

# HINTS

and Advice

For Owners of

# PANHARD CARS

Works  
Humberly Road,  
Birmingham,  
LONDON, N.

HARVEY DU CROS,  
14, Regent Street,  
LONDON.

1905

**HEAD OFFICE.**

Telegrams :—

LEVASSOR, LONDON.

Telephones :—

4245 GERRARD.

5483 GERRARD.

**WORKS.**

VOITURANTE, LONDON.

181 HAMPSTEAD.

189 PADDINGTON.

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# Panhard

and

# Levassor

Concessionnaire exclusif for Great Britain and Ireland and the Colonies,

**HARVEY du CROS,**

14, Regent Street, LONDON, S.W.

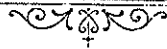
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**WORKS:**

Kimberley Road, Willesden Lane,

**KILBURN, N.W.**

## A Few Panhard Racing Successes.



Concours du Petit Journal 1894  
1ST PRIZE.

Course Paris-Bordeaux et Retour 1895  
Panhard car arrived first.  
SPECIAL PRIZE awarded by the President  
of the Republic.

SPECIAL PRIZE awarded by the town of  
Bordeaux.

Course Paris-Marseille et Retour 1896  
1st, 2nd and 3rd.

Exposition de Bruxelles 1897  
GRAND PRIZE.

Course Paris-Dieppe 1897  
1st, 2nd, 3rd, 5th and 6th.

Course Marseille-Nice 1898  
1st, 2nd, 3rd.

Course Paris-Amsterdam-Paris 1898  
1st, 2nd, 4th and 6th.

Course Paris-Bordeaux 1899  
ALL THE PRIZES

Tour de France, 1899  
1st, 2nd, 3rd, 4th, 6th and 7th

Course de Pau, 1900  
1st, 2nd, 3rd, 5th and 6th.

Course de Nice-Marseille 1900  
1st, 2nd, 3rd, 4th, 6th, 7th

Course Paris-Toulouse-Paris 1900  
2nd, 3rd, 4th

Course Paris-Bordeaux 1901  
2nd, 3rd, 4th 5th, 6th, 8th, 9th

Course Paris-Berlin 1901  
Heavy Cars : 2nd, 3rd, 5th, 6th 7th, 8th  
Light Cars : 1st, 2nd, 3rd.

Exposition de l'alcool 1902  
2 Gold Medals.  
4 Silver Gilt Medals.  
2 Silver Medals.  
3 Bronze Medals.  
1 Objet d'Art (Boats).

Circuit du Nord à l'alcool 1902  
Heavy Cars : 1st, 2nd.  
Alcohol Cup.

Course Paris-Vienne 1902  
Heavy Cars : 1st, 3rd, 4th, 5th, 6th, 7th.  
Arenberg Cup.

Circuit des Ardennes 1903  
First.

Circuit des Ardennes 1903  
First.

Gordon-Bennett Cup 1903  
French team, Panhard Cars, 1st and 2nd.

Exposition de l'alcool à Vienne 1904  
GRAND PRIX D'ÉTAT, and Gold Medal.

Exposition Universelle de Saint-Louis  
1904  
GRAND PRIZE.

Circuit des Ardennes 1904  
1st and 2nd.

Coupe Vanderbilt 1904  
First.



PANHARD Cars having become increasingly popular in this country, we venture to place this little book at the disposal of our numerous clients.

In the limited space at our command we have endeavoured to explain briefly and clearly the construction of the various working parts and to give a few hints as to the general care of Panhard Cars, and also the means to be used to obviate imperfect working and overcome any minor trouble which may arise.

We shall be pleased at any time to receive suggestions from our clients, and trust that the information contained herein may be of practical value.

# The Engine.

Panhard and Levassor engines are propelled by a series of explosions of a mixture composed of petrol vapor and air and work on the Otto Cycle principle. The cycle of operations is as follows:—

**Suction Stroke.** The piston descending produces a vacuum in the cylinder; the inlet valve opens and the mixture goes in.

**Compression Stroke.** The piston ascends, the inlet valve closes and the mixture is compressed by the piston at the top of the cylinder.

**Explosion Stroke.** When the piston is at the top of the compression stroke the mixture is fired, and by the explosion produced the piston is forced to the bottom of the cylinder. The mixture is fired through the medium of a sparking plug.

**Exhaust Stroke.** The exhaust valve opens, and the piston returning upwards, forces out the burnt gas which filled the cylinder.

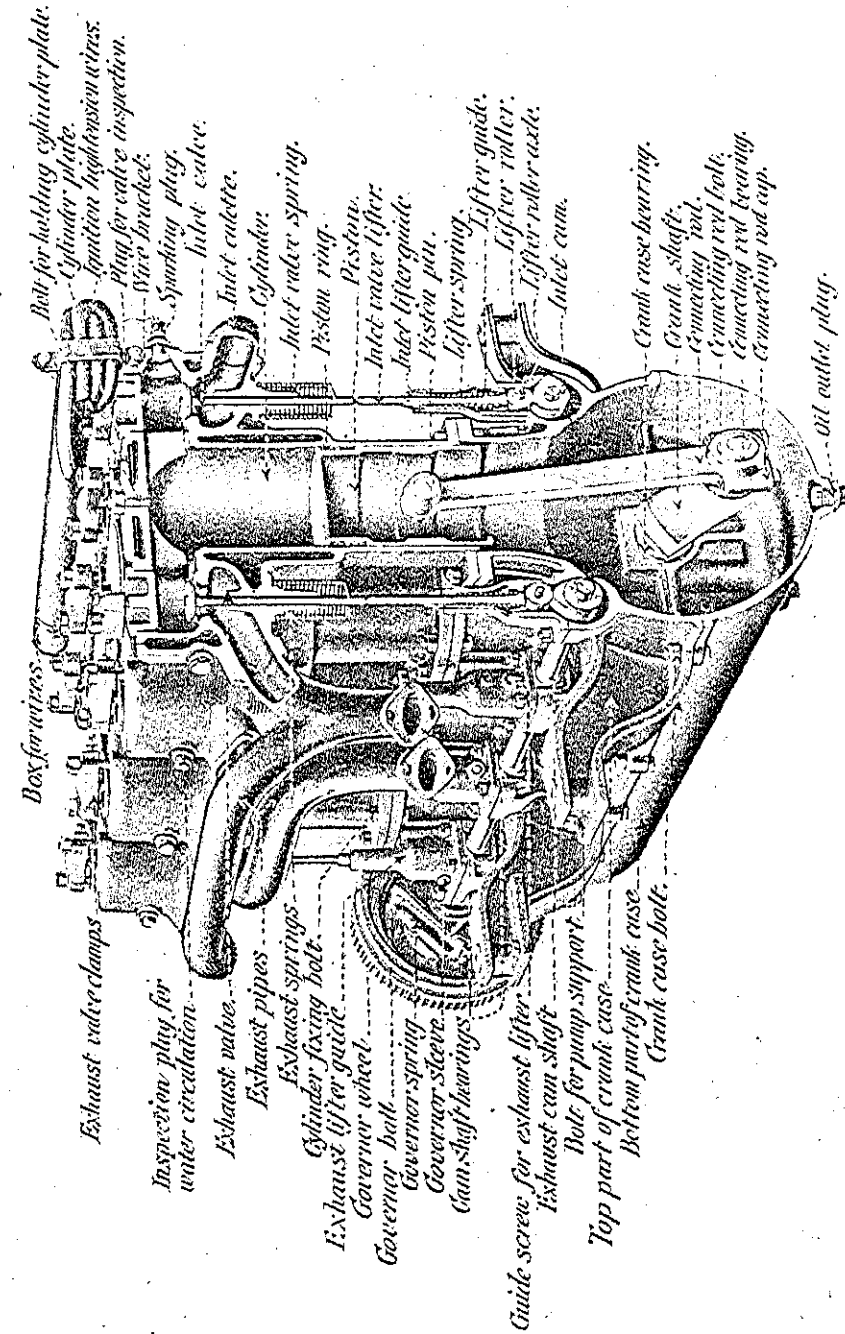
Out of the four strokes of the piston, one only gives the power, and this corresponds to the explosion. It is necessary to have on the crank shaft a fly wheel heavy enough to store the energy given by the explosion stroke, so as to be able to give movement to the other three strokes.

Panhard Motors have two, three, or four cylinders, and the cycle of motions just described is repeated in each cylinder.

The order of the ignition in a four-cylinder engine is as follows:—The first cylinder—the one next the radiator—fires, after which the third, then the fourth, and lastly the second.

**Causes of Bad Working.** The bad working of an engine might arise from various causes—viz., faulty ignition, bad carburation, the engine over-heating caused by defective water circulation, or insufficient lubrication. (See the chapters dealing with these questions.)

View of Engine. Separated Cylinder Type.



There may be a loss of compression due to faulty exhaust or inlet valves or leaky joints.

If this comes from the valves, clean well and grind them. To grind the valves, use some fine emery powder and paraffin. Take care to replace the valves properly. The valve is well ground when after being rubbed dry it shows a bright bearing surface.

A valve may be broken, replace and adjust it, or possibly the valves may only be sticking, in which case it is merely necessary to remove them, wash in petrol, clean the stems with fine emery cloth and replace.

**Adjustment of the Inlet Valves.** For all cars up to 20 H.P., the opening of the inlet valve ought to be 4m/m ( $\frac{1}{8}$ "). It is difficult to tell at what tension the springs ought to be. Some engines work well with weak springs, others with stronger springs.

In the event of explosions taking place in the carburator, this is caused by one or more of the valves not closing properly, the springs being too weak, one of the valves being broken, or by there not being enough petrol vapour in the explosive mixture.

