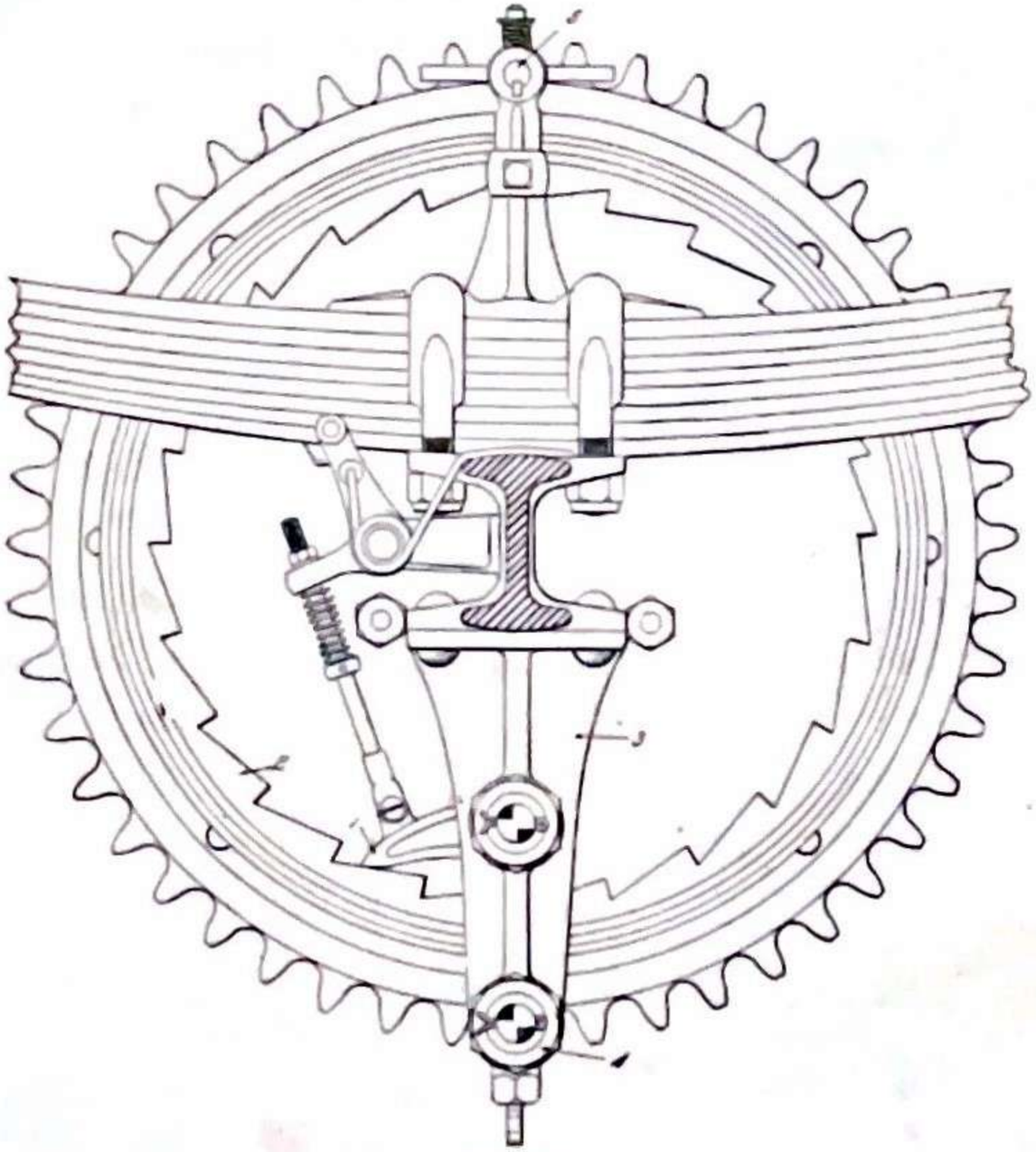


FIGURE I
PLATE VI

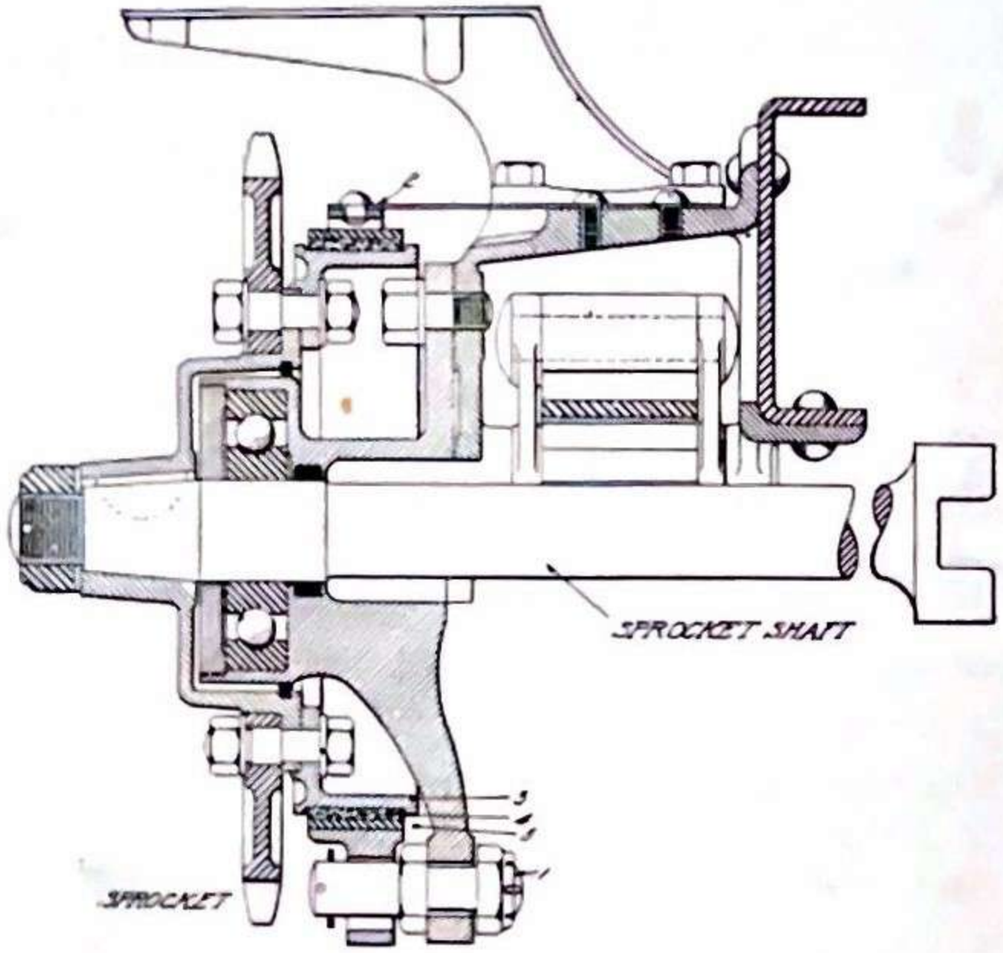


FIGURE I
PLATE V

On the inside of the drum and integral with the casting will be found a toothed flange (2) or internal ratchet wheel; also carried on brackets 3, pawl 1 will be found, which engages in teeth of ratchet. These pawls are operated from the driver's seat by lever (29, Plate 1). This mechanism is famous Thomas patented safety device and without it no automobile is a positively safe vehicle. On starting up a severe grade the pawls should be thrown into engagement by swinging lever (29) in a forward direction. Should you wish to stop your car, you can be sure of an absolutely safe means of holding the car. Do not wait until on the top of a hill, or after the car has started to