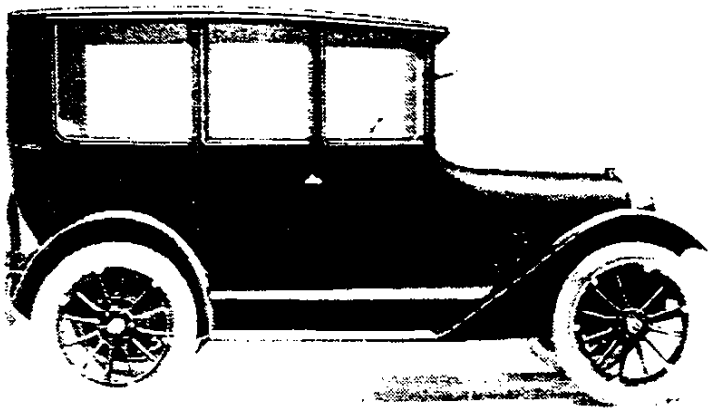
CHEVROLET



Chevrolet, center-door sedan, OCW

1918

1918 Chassis Specifications

Model	Front Axle				Wheel Bolts				Rear Axle Driving Gears						
	Section	Steer	Normal Tread Spindle	Dia of Contact	No	Size	No	Size	Type	Pitch	Teeth	Pinion	Face	Pitch	Dia of Main Shaft
490 Coupe	I Beam	Cross	1 3/16	1/2	12	1/2	11	3/8	3/4 Floating	37-11	40	11	5	1	1 1/16
490 Coupe	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
490 Sedan	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
490 Coupe	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Del 490	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
FA-2	"	Fore & Aft	1 3/8	5/8	11	5/8	10	1/2	"	4 1/4-1	51	12	"	1 1/4	1 1/4
FA-5	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
FA Sedan	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
D-4	"		"	"	"	"	"	"	"	"	"	"	"	"	"
D-5	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
T	"	"	1 1/2	3/4	Timken Cone 337		Timken Cup Cone 332		Semi Floating	7-1	28	4 7/16	1 1/16	2 1/4	1 3/16

1918 Chassis Specifications

Model	Service Brake				Emergency Brake			
	Type Operating on Rear Wheel Brake	Dia of Drum	Width of Shoes	Area in Sq. In.	Type of Operating on Rear Wheel Brake	Dia of Drum	Width of Shoes	Area in Sq. In.
490 Coupe	Internal Contract	10	1 1/4	69	Internal Expansion	10	1 1/4	66
490 Coupe	"	"	"	"	"	"	"	"
490 Sedan	"	"	"	"	"	"	"	"
490 Coupe	"	"	"	"	"	"	"	"
Del 490	"	"	"	"	"	"	"	"
FA-2	"	12	1 3/4	132	"	12	1 3/4	121
FA-5	"	"	"	"	"	"	"	"
FA Sedan	"	"	"	"	"	"	"	"
D-4	"	"	"	"	"	"	"	"
D-5	"	"	"	"	"	"	"	"
T	Internal Expansion	14	2	124 1/2	"	14	2	124 1/2

1918 Chassis Specifications

Model	Differential Bearings			Rear Axle				
		Wheel Adjustment	Wheel Bearings	Pinion Bearings	Pinion Shaft Thrust Bearings	Pinion Shaft Rear Bearings	Pinion Shaft Front Bearings	Type of Drive
490 Tour	Hyatt 16221	24	3/8	Hyatt 16483	1	Cast Iron 1 X 1½	Hyatt 26621	Bevel Gear
490 Road	"	"	"	"	"	"	"	"
490 Sedan	"	"	"	"	"	"	"	"
490 Coupe	"	"	"	"	"	"	"	"
490 Del	"	"	"	"	"	"		"
FA-2	Hyatt 16217	30	"	Hyatt 16530	1⅛	Cast Iron 1½ x 1¾	Hyatt 26663	"
FA-5	"	"	"	"	"	"	"	"
FA Sedan	"	"	"	"	"	"	"	"
D-4	"	"	"	"	1¼	Bronze 1¼ x 1⅜	"	"
D-5	"	"	"	"	"	"		"
T	H.D. 931	10	3/4	N.D. 310	1⅝ Tube	SKF 1207	N.D. 1307 406	Worm