**Setting the Inlet Valves. 8 and 10 H.P.** Inlet Valves are Automatic.

**15 and 18 H.P.** The valve opens when the piston is 2m/m ( $\frac{1}{8}$ ") down from the top on the suction stroke, and closes when the piston is 10 to 14m/m ( $\frac{3}{8}$ " to  $\frac{1}{2}$ ") up from the bottom of the compression stroke.

**24 H.P.** The valve opens as above, and closes when the piston is 13 to 17m/m ( $\frac{1}{2}$ " to  $\frac{5}{8}$ ") up from the bottom on the compression stroke.

**Setting of Exhaust Valves. 8 and 10 H.P.** The valve opens when the piston is 10 to 14m/m ( $\frac{3}{8}$ " to  $\frac{1}{2}$ ") from the end of the explosion stroke and closes when the piston is 2m/m ( $\frac{1}{8}$ ") from the top of the suction stroke.

**15 and 18 H.P.** The valve opens when the piston is 11 to 15m/m ( $\frac{3}{8}$ " to  $\frac{1}{2}$ ") from the end of the explosion stroke and closes as above.



**24 H.P.** The valve opens when the piston is 14 to 18m/m ( $\frac{1}{2}$ " to  $\frac{1}{16}$ ") from the end of the explosion stroke and closes as above.

It is most important to replace the valves in the same cylinders from which they were removed.

**Different Types of Engines.** The principal types of Panhard Motors are as follows:—

(1) The engine in which the governor acts on the exhaust, called the Phoenix Type.

(2) The engine in which the governor acts on the induction, called the Centaure Type. The present cars of this latter type have the cylinders cast separately, whereas in the previous types they were cast in pairs.

An engine is designed to revolve at a given rate: suppose, for example, this speed is 800 revolutions per minute.

The governor is the mechanism which keeps constant the rate of the revolutions. In the case of the governor on the exhaust, the action of the governor prevents the speed being increased by suppressing the opening of the exhaust; owing to the pressure of the burnt gas in the cylinder the engine cannot take in a fresh supply.

In the case of the governor on the induction, if the engine exceeds the calculated speed, the governor acts, but this time the supply of gas is reduced by a throttle.

## Specification of the various Type Cars.

H.P.	No. of Cylinders.	Bore in m/ms.	Stroke in m/ms.	Inlet Valves.	Front Wheels.	Back Wheels.
8	3	80	120	Automatic	870×90	870×90
10	4	80	120	"	870×90	870×90
15	4	90	130	Mechanical	870×90	880×120
18	4	100	130	"	910×90	920×120
24	4	110	140	"	920×120	920×120

All the above are fitted with high tension Magneto Ignition with supplementary batteries four speeds and reverse and run at a normal speed of 800 revolutions.

## Carburators.

Three types of carburators have been applied to Panhard and Levassor cars.

- (1) Phoenix Carburator.\*
- (2) Centaure Carburator.\*
- (3) Krebb's Automatic Carburator.

**Phoenix Carburator.** This carburator is employed on the Phoenix type engine in which the governor acts on the exhaust.

To put the engine in motion, nearly close the air inlet, but as soon as the engine starts, open more or less so as to obtain the best carburation. This adjustment is rather delicate, but with a little experience it is easily managed. If, while the car is travelling, the carburation is not so good, it can be corrected by means of the air inlet on the dash board.

**Necessary Care.** It is advisable for the carburator to be occasionally cleaned; keep the filter in good condition, see that the jet is clear, or if there is a leakage of petrol in any part of the tubing.

**Causes of Bad Working.** Should a sufficient supply of petrol not enter:—

- (1) See if the taps are open.
- (2) See if there is any petrol in the tank.
- (3) There may be air in the piping; in this case unscrew the brass plug at the bottom of the carburator and allow a little petrol to flow through.
- (4) The jet may be stopped.

\* Clients having cars fitted with the Phoenix or Centaure Carburators should have them replaced by a Krebb's Automatic Carburator, which is inexpensive, and greatly improves the working of the engine.

(5) The point of the float might be stuck. Test this by turning the float round.

(6) Some dirt may have stopped the needle; remove and clean.

(7) The filter may be dirty.

(8) See if there is any dirt in the petrol pipe; for this, pass a wire into the tube from the carburator.

(9) There might be something in the tank, in this case unscrew the union from the petrol tap; if the petrol does not flow remove the stoppage by means of a wire.

(10) There may be some water in the petrol in which event completely empty the tank.

(11) Ascertain that the air-vent is clear in the screw cap on the tank.

If too much petrol comes in, the cause may be:—

(1) Some dirt may keep the needle from shutting: remove the float and clean.

(2) The float may be punctured, when it becomes filled with petrol and being too heavy allows the petrol to flow in continually. It is then necessary to repair or change the float.

(3) In case the carburator is flooded and it is difficult to start the engine, remove the spray cone, then turn the engine, replacing the cone when it starts.

**Centaure Carburator.** This is applied to all Centaure engines—that is to say, those where the governor acts on the induction.

In the Centaure carburator there is the float chamber, carburation chamber and the chamber with the perforated cylinder; it is here the throttle works the gas mixture before passing into the induction pipes.

This carburator is adjusted in the same way as the Phoenix, opening more or less the principal air inlets.

**Causes of Bad Working.** If sufficient petrol does not enter:—

The causes are the same as in the Phoenix.

If too much petrol comes in:—

(1) The float may be punctured, when it becomes filled with petrol, and being too heavy, allows the petrol to flow in continually. It is then necessary to change or repair the float.

(2) The spring which keeps the ball on its seat may be damaged and not act. To repair the spring, it will be necessary to unscrew the bottom plug which serves as a seat for the spring.

(3) The ball may be forced between the coils of the spring and does not shut off the petrol; proceed as before and disengage the ball.

**Remarks.** Owing to the rapid evaporation in the carburator, ice is sometimes formed round the perforated cylinder and prevents the piston from working: it is necessary to let in as much hot air as possible, and to do this shut completely the air inlet on the dash-board. When the carburator becomes warm the air-inlet on the dash may be opened.

It might happen that the piston is binding in the perforated cylinder and allows too much or too little gas to enter. In this case take out the piston and lightly rub the binding part with emery cloth.

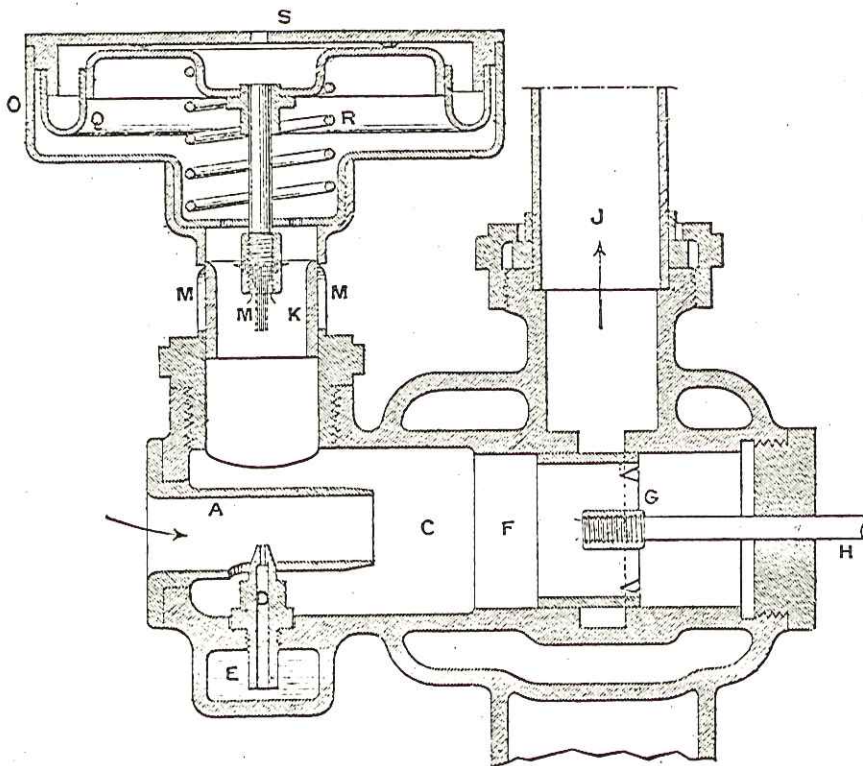
**Krebb's Carburator.** This apparatus needs no adjustment for carburation.

It might happen that the piston becomes a little stiff and the throttling does not act properly: it is then necessary to rub it lightly with fine emery cloth.

**Causes of Bad Working.** These are the same as in the Centaure carburator, nevertheless it is well to note the following which are peculiar to this type.

(1) The rubber diaphragm may be perished: it should be replaced.

To do this undo the lock-nut under the piston and the piston itself (for this use small flat pliers), take off the diaphragm cover, unfasten the thread that holds the rubber ring to the cover and the piston, and then to fix a new ring, place same on to the piston first and then on to the cover, bind them strongly.



Section of Krebb's Automatic Carburator.

(2) The fastening of the rubber may be loose; if so proceed as above.

(3) The piston may be binding, if so remove, clean, and lightly rub with fine emery cloth where necessary.

## Electric Ignition.

Two types of electric ignition apparatus have been applied to Panhard and Levassor Cars:—

I. By Accumulators only.

II. By Magneto.

*before at the time*  
*boogie*

1. Ignition by Accumulators only. The parts used for this are:—

- (1) Accumulators producing a primary current.
- (2) An induction coil for each cylinder.
- (3) Sparking plugs.
- (4) One commutator.
- (5) High and low tension wire.

If while the engine is running the accumulator shows only 3.5 volts, it is advisable to have it recharged within 24 hours.

The accumulators may be connected in such a way with the switch that one only can be used at a time. The accumulators should not be allowed to remain a fortnight without being used.