go down backwards, to throw the pawls into engagement. Look over this part of your car often, satisfying your self that it is in good working order, well oiled and free from mud and dirt.

EMERGENCY BRAKES.

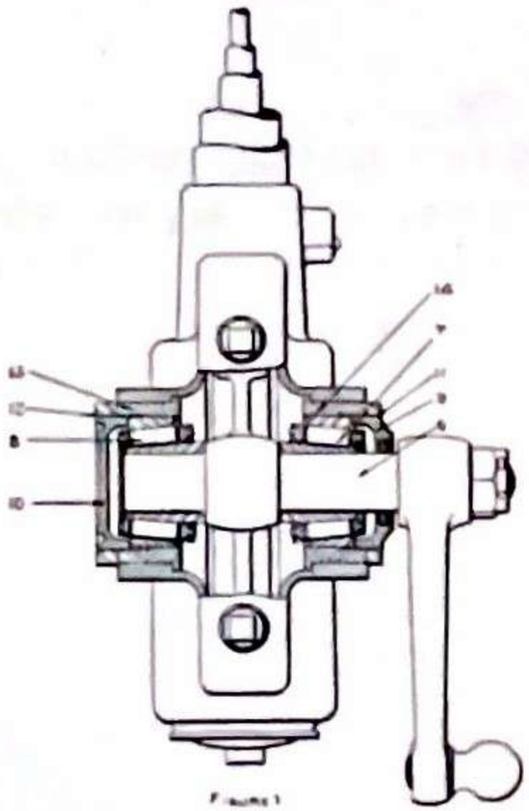
The sprocket shaft brakes (Plate V) are also of the band type placed outside of, and overhanging the sprocket shaft bearing. These brakes are used as emergency brakes and are operated by the emergency brake lever (30) (Plate I). By the application of these brakes through lever (30) the clutch is also thrown out of engagement. Brake bands are also supported at pawls 1-2 so as to be kept entirely free from the drums (3) when lever 30 is in a released position. Drums are fastened firmly to the sprockets so that there is no strain on the counter shaft.