1918 Complete Car Specifications

Model	Capacity	Drive	Weight Fully Equipped				Road Clearance	Circle to Turn Car Around	Top Material	Overall Dim.		
			On Front Wheels	On Rear Wheels	Shipping Weight	Car with Gasoline				Height Top Down	Width	Height Top Up
490 Tour	5 Pass.	Left or Right	1010	870	1830	1890	9¾	20 ft	Mohair	152	64	80
490 Road	2 "	"	950	770	1660	1740	"	" "	"	142	"	79
490 Sedan	5 "	"	1010	1920	2164	2270	10¼	" "	"	"	"	74½
490 Coupe	2 "	"	1050	930	1910	1990	9¾	" "	"	"	"	74½
490 Del		Left	890	590	1460	1540	"	" "	Oil Duck	152	"	80
FA-2	2 "	Left or Right	1240	1290	2310	2500	9⅞	21 ft "	Mohair	165	66	78
FA-5	5 "	"	1200	1370	2410	2580	"	" "	"	168	"	83
FA Sedan	5 "	"	1210	1620	2700	2850	"	" "	"	165	"	76
D-4	4 "	Left	1490	1640	2900	3140	10⅜	22 ft "	"	176	67	81½
D-5	5 "	"	1500	1580	2880	3100	"	" "	"	180	"	77
T	2000 lbs	"	1350	2040	3300	3420	9 1/16	" "	Oil Duck	200	"	83½

1918 MOTOR SPECIFICATIONS

MODEL	HORSE POWER R.L.A.M.	HORSE POWER MAX.	FAN Diam.	FAN No. of Blades	FAN Bearings	FAN V. Belt	IGNITION	CLUTCH Leather Faced	CLUTCH Type	CLUTCH System	TRANSMISSION Selective Type	TRANSMISSION Gear Reduction
490 TOUR	21.4	26	14	4	BRONZE		BAT & COIL					10-1
490 ROAD	"	"	"	"	"		"					"
490 SEDAN	"	"	"	"	"		"					"
490 COUPE	"	"	"	"	"		"					"
490 DEL.	"	"	"	"	"		"					"
FA-2	"	37	15	"	"	LEATHER	"	PEDAL	ELECTRIC	DUO LITE		11.16-1
FA-5	"	"	"	"	"		"					"
FA SEDAN	"	"	"	"	"		"					"
D-4	36.5	50	19	2	Ball		"					"
D-5	"	"	"	"	"		"					"
T	21.4	"	15	4	BRONZE		"					"

1918 CHASSIS SPECIFICATIONS

MODEL	CAPACITY OF GASOLINE TANK	GASOLINE FEED	CROSS SECTION OF TANK	FRONT SPRING Style	FRONT SPRING Length of Spring from Eye to Eye	FRONT SPRING Width	FRONT SPRING No. of Leaves	REAR SPRING Style	REAR SPRING Length of Spring from Eye to Eye	REAR SPRING Width	REAR SPRING No. of Leaves
490 TOUR	18 GAL	GRAVITY		¾ ELLIP		1 3/4	8	SEMI ELLIPTIC		2	9
490 ROAD	10 GAL	"		"		"	"	"		"	7
490 SEDAN	12 GAL	STEWART VACUUM		"		"	"	"		"	9
490 COUPE	10 GAL	GRAVITY		"		"	"	"		"	"
490 DEL	10 GAL	"		"		"	"	"		"	"
FA-2	18 GAL	STEWART VACUUM		SEMI ELL 3/4	36	2	"	"		2½	8
FA-5	17 GAL	"		"	"	"	"	"		"	10
FA SEDAN	17 GAL	"		"	"	"	"	"		"	10
D-4	18 GAL	"		"	35⅝	"	9	"		"	11
D-5	17 GAL	"		"	"	"	"	"		"	11
T	18 GAL	GRAVITY		"	37½	2¼	8	SEMI ELLIPTIC	38	2½	12

1918 MOTOR SPECIFICATIONS

MODEL	CAMSHAFT BEARINGS FRONT	CAMSHAFT BEARINGS CENTER	CAMSHAFT BEARINGS REAR	MANIFOLDS INSIDE DIA. INT.	MANIFOLDS INSIDE DIA. EXH.	CENTER OF SHAFT TO TOP OF CYL.	OILING	OIL CIRCULATED BY	OIL CAPACITY IN QUARTS	TYPE OF WATER PUMP	WATER CAPAC. IN GAL.
430 TOUR.	1 15/16 x 2 3/4	1 9/32 x 2	1 1/4 x 1 9/16	1 1/32	1 11/16	12 3/8		GEAR PUMP	4		1 3/4
430 ROAD	"	"	"	"	"	"		"	"		"
430 SEDAN	"	"	"	"	"	"		"	"		"
430 COUPE	"	"	"	"	"	"		"	"		"
430 DEL.	"	"	"	"	"	"		"	"		"
FA-2	1 13/16 x 2 1/4	1 1/2 x 2	1 15/32 x 2	"	2	16	SPLASH / SYSTEM	"	3 1/2	CENTRIFUGAL	2 7/8
FA-5	"	"	"	"	"	"		"	"		"
FA SEDAN	"	"	"	"	"	"		"	"		"
D-4	1 13/16 x 2 3/8	1 1/2 x 1 1/8	"	1	1 3/8	12 13/16		PLUNGER PUMP	"		4 5/8
D-5	"	"	"	"	"	"		"	"		"
T	1 13/16 x 2 1/4	1 1/2 x 2	"	1 1/32	2	16		GEAR PUMP	3		3 1/8