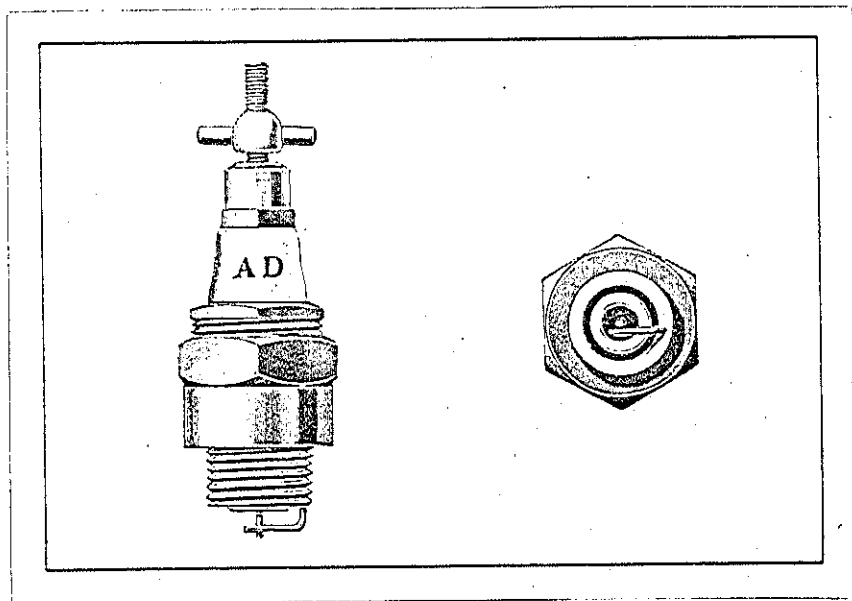
**Sparking Plugs.** There are several kinds of sparking plugs, but nearly all work on the same principle. The A.D. Plug is one which is well recommended.

The distance between the two points must be about 1m/m ( $\frac{1}{32}$ ").

**To Set the Ignition.** The commutator is adjusted in such a way that if the commutator cam is set for one cylinder it will also do for the others.



Start from the first cylinder and place the control handle as far back as possible; to this handle is fixed the length of wire controlling the advance and retard of the spark; connect this wire to the arm of the commutator so that the commutator will be 30 degrees toward the retard—that is, to the left. It is necessary to place the cam so that it will meet the No. 1 brush when the piston, No. 1, is at the top of its compression stroke, that is to say, at the time of the spark.



A. D. Sparking Plug.

To place piston No. 1 in the position mentioned, pass a rod through the hole of the compression tap or through the hole for the sparking plug, then turn the starting handle until the rod shows the piston is at the top.

For adjusting the cam, holes are made to receive the pin fixed on the cam shaft of the engine.

**Necessary Care.** Examine from time to time the commutator and see to the condition of the brushes and change them if necessary.

Occasionally test the accumulators, and it is advisable to keep them well charged.

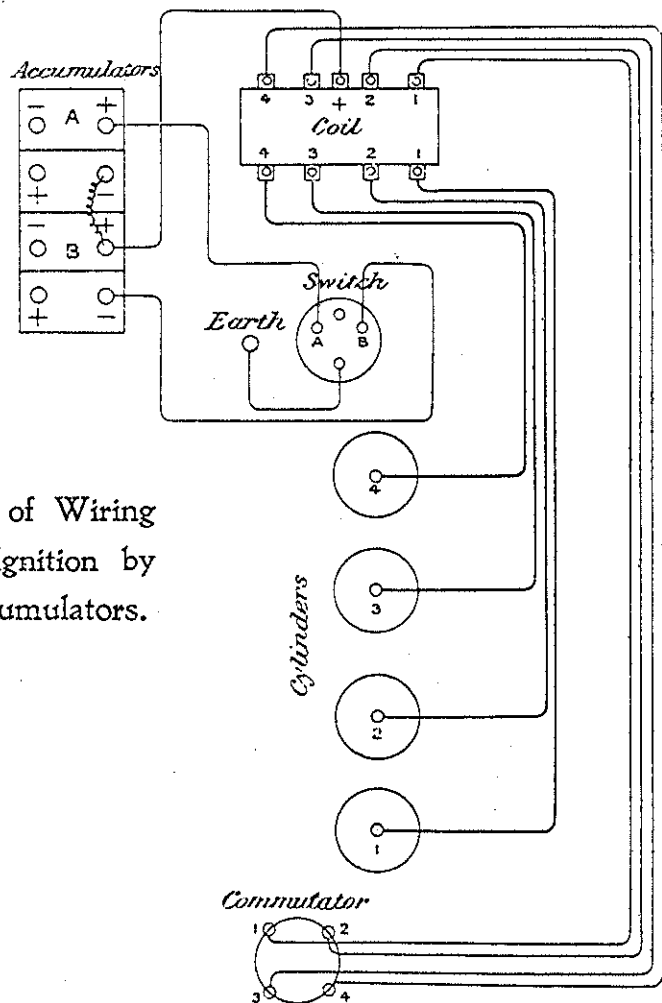
**The causes of bad working** of ignition by accumulators may be as follows:—

- (1) The accumulator may be run down.
- (2) The acid in the accumulator may have lost its strength, then empty and refill with sulphuric acid and water, the proportion being one to four.
- (3) One or more of the sparking plugs may be dirty or broken. To find this out, leave the engine running and let only one cylinder at a time work: to do this place the fingers on the top of the tremblers of the cylinders which it is intended to stop working,\* then the defective sparking plug can be found. It may be that the points are either too far apart or too close.
- (4) One or more of the tremblers may not work properly: in this case remove and well clean the platinum tips with fine emery cloth; refix and adjust.
- (5) One of the trembler springs may be broken.
- (6) One of the wires may have become detached, broken, or the earth wire may be bad; or the wires from the coil to the commutator may have lost their insulation and be making a short circuit.
- (7) The commutator may have some of the brushes not properly touching the cam: adjust them and see that the springs are strong enough.
- (8) One of the brushes in the commutator may be damaged.

\* By having a controller fitted this procedure is much simplified.

(9) One of the brushes may be dirty; to clean, use a little emery cloth.

(10) There may be a defect in the contact of the commutator cam.



Plan of Wiring  
for Ignition by  
Accumulators.

(11) There may be a short circuit in the commutator itself; to avoid this keep the wire terminals well apart.

(12) One of the coils may be burnt.

**Ignition by Magneto.** The system of ignition by magneto and sparking plugs is simple, takes up very little room and is easily adjusted.

The magneto is placed on the dash. The tremblers of the old system are replaced by a single contact breaker, strong and easily regulated.

A special arrangement allows the use of dry batteries when the magneto is defective.

**Principle of the Magneto System.** This ignition is composed of four main parts:—

- (1) The magneto, producing a current.
- (2) The induction coil.
- (3) The commutator.
- (4) The sparking plugs.

The magneto produces a low tension alternating current (about 12 volts), which is sent through the primary induction coil.

This coil transforms the low tension current to a high tension (secondary) of about 15 to 20 thousand volts of small ampèreage.

The secondary current is distributed by the commutator to the sparking plugs which produce a spark in each cylinder. The same induction coil is used for all cylinders while in the electric ignition by accumulators, one induction coil is used for each cylinder.

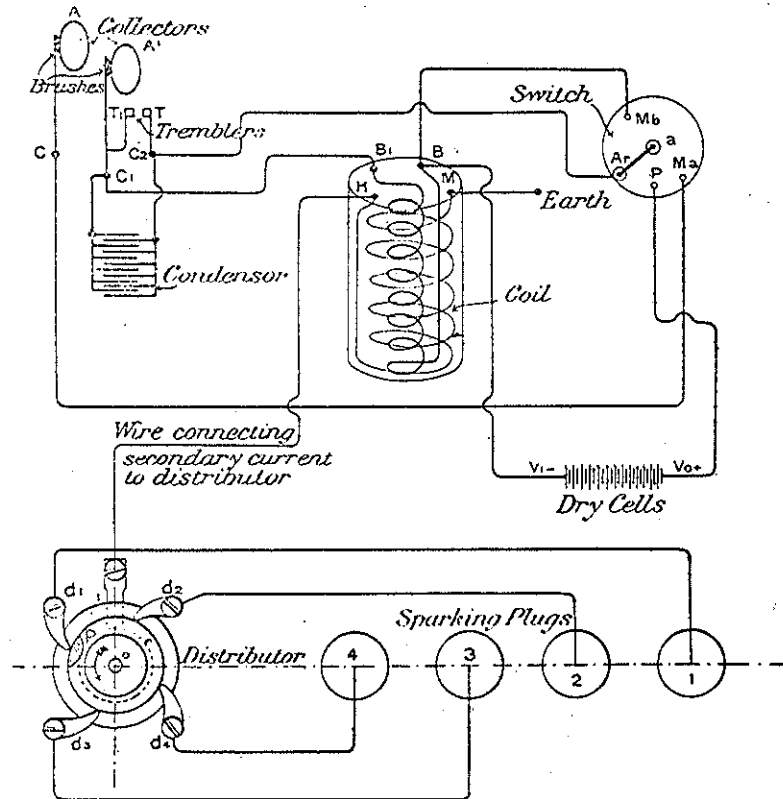
**To Set the Ignition.** (1) Place the control handle as far back as possible.

(2) Take off the magneto chain.

(3) Place the piston of No. 1 cylinder at the top of the compression stroke.

(4) Take hold of the pinion commanding the armature and turn it in such a way that the steel cam will be at the breaking point; at the same time the steel finger corresponding to sparking plug No. 1 will be about the centre of the brass segment on the fibre cam.

(5) Replace the chain without altering the position of the two pinions. The ignition is then set.



Plan of Wiring for Ignition by Magneto.

**Necessary Care.** To avoid the collectors heating by the friction of the brushes, and to keep the oscillating shaft which holds the platinum screws in good order, it must be lightly oiled; and to keep the collector in good condition it must be kept clean so that the brushes will glide easily in their track.