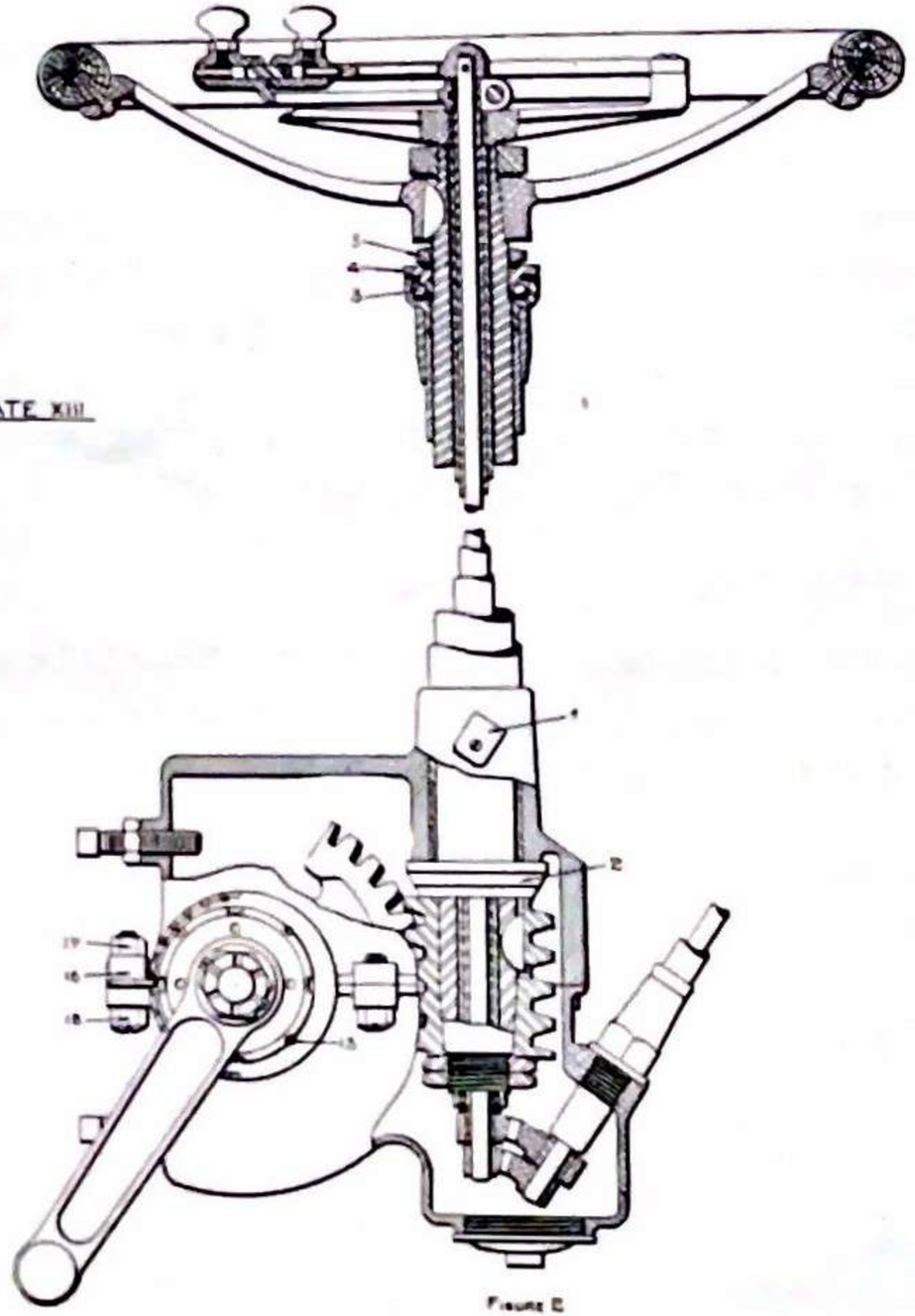
STEERING GEAR.

The Steering Gear of the Thomas "Flyer" (Plate XIII) is of the worm and sector type, entirely incased and working in oil, oil being supplied at point 1.

Ball Bearings 2 and 3 are provided to take up the thrust of the worm, any wear, being taken up at bearing 3 by cone 4, same being locked by nut 5.

PLATE XIII





The sector shaft 6, is provided with the Timken roller bearings 7 and 8. When bearings are properly adjusted and sector is in its correct central position, collars 9 and 10 are so made as to be flush at points 11 and 12. Collars are locked by screws 13.