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1918 CHASSIS SPECIFICATIONS

MODEL	WHEEL BASE	TREAD	TIRES	TYPE OF WHEELS	FRAME OVERALL WIDTH	FRAME OVERALL LENGTH	FRAME DEPTH OF CHANNEL	FRAME DROP	STEERING GEAR TYPE	STEERING GEAR ANGLE OF POST	STEERING GEAR DIA. OF POST	STEERING GEAR DIAM. OF WHEEL
TOUR 430	102	56	30 x 3 1/2	[illegible]	[illegible]	101 1/2	3 9/16	NO	SPUR SECTOR	35 L.D. 35 R.D.	1 1/2	15
430 ROAD	"	"	"	"	"	"	"	"	"	"	"	"
430 SEDAN	"	"	31 x 4	"	"	"	"	"	"	"	"	"
430 COUPE	"	"	30 x 3 1/2	"	"	"	"	"	"	"		"
430 DEL.	"	"	"	"	"	"	"	"	"	"	"	"
FA-2	108	"	33 x 4	"	[illegible]	147	4 1/2	4	WORM GEAR	44°	"	17
FA-5	"	"	"	"	"	"	"	"	"	"	"	"
FA SEDAN	"	"	33 x 4 1/2	"	"	"	"	"	"	"	"	"
D-4	120	"	34 x 4	"	"	159	"	"	"	40°	"	"
D-5	"	"	"	"	"	"	"	"	"	"	"	"
T	125	"	[illegible]	CLINCHER	[illegible]	189	4	NO	"	63 1/2°	"	"

1918 MOTOR SPECIFICATIONS

MODEL	VALVES: STEM DIAM.	VALVES: LIFT	PISTON DISPLACEMENT	CONNECTING ROD AND CRANK PIN BEARINGS: LENGTH	CONNECTING ROD AND CRANK PIN BEARINGS: DIAM.	CRANK SHAFT: DIAM.	CRANK SHAFT: LENGTH	CRANK SHAFT BEARINGS: FRONT	CRANK SHAFT BEARINGS: CENTRE	CRANK SHAFT BEARINGS: REAR	FLY WHEEL: DIAM.	FLY WHEEL: WIDTH	FLY WHEEL: WGT
385 TOUR	1 5/16	7/16	177.1	1 3/32 x 3 5/16	1 3/8 x 1 5/8	1 3/8	3 1/4	3	1 3/4 x 2 1/16	1 31/32 x 1 1/2	1 3/4 x 2 1/2	13 3/8	3 1/16	43 1/2
385 ROAD	"	"	"	"	"	"	"	"	"	"	"	"	"	"
490 SEDAN	"	"	"	"	"	"	"	"	"	"	"	"	"	"
490 COUPE	"	"	"	"	"	"	"	"	"	"	"	"	"	"
490 DEL	"	"	"	"	"	"	"	"	"	"	"	"	"	"
FA-2	"	1/4	224.3	"	1 1/2 x 2 5/8	10	"	"	1 1/2 x 2 5/16	1 31/32 x 2	2 x 3	15 11/16	3 3/8	56 1/2
FA-5	"	"	"	"	"	"	"	"	"	"	"	"	"	"
FA SEDAN	"	"	"	"	"	"	"	"	"	"	"	"	"	"
D-4	"	"	286.3	2 3/32 x 3 1/16	1 7/16 x 1 1/2	7 3/8	"	"	1 3/4 x 2 3/8	"	"	"	"	"
D-5	"	"	"	"	"	"	"	"	"	"	"	"	"	"
T	"	"	224.3	2 1/32 x 3 5/16	1 1/2 x 2 1/8	10	"	"	1 1/2 x 2 1/16	"	"	"	"	"