### Causes of Mis-firing.

- (1) The primary wires may be making a short circuit.
- (2) The coil may require to be changed.
- (3) The earth wire may be defective.
- (4) The condenser may be defective.

**Probable Causes of Bad Working.** If no spark is given from the magneto, try to start with the battery. If the engine then starts, it means that the battery, coil, platinum screws, the cam and the sparking plugs are in good order, but the armature or the switch wire is defective.

If no spark is given either from the magneto or the batteries:—

- (1) Verify the batteries with a voltmeter.
- (2) Verify the distance between the two platinum points.
- (3) Verify the switch.
- (4) Change the coil.
- (5) Verify the timing of the engine.
- (6) Examine all wiring.

### Water Circulation.

To have the pump well adjusted it is necessary to have its wheel bearing against the fly wheel of the engine. In the case of the 1904 type pump, this wheel is made to touch more or less by tightening or loosening the nut for this purpose. The springs are adjusted in such a way that the pressure of the pump wheel on the fly wheel of the engine is just enough to work the pump. It is a mistake to think that this pressure should be great. Too great a pressure increases the friction of the shaft in the bushes, and wears out the leather on the pump wheel.

The water is brought from the tank by the pump, and is forced into the bottom of the radiator from whence it passes into the water jacket on the cylinders coming out at the top and returning to the tank.

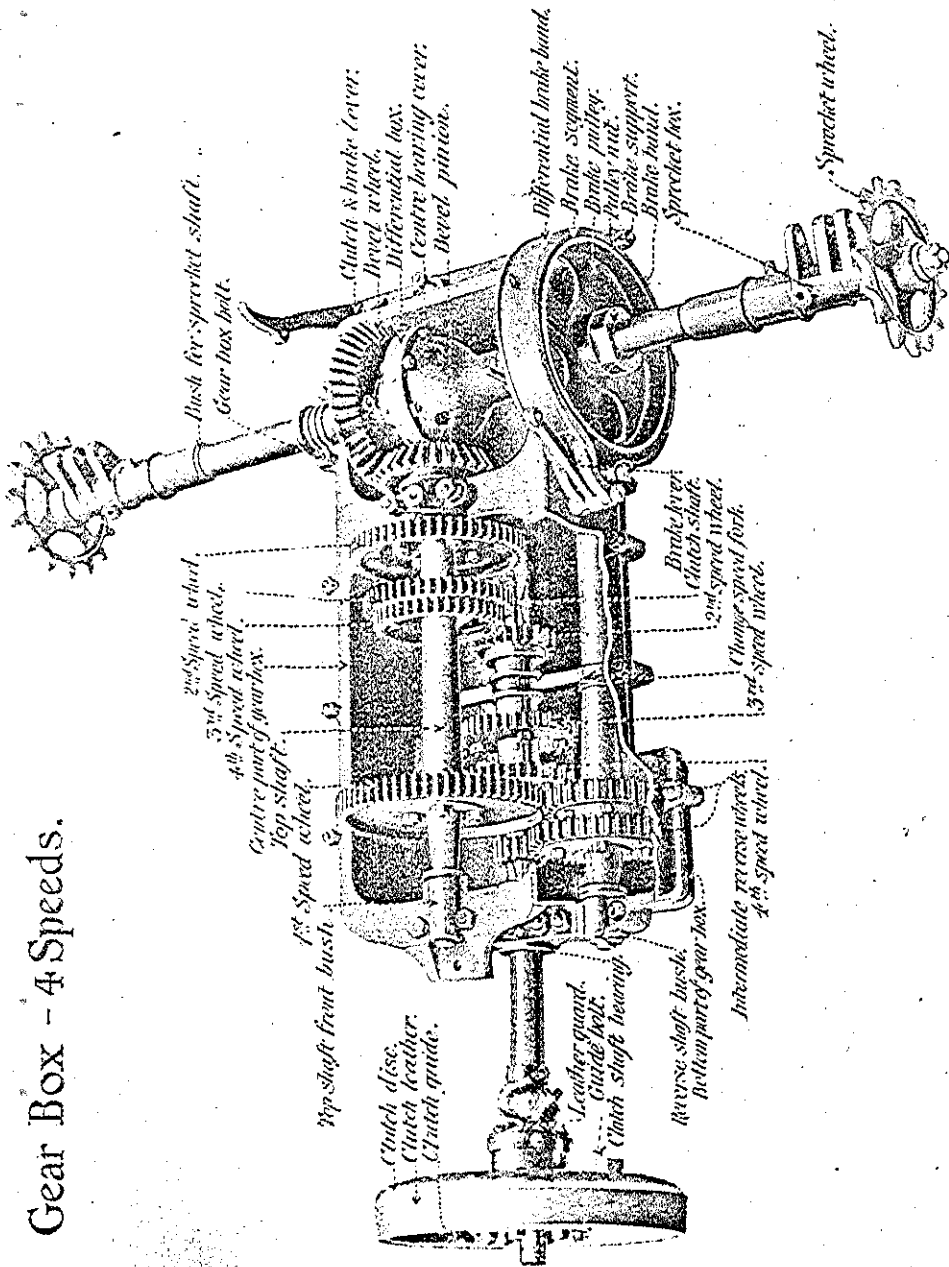
In cars having the water tank round the radiator the water is circulated by the pump from the bottom of the tank, forced through the radiator and the water jacket of the cylinders and enters the tank at the top.

**Necessary Care.** It is necessary to keep the pump well greased. Lack of lubrication may make the pump shaft seize and so stop the circulation of water, and by this cause the engine to heat and the pistons to seize in the cylinders. No grease should be allowed to remain between the pump wheel and the fly wheel of the engine.

### Causes of Bad Circulation of Water.

- (1) If the pump stops working it is probably owing to want of grease.
- (2) Some small pieces of solder may come from the radiator to the pump and prevent it working.
- (3) The pump may have some end play, then this can be remedied by inserting a thin washer between the pump wheel and the steel collar.
- (4) The pump wheel may be too tight on its shaft; free it from the fly wheel of the engine, unscrew the nuts so that the pump wheel turns round freely without end play, then renew the friction of the two wheels.
- (5) There may not be enough friction between the two wheels, adjust the nut for the purpose.
- (6) The key of the pump shaft that holds the pump wheel in position may be broken; the wheel would then turn on the shaft. Fit a new key.
- (7) The pin which holds the fan may be broken.
- (8) The pipes may be choked.

## Gear Box - 4 Speeds.



**Remarks.** In the 1904 type pumps, one of the pins which pass through the shaft of the pump or the shaft of the friction wheel may be broken.

The driving spring may not hook one of these pins, and the pump does not work. It is then necessary to lengthen the spring.

## Clutches.

The clutch is the mechanism by means of which the engine is connected or disconnected from the transmission gear.

In most cases the fly wheel which is fitted on the shaft of the engine has the inner part shaped concave so as to receive the clutch.

On the transmission shaft is an aluminium disc which is called the cone clutch.

This aluminium disc is fitted with a leather so as to make a gradual grip.

There are springs placed between the aluminium disc and the leather to allow the car to be started smoothly.

There are three kinds of clutch cones:—

- (1) Ordinary clutch cone.
- (2) Guided clutch cone.
- (3) Guided clutch cone used with the 3-cylinder cars.

**Ordinary Clutch.** In this clutch the aluminium disc is fixed in a solid way to the transmission shaft.

The release of this clutch is made by the action of a fork on the end of the shaft by means of a detachable nut.



**Adjustment.** The fork acts directly on this nut which ought to be so adjusted as to allow the cone to be freely put into its place.

If the fork is tight against the nut, the clutch is held back, and is prevented from entering the fly wheel far enough, causing it to slip, in which case it is necessary to take the split pin out and regulate the adjustable nut to allow  $\frac{1}{8}$ in. play when the brake is off.

**Guided Clutch.** It has been found preferable not to have the shaft sliding in the sliding sleeve when clutching or releasing. It is better to allow the cone a certain liberty to adjust itself into the fly wheel. These two conditions are realised in the following way in this clutch.