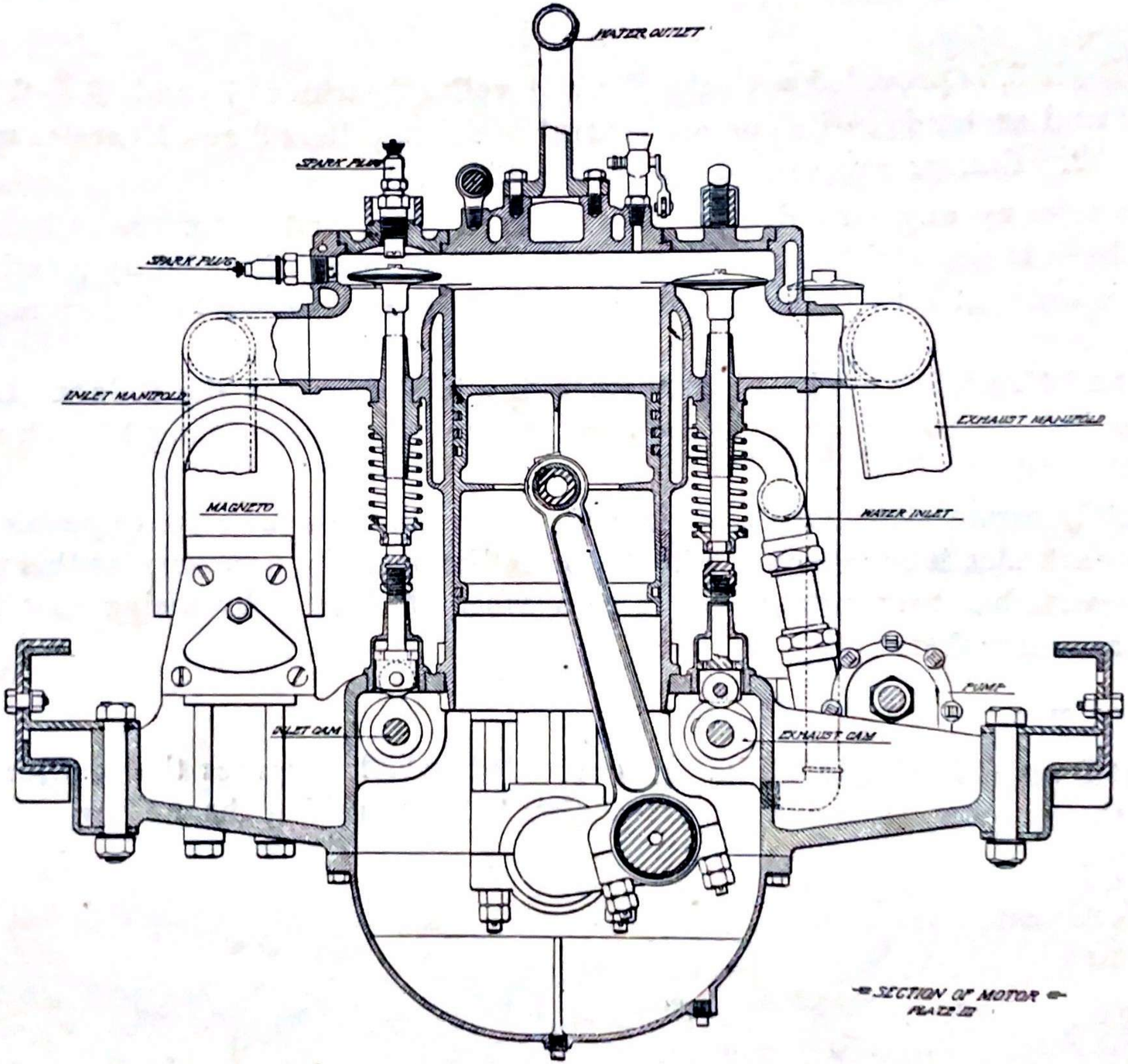
In order to take up any play due to wear between worm and sector the collars 14 and 15 are so constructed as to have their outsides eccentric with the sector shaft. By slightly rotating these eccentric collars the sector is brought into a closer position with the worm, thereby taking up any back lash in the gears.

Collars 14 and 15 are locked by piece 16 engaging in slots out in the collars. Lock 16 is held by nut 17. The holes in lock 16 for screw 18 are elongated and by loosening nut 17, lock may be moved out of engagement with collars.

It is absolutely essential to have the eccentric collars in the same relative position, and in order to make sure of this each slot is numbered. Should any adjustment be necessary at this point assure yourseld that each eccentric has been rotated the same number of degrees by seeing that the lock (16) engages slots of the same number.

MUFFLER CUT-OUT.

A small foot lever (16) (Plate 1, Fig. 1), is provided, which operates the muffler cut-out, allowing the exhaust from the motor to escape at the valve, (17) before reaching the muffler.



SECTION OF MOTOR
PLATE III