1918 TRANSMISSION SPECIFICATIONS

MODEL	COUNTER SHAFT BEARINGS: DIA.	COUNTER SHAFT BEARINGS: LENGTH OF EACH BEARING	COUNTER SHAFT BEARINGS: DISTANCE BETWEEN BEARINGS	IDLER GEAR BEARING: DIA.	CLUTCH GEAR BEARING: DIA.	MAIN BEARINGS: FRONT	MAIN BEARINGS: REAR	MAIN BEARINGS: CENTRE	BRAND CONTROL	UNIVERSAL JOINT: NUMBER OF PINS	UNIVERSAL JOINT: LUBRICATION
385 TOUR	3/8	1 1/2	4 3/8	3/4 x 2 3/8	1 2.0711 B	1 1/4 x 1 15/16	306 NXX	6 1/16	CENTER	1	GREASE
385 ROAD	"	"	"	"	"	"	"	"	"	"	"
490 SEDAN	"	"	"	"	"	"	"	"	"	"	"
490 COUPE	"	"	"	"	"	"	"	"	"	"	"
490 DEL	"	"	"	"	"	"	"	"	"	"	"
FA-2	"	2	4	3/4 x 2 3/8	1 2.0711 B 1 2.0710 B	15/16 x 2 1/4	1307 NXD	7 1/16	"	"	"
FA-5	"	"	"	"	"	"	"	"	"	"	"
FA SEDAN	"	"	"	"	"	"	"	"	"	"	"
D-4	"	"	"	"	"	"	"	"	"	"	"
D-5	"	"	"	"	"	"	"	"	"	"	"
T	"	"	"	"	"	"	"	"	"	1 1/16	-

1918 Motor Specifications

Model	Cylinders: Bore	Stroke	No.	Head/Cast	Water Jacket: Thickness	Water Jacket: Depth	Valves: Size	Valves: No.	Valves: Location	Valves: Lift	Carb. Zenith Size	Piston Pins: No.	Piston Pins: Width
[illegible]	3 1/16	4	4		Enbloc	9/16	3 3/8	3/8	No		043	3	3/16
[illegible]	"	"	"		"	"	"	"	"		"	"	"
[illegible]	"	"	"		"	"	"	"	"		"	"	"
[illegible]	"	"	"		"	"	"	"	"		"	"	"
[illegible]	"	"	"		"	"	"	"	"		"	"	"
[illegible]	"	5 1/4	"		"	"	5 1/8	"	"		"	"	"
[illegible]	"	"	"		"	"	"	"	"		"	"	"
[illegible]	"	"	"		"	"	"	"	"		"	"	"
D-4	3 3/8	4	8		"	17/32	3 3/4	1/10	"		040	"	"
D-5	"	"	"		"	17/32	"	"	"		"	"	"
[illegible]	[illegible]	5 1/4	4		Enbloc	"	5 7/8	3/8	"		040	"	"

CHAIN-UNIFIED

1918 Transmission Specifications

Model	Type of Control	Type of Clutch	Area of Clutch Surfaces	Ratio Trans.: First	Second	Gear Speed: Direct	Reverse	Gear Teeth: Pitch	Width of Face	Square Shaft: Across Corners	Across Flats
[illegible]	[illegible]	[illegible]	53.34	2.82-1	1.77-1	1-1	4.2-1	7/8	5/8	1 3/8	7/8
[illegible]	"	"	"	"	"	"	"	"	"	"	"
[illegible]	"	"	"	"	"	"	"	"	"	"	"
[illegible]	"	"	"	"	"	"	"	"	"	"	"
[illegible]	"	"	"	"	"	"	"	"	"	"	"
[illegible]	"	"	85.34	3.62-1	1.75-1	"	4.08-1	6-8	3/4	1 3/8	1 1/8
[illegible]	"	"	"	"	"	"	"	"	"	"	"
[illegible]	"	"	"	"	"	"	"	"	"	"	"
[illegible]	"	"	"	"	"	"	"	"	"	"	"
[illegible]	"	"	"	"	"	"	"	"	"	"	"
[illegible]	"	"	"	"	"	"	"	"	"	"	"

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The following is a list of manufacturers supplying accessories for Chevrolet Cars, and as under the terms of our warranty these are guaranteed separately by the manufacturers, any questions as to the repair or replacement of the units should be taken up with them or their nearest service station.

Ammeter
Electric Auto-Lite Co., Toledo, Ohio, or authorized service station.

Battery
Willard Storage Battery Co., Cleveland, Ohio, or authorized service stations.

Carburetor
Zenith Carburetor Co., Detroit, Mich., or authorized service stations.

Circuit Breaker
Electric Auto-Lite Co., Toledo, Ohio, or authorized service stations.

Coil
Remy Electric Co., Anderson Ind., or any branch of United Motors Service, Inc.