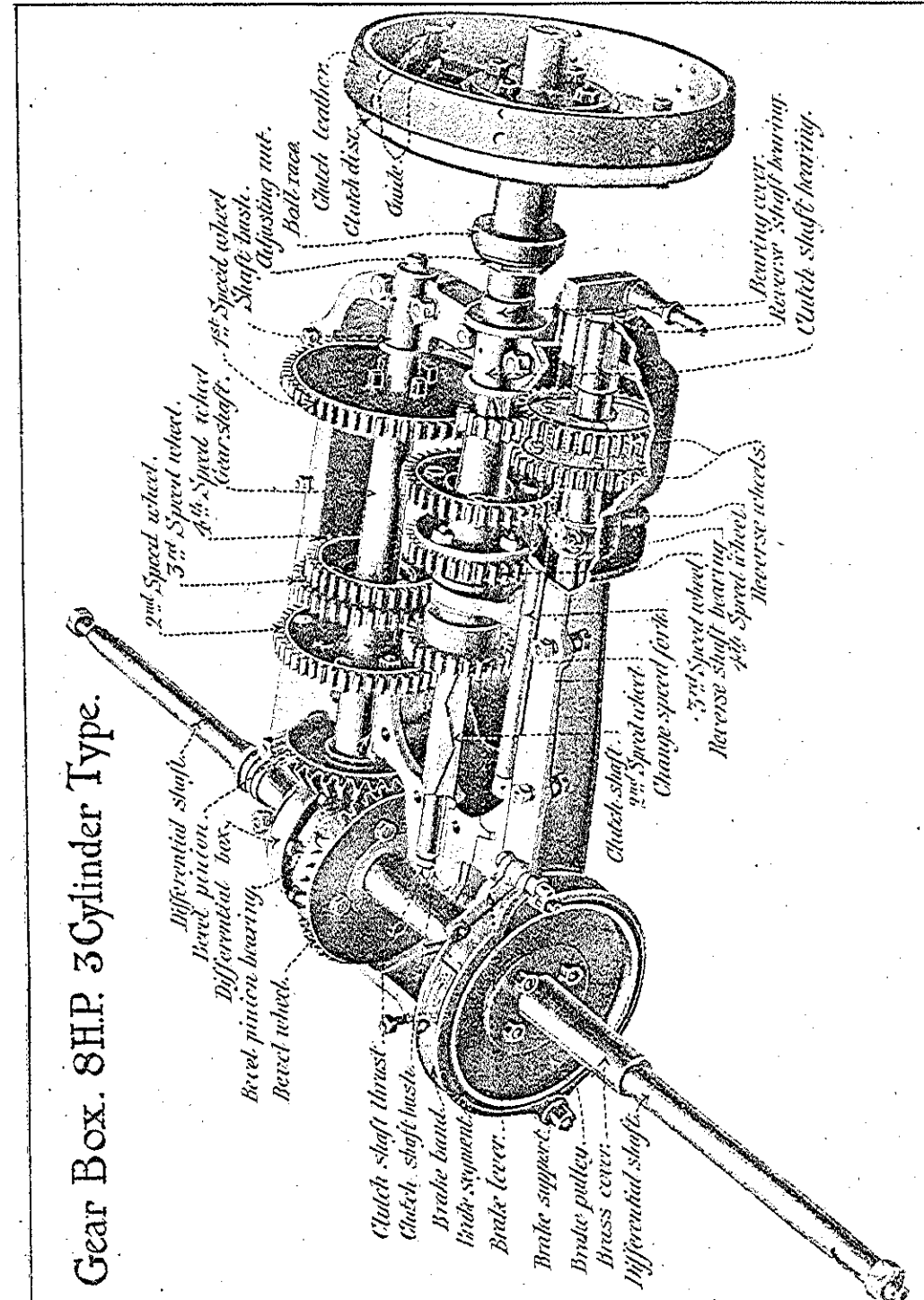
The centre of the cone forms a bush which slides freely on one end of the shaft. Inside the clutch shaft there is a rod attached to the cone by means of a key. The shaft has at the end a part into which the guides of the cone clutch engage themselves; this piece makes the grip. These guides being away from the centre reduce the friction and make the clutch work easier. The adjustment is the same as before.

**Guided Clutch applied to the 3-Cylinder Cars.** This clutch is similar to the preceding one in principle, but differs only in construction.

The rod instead of being the full length of the clutch shaft is shortened. This clutch has on the front a cavity into which the clutch spring is fitted.

The clutch engages by the pressure of the spring on the rod which pushes the aluminium disc keyed to it.

The release is worked by means of a pedal and a fork, the latter acting on the ball races. One of these is fitted loosely on the bronze bush carrying the aluminium disc. The other is held in position by a solid nut on the bronze bush.



**Gear Box. 8H.P. 3 Cylinder Type.**

When pressing on the pedal the fork draws back the ball races and releases the nut against which these are resting, and carries with it the bronze bush and the aluminium disc.

**Adjustment.** The releasing fork is fitted on the same shaft of the lever which is called the adjusting lever, and is fitted with two screws. It is absolutely necessary that the adjusting lever descends low enough to permit the fork to leave the ball races quite free; this is regulated by tightening or unscrewing the two screws of this lever.

**Necessary Care.** On the boss of the aluminium disc there is a hole for lubrication. This and other joints should be well oiled.

Never put oil or resin on the leather of the clutch.

**Causes of Bad Working of the Clutch.** If the clutch slips. See immediately that there is the necessary play at the fork; if the play is there the leather is greasy; wash with petrol; apply chalk or Fuller's earth.

If the clutch is too fierce. This may be caused by the springs placed under the leather not acting properly, and is probably due to the leather being burnt, which makes it slip. In this case a new leather must be fitted.

It may be that the thickness of the leather is not uniform, and the cone fits in the fly wheel in such a way that the springs do not stretch, in this case it is very easy to find where the cone is touching and file it enough to make it touch all round.

In all cases never leave the remedy till the defect is worse, as the consequences may be serious, such as twisting the clutch shaft, bending the differential shaft, tension rod and seizure of the ball race, etc.

## Change Speed and Reverse.

**Necessary Care.** It is advisable from time to time to remove the inspection plate of the gear box for examination.

Make sure that the gear is never without oil.

The joints of the gear box should be kept tight to prevent leakage of oil.

From time to time put a little oil in the differential sleeve holes which are covered with dust caps.

It is necessary about once a month to change the oil in the gear box. Grease should not be put in the box.

**Causes of Bad Working.** The wheels become out of mesh. Probably caused by the notches of the sector becoming worn and so preventing the teeth from meshing all their length: this causes the rapid wearing of the teeth.

If an unusual noise is heard it is necessary to immediately open the gear and examine what is the cause of the noise. See if one of the gear wheels is loose, a key or a bolt broken.

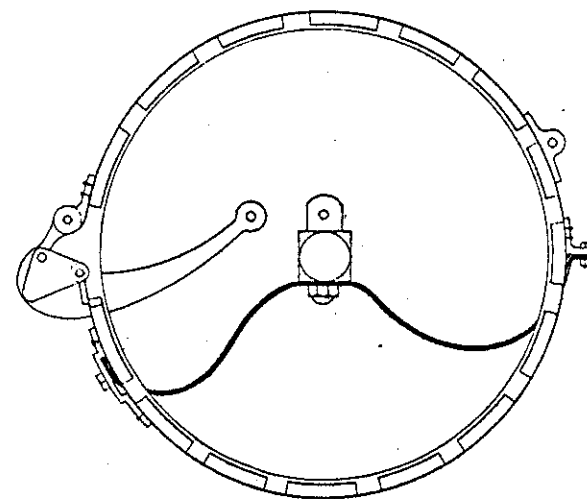
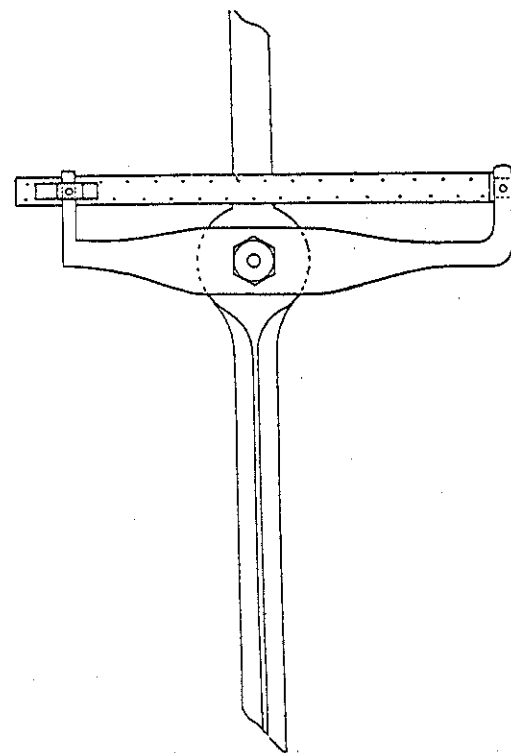
It is very necessary to make this examination at once, for if one continues a journey under these circumstances the risk is run of completely ruining the gear box.

## Brakes.

There are 2 brakes fitted to Panhard and Levassor cars. One acting on the transmission and the other on the back wheels.

**Differential Brake Adjustment.** For this brake to be well adjusted it is necessary when it is released that it does not touch the drum when off.

Brake Support for External Brakes.



The distance between the segment of the band and the pulley ought to be 1-16th in. This distance is regulated by a steel plate fixed to the gear box which holds the band clear from the drum.

To make sure that the pedal is free to act the brake properly, when it is pressed down it should have a little play from the foot board. To regulate this one tightens or unscrews the nut and the lock nut on the end of the brake rod.

When the brake pedal is down the clutch pedal should be free.

Put a little oil in the joints and see there is no grease on the brake drum, which should be occasionally washed with petrol.

**Adjustment of the Side Brakes, Single Action.** For this brake to be well adjusted it is necessary that the metallic band tightens on the pulley before the lever is at the end of its course.

It is necessary that the brake rod is tangent to the brake band. To ensure this tighten or unscrew this brake rod by the thread cut at the end. It is of course necessary that the releasing of the clutch is made before the brakes are applied. To do this push the brake lever sufficiently forward to release the clutch; that is to say, so that the cone clutch turns freely in the fly wheel of the engine. At this moment attach the brake rope so that when the lever is pushed further forward the brake will act.

It will be necessary to have the brakes hard on before the brake lever is at the bottom of the sector.

**Exterior Double Action Brake.** For this brake to be well regulated it is necessary that the brake rod be tangent to the brake band.

This is regulated in the same way as the single action brake.

The brake cord is regulated in the same way as above.

The brake band ought not to touch the pulley when the brake is released. To produce this effect, the joint of the brake rod with the brake band is separated with an angle plate which is placed vertically on the metallic support fixed to the back axle. It is then necessary that this angle plate be high enough to keep the top part of the brake band from touching the brake pulley. If, however, this brake support is too high the lower part of the brake band will touch the pulley.\*

**Interior Double Action Brake. Adjustment.** The adjustment of this brake is obtained by the greater or lesser tension of the rope which is attached to the two brake levers. It is advisable from time to time to examine the segments for wear.

**Necessary Care.** The same as for the differential brake.

**Causes of Bad Working.** This is the same for all brakes. If they do not act see if there is any grease on the pulleys, if so, clean them with petrol. If they do not then work examine the adjustment.

## Steering.

The steering mechanism which is used on Panhard and Levassor cars is of the worm and sector type.

These are enclosed in a box which ought to be always filled with grease.

There is no adjustment required for the steering.

It is necessary to keep all the joints well oiled, and to provide them with leather guards so as to exclude the dust

\* Clients having this type of brake fitted to their cars should have the new type of support fitted. See page 25.

**Causes of Bad Working.** (1) The teeth of the sector may be worn. It is then necessary to replace it. This wearing does not generally require to be urgently repaired.

(2) The thrust block on the bottom of the steering might be worn.

(3) The steering rod spring might be broken.

(4) There may be play in the different joints of the steering. Locate and adjust.

Accidents caused by the steering mechanism failing are extremely rare.

## General Care of the Car.

**Lubrication.** The lubrication of the car is most important, neglect of this causes many breakdowns; oil and grease should be freely used.

**Oil.** The parts which ought to be kept well oiled are as follows:—

(1) The engine.

(2) Gear box and differential.

(3) Wheel caps.

(4) The ends of the clutch shaft.

(5) The governor.

(6) Exhaust lifter.

(7) All the oil holes on the car, and the joints, such as levers, connecting rods, spring shackles, etc.

**Engine.** The 15 H.P. engine requires about one pint of oil, 18 H.P. and over about one-and-a-half pints.

The different parts that are necessary to be oiled have been mentioned in the preceding chapters.

The quantity of oil is kept up by the drip of the Dubrielle lubricator. The oil ought to be changed about every 800 miles.

Beside the automatic drip there is a hand pump which is occasionally used when the engine is accelerated.

This hand pump serves to put fresh oil in the crank case when necessary.

**Gear Box.** About one gallon of oil should be kept in the gear box.

**Wheel Caps.** The oil contained in the wheel caps ought to be changed about every 400 miles.

To do this, unscrew the wheel caps, empty the old oil, wash the caps with petrol, fill with clean oil and screw up tight.

Panhard's special oil is well recommended.

**Grease.** There is on the dash board a special greaser for lubricating the bearings of the gear with the exception of the top shaft centre bearing, which is lubricated by oil from the Dubrielle.

Independent of this there are several other smaller greasers, viz:—

(1) On each side of the car on the support of the sprocket bearings.

(2) On the water pump, which should never be without grease, otherwise the shaft may seize and stop the circulation of the water.

(3) On the commutator (ignition by accumulators). Put grease in small quantities only, for if put in excess the risk is run of stopping the contact of the brushes.



(4) On the starting bush: so as to keep the front end of the crank shaft well greased, there being a lot of friction.

(5) On each side of the front axle.

Keep these greasers always full of grease. The steering is also greased, and the box ought to be refilled when necessary. This ought to be done by placing a temporary greaser on the top part of the steering box, where a bolt is fitted. The connecting rods and other parts of the steering ought to be carefully greased also.

**Care of the Chains.** It is necessary from time to time to take the chains down, wash them with petrol, then dip in Panhard chain lubricant and let them cool and refix.

Never put grease and oil on the outside of the chains. Brush them, and with a paint brush put on some chain lubricant.

To keep the car always in good condition it is necessary after each time it has been used to proceed as stated below.

(1) Put the change speed lever in the neutral position.

(2) Switch off the current and take advantage of the few turns which the engine makes after the current has been cut off to pump some paraffin into the cylinders by means of the hand pump of the Dubrielle Oiler (side paraffin). This operation is to facilitate the starting of the engine. The paraffin should not be used too liberally, as it thins the oil in the crank chamber.

(3) Release the side brakes by putting the lever back.

(4) Put the ignition control handle back to the retard.

(5) Leave the throttle handle open.

(6) Turn off the petrol tap to avoid any possible leakage.

(7) Carefully examine all the parts so as to avoid any stoppage on the road.

(8) Wash the car, and while it is on the jacks see if the wheels run freely.

(9) Fill all the greasers and oil where necessary.

(10) Fill the petrol tank.

(11) Fill the water tank.

When all this is done the car will be quite ready when again required.

**The Care Necessary** to give to the car in the winter and during storage differs according to the following three circumstances: :—

(1) If the car is not used for several months.

(2) If the car is used every fortnight or every month.

(3) If the car is used frequently.

**If the Car is not used for Several Months. Circulation of Water.** It is necessary to take all the water out of the car. Should any water be left in the cylinders or carburator considerable damage may be caused by this becoming frozen.

**Engine and Chassis.** Remove the valves and the chains, clean them with petrol, well grease and put in a dry place.

Keep the change speed lever in the neutral position, release the brakes, refill all the greasers and grease all the mechanical parts.

**Ignition.** Take off the brushes, oil the magneto, principally the collectors and the cam; disconnect the wires of the batteries. If accumulator ignition, empty the acid and replace it with distilled water.

**Tyres.** It is well to remove the tyres and verify the condition of the covers, the tubes and the rims. Put a little French chalk on the tubes and then put them in the covers, wrap them in paper and put in a dry dark place. Avoid the damp. See if the edges of the rims have been flattened, also if there are any cutting edges: if so, file round the cutting part and take off any rust with emery cloth. Put on two coats of paint. Block the car up so that the rims of the wheels do not touch the ground.

The Car which is used every Fortnight or every Month. **Circulation of Water.** It is advisable to follow the above instructions; nevertheless it is possible to do without taking the water out by mixing with it glycerine equal to one-tenth of the water contained in the tank and be careful to always keep this proportion.

The glycerine does not evaporate, so it is not necessary to add more when refilling the tank.

**Ignition.** The same as above without taking down the brushes.

**Engine and Chassis.** The same as above without taking off the chains.

It is advisable occasionally to examine all nuts; special attention should be paid to those on the back sprockets.

The use of one non-skid tyre is most detrimental to the differential gear.

**Tyres.** It is enough to raise the car so that the tyres do not carry the weight. To do this operate as before mentioned.

Take care to wash the tyres but do not use too much water; do this with a wet cloth in such a way as to prevent the water going into the rims and producing rust.

## Various Hints.

**When Washing a Car** use plenty of water, do not allow the water to dry on the car; use a sponge and afterwards dry with a chamois leather.

**Injudicious use** of the brakes causes much damage to the tyres and car generally.

**Careful attention** given to the lubrication and water circulation saves trouble.

**Remove the Clutch** if possible when passing over loose stones.

**On Greasy Roads** avoid applying the brakes suddenly; it is better to use the hand brake than the differential.

**When Stopping** be sure to put the gear lever in the neutral notch and draw the clutch by means of the hand lever. Accidents are frequently caused by starting the engine when in gear.

**Tyres.** Great care should be taken to prevent oil coming in contact with the tyres as nothing can be more injurious to rubber.

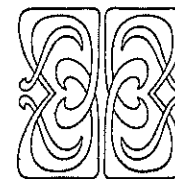
See that the chains are never slack enough to swing sideways and rub the tyre.

It is necessary to frequently test the wing-nuts on the rim bolts and tighten them, as well as the valve nut, in order to prevent water getting through the rim to the inside of the tyre.

Remove mud from the crevices where the tyre joins the rim.

Driving on sharp curves causes lateral rubbing friction which wears the tyres; it is therefore prudent to make it a rule to disconnect the clutch at corners, leaving the car to turn them by its own impetus.

Wear and tear are also minimised by driving whenever possible on the crown of a road, so that the weight and strain are equally divided between the wheels.



## Spare Parts to Carry on the Car.

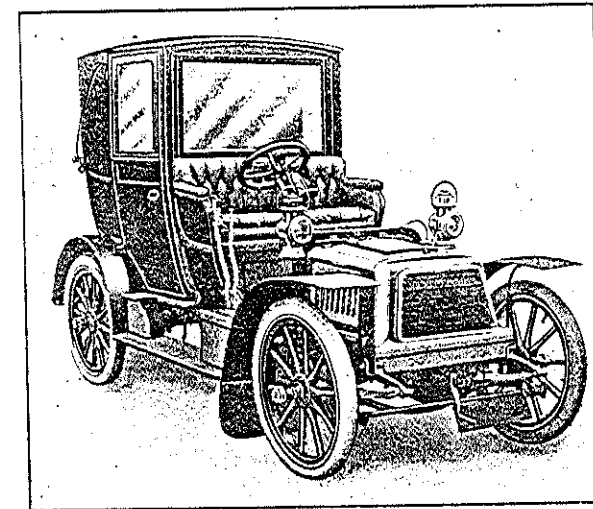
Carburator Jet.	Inner Tubes.
Inlet Valve.	1 Tyre Cover.
2 Inlet Valve Springs.	Asbestos Cord.
2 Inlet Valve Keys.	Asbestos Sheeting.
2 Inlet Valve Caps.	Asbestos Cloth.
1 Exhaust Valve.	1 Length of Control Wire.
1 Exhaust Valve Spring.	Rubber Tubing, various diameters
2 Governor Springs.	Various Joints, Washers, Nuts, Bolts, Caps and Pins.
1 Pump Fly Wheel.	Brake Rope Clips.
2 Spare Chain Links.	Pump Wheel Spindle.
8-ft. Brake Rope.	1 Starting Pin.

## Accumulator Ignition.

- 6 Sparking Plugs, 6 Commutator Brushes.
- 4 Brush Springs, 1 Platinum Screw, 2 Tremblers.
- 6 Trembler Plates, Supply of High and Low Tension Wire.

## Magneto Ignition.

- 1 Coil, 2 Carbon Brushes, Chain Link and Rivet.
- Finger Springs, 2 Brush Springs, 2 Platinum Screws.
- 1 Cam Screw, 1 Collector Screw.
- 1 Distributor Screw Contact.



8—11 H.P. Landaulette.

40, Cadogan Place, S.W.,  
October 15th.

To Harvey du Cros,  
Regent Street.

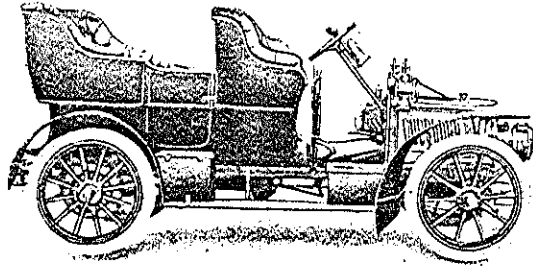
Dear Sir,

It may be of interest for you to know what your 8 — 11 h.p. Panhard landaulettes are capable of.

On Friday I took a party of three men, and my driver, three guns, 400 cartridges to Cranley. The weights were 14 st., 13 st. 7 lbs., 12 st. 7 lbs., and 10 st. 7 lbs. The way the car behaved on Red Hill especially was a revelation to me, taking it with ease, and this in spite of the awful surface caused by the rain of that morning. If you care to make use of this do so.

Yours truly,

(Signed) A. FRENCH-BREWSTER.



8-11 H.P. Touring Car.

From the Correspondence Columns

"AUTOCAR," *April 15th, '05.*

REPAIRS.

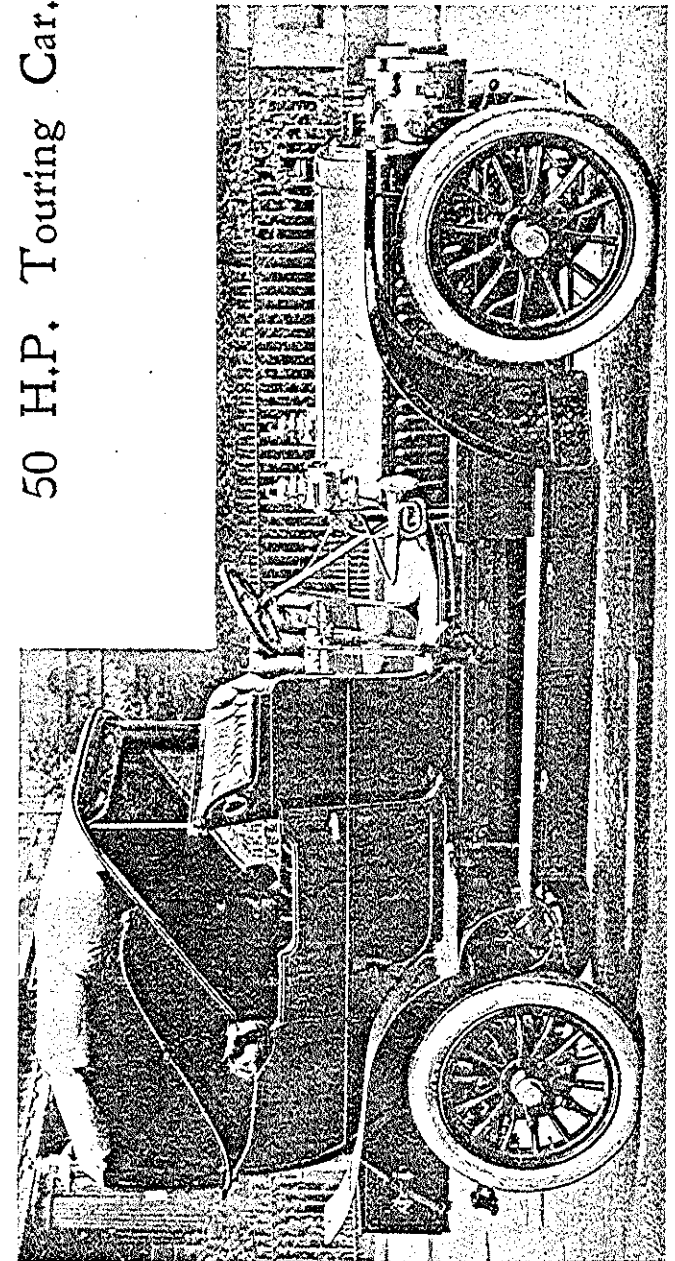
19659.—In reference to the letter (No. 9596) of Mr. Edward Kennard in your issue of March 18th, for the benefit of brother motorists I would like to express my appreciation of the 8 to 11 h.p. three-cylinder Panhard car on which I have been doing an average distance of 300 miles weekly since June 13th last, and now it shows no sign of wear in any particular.

For reliability and excellence of workmanship I doubt if there is a car on the market to equal the Panhard, certainly none to excel, hence the reason of my buying a car of foreign manufacture.

The Panhard firm has also a splendid factory for repairs to motors of any make at Kimberley Road, Kilburn, under the management of Mr. W. A. Turpin, from whom I have always received the greatest courtesy and consideration, together with prompt attention and reasonable charges.

WELL SATISFIED.

50 H.P. Touring Car.



## Travelling Workshop Car.

(On the Road.)

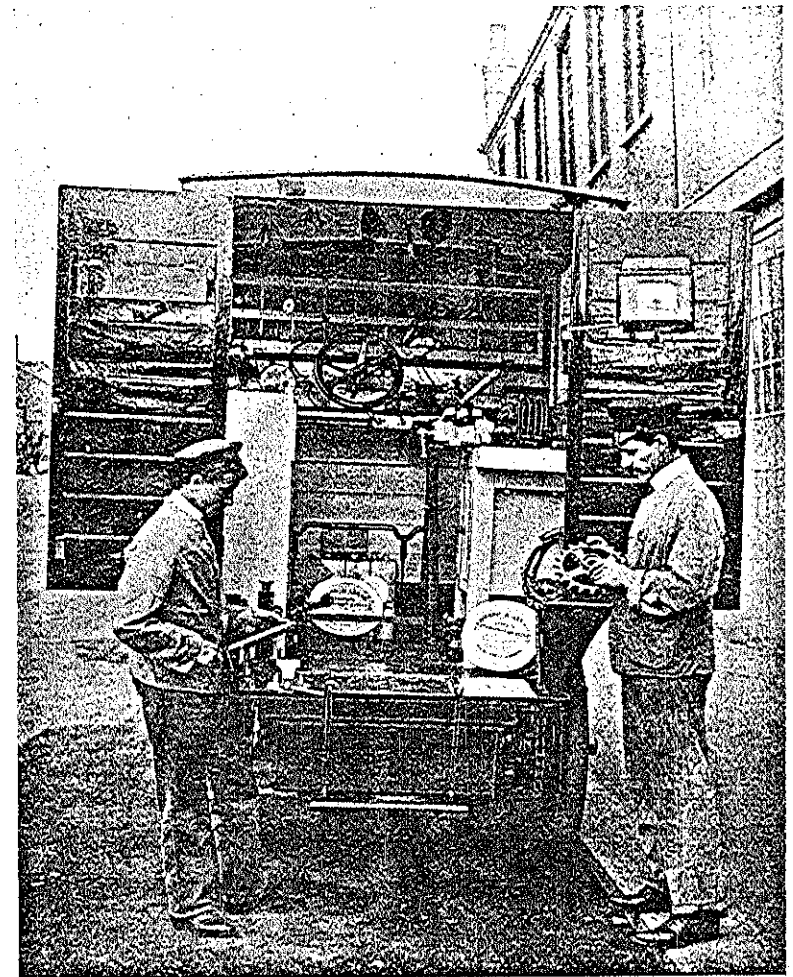


The object of this car is to give our clients an opportunity of having their cars examined and adjusted at their private residences by expert motor engineers.

The car periodically visits the principal towns in the country, and its whereabouts is advertised weekly in the motor papers. In addition to this, all our clients are advised as to the day the car will be in their district.

## Travelling Workshop Car.

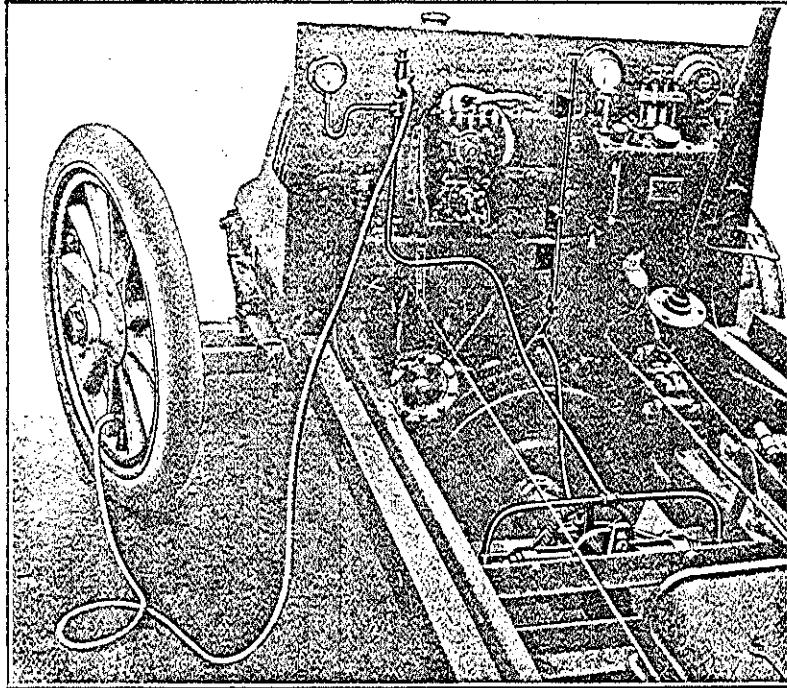
(Showing Interior.)



This car is equipped with lathe, bench, vice and all necessary tools, and also a large supply of useful parts and accessories. Any orders given to the engineer-in-charge will receive immediate attention.



## Mechanical Air Pump.



Testimonial from

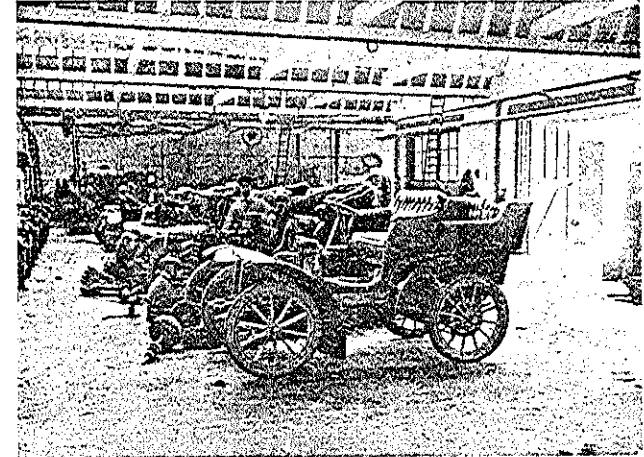
George Pauling, Esq.,

26, Victoria Street,

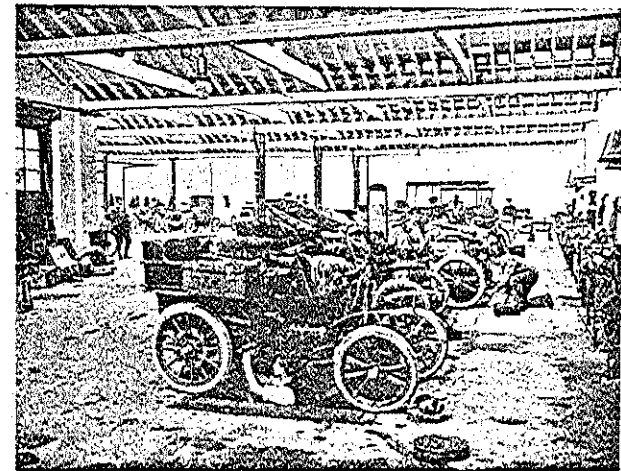
Westminster, S.W.

I have had the "WICKENS" Tyre Pump fitted to my car for the last sixteen months, and during that time it has never once failed to do its work. I find it a great advantage over the old style of pumping by hand. It is very simple and reliable. I carry no other pump with me.

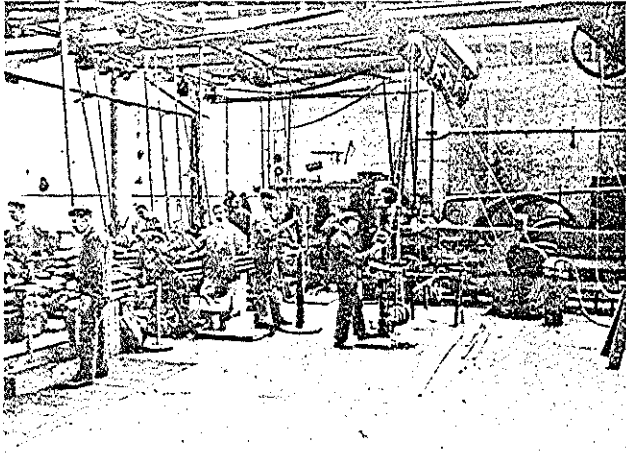
## Views of London Works.



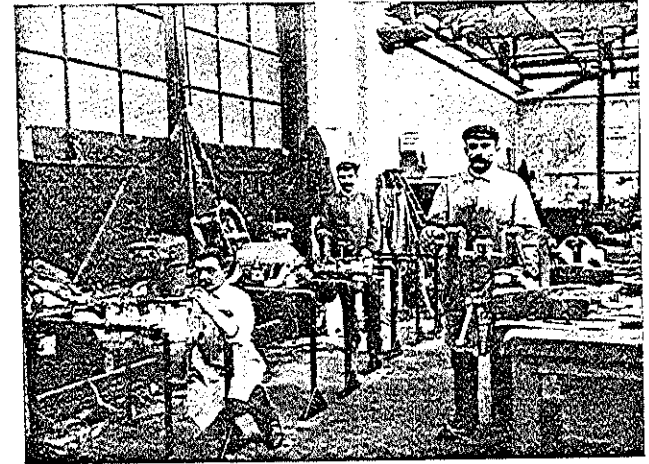
Repairing Shop No. 1.



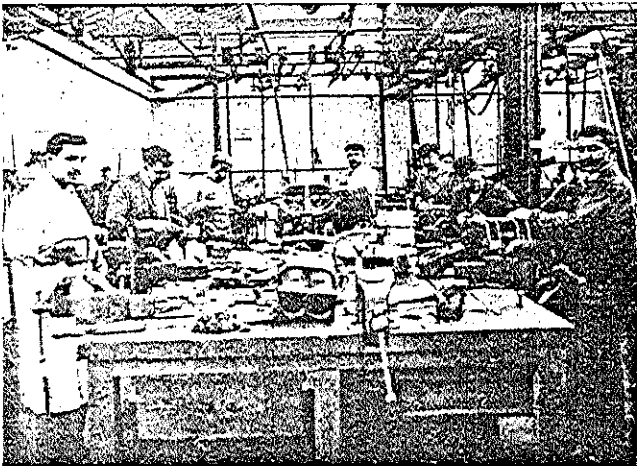
Repairing Shop No 2, showing Cars over Pit.



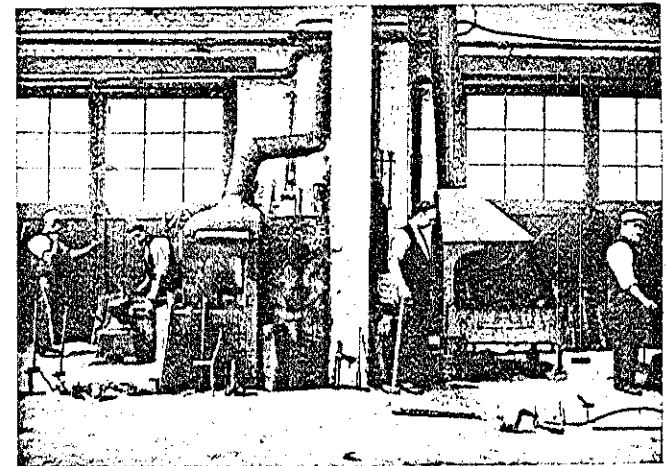
Lathe Shop.



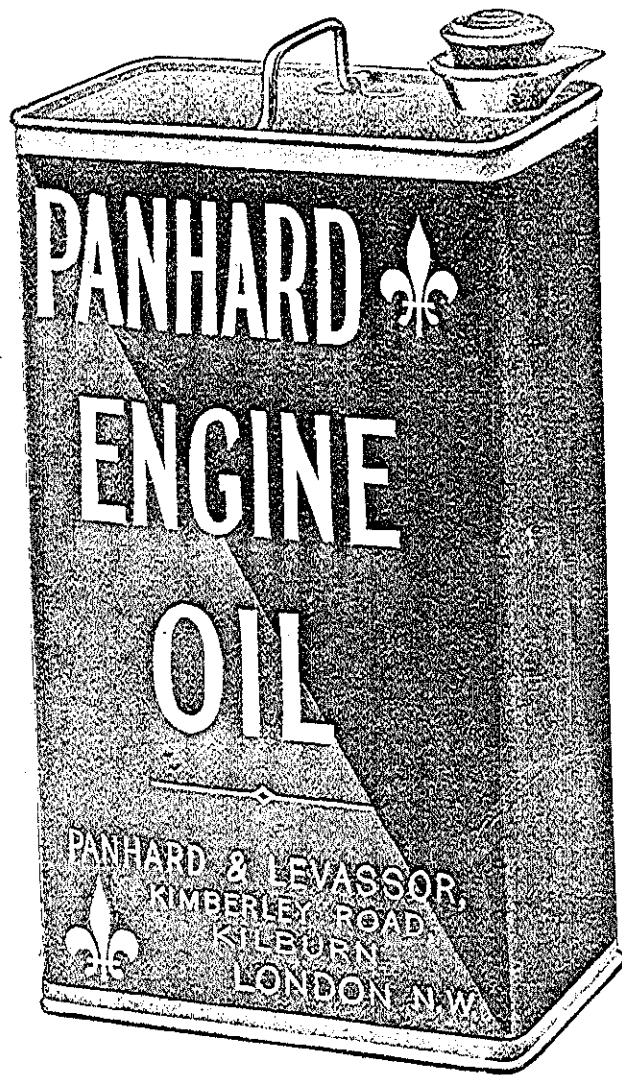
Erecting Shop.



Fitting Shop.



Two of the Forges.



Panhard Engine Oil is specially prepared for Panhard Engines to ensure smooth running and reduce the wear of the working parts. It is supplied in sealed gallon tins at reduced prices for quantities.

# A HILL-CLIMBING TEST

of the

8-

*Panhard & Levassor*

-11

**THREE-CYLINDER LANDAULETTE.**

"As to Netherhall Gardens, this was climbed easily with the throttle not fully open, as it was so far within the capacities of the car that the engine showed a strong disposition to race."

*The Autocar*, May 6th, 1905.

(Netherhall Gardens, N.W., has a gradient in parts of about 1 in 5, and is entered by a right-angled turn from a busy thoroughfare.)

Full particulars of Panhard and Levassor cars on request.

**HARVEY DU CROS,** Concessionnaire  
Exclusif,

PARIS: 1, Rue des Acacias.

14, Regent Street, LONDON, S.W.



## Our Works have the compass

of every possible demand for motor repair work, and no work leaves our hands until it has been thoroughly tested. A thorough overhaul at our works will add greatly to the value of a car if disposal of same is contemplated. This is a point worth your consideration. Our experience is at the disposal of all motorists, and we shall be pleased to quote and advise on any motoring matter.

**PANHARD & LEVASSOR, W. & G. DUCROS, Ltd., Acton Vale, LONDON, W.**

Telegrams—"Volturaste, London."

Telephone—430 Hammermith (Private Branch Exchange).

Try the New "W. & G." Plug, and note the effect on your engine. DUCROS (Concessionaire Eschaff.)



# PANHARD WORKS