Distributor
Remy Electric Co., Anderson Ind., or any branch of United Motors Service, Inc.

Generator
Electric Auto-Lite Co., Toledo, Ohio, or authorized service stations.

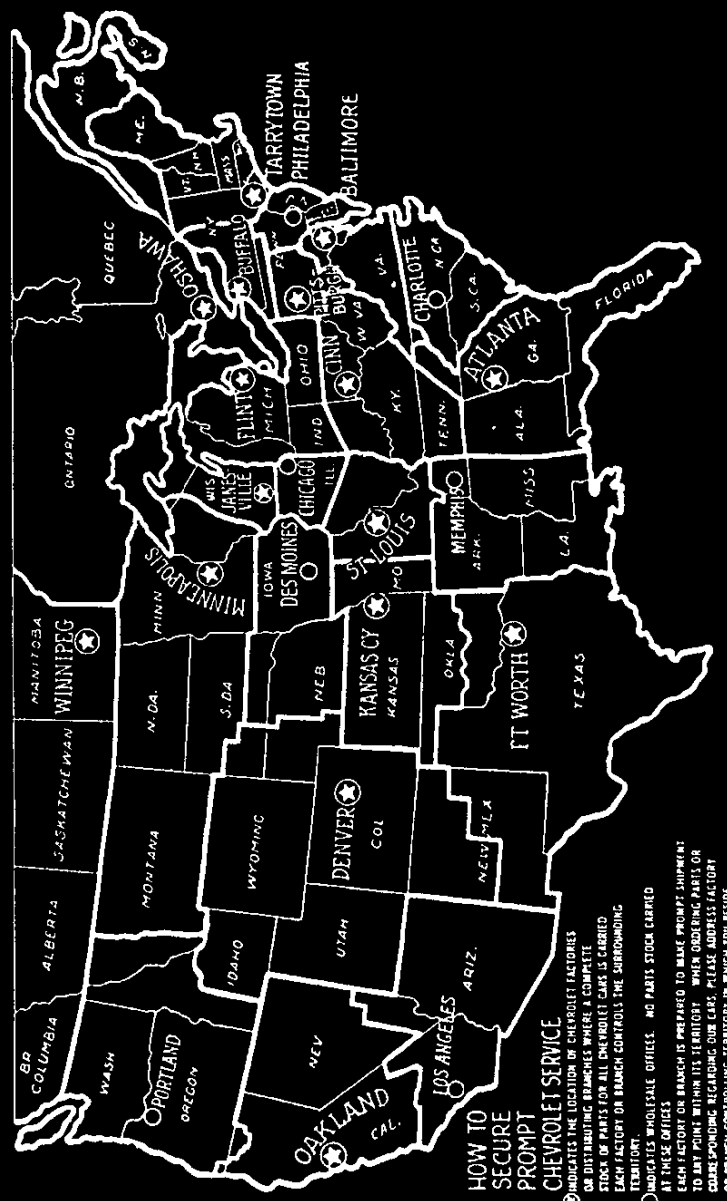
Rims
Jaxon Steel Products Co., Jackson, Mich., or any branch of United Motors Service, Inc.

Starting Motor and Switch
Electric Auto-Lite Co., Toledo, Ohio, or authorized service stations.

Speedometer
Stewart-Warner Corporation, Chicago, Ill., or authorized service stations.

Tires
Goodyear Tire & Rubber Co., Akron, Ohio.

Vacuum Tank
Stewart-Warner Corporation, Chicago, Ill., or authorized service stations.



Directions for Ordering Parts

When ordering parts be sure to give the model, year produced, and car number for which parts are desired.

The model and car number will be found on the name plate attached to the dash under the instrument board.

If in doubt as to the name of the part needed, send the broken part to your dealer or the factory, by **prepaid express.** Write your name and address plainly on the package, so that it can be identified upon arrival. Write a letter **the same day** shipment goes forward, stating the purpose for which it is returned, **regardless of any previous correspondence.**

In ordering from the factory, if possible, always send cash with your order, because we cannot open accounts except with our regularly appointed dealers. **Orders not accompanied by cash will be sent C.O.D.**

In ordering parts by telegram, be sure the message is prepaid. **Collect messages will not be accepted** by this company. Always confirm the telegram by a regular order, marked "confirmation of telegram," through the mail.

All Chevrolet dealers carry a stock of such parts as are needed most frequently; therefore, delays can be avoided by ordering from your nearest dealer.

To drain the battery, proceed as follows:

Have the battery **fully charged** either by operating the engine or by removing the battery and having it charged at a charging station. It is absolutely necessary that the battery be fully charged, so proceed carefully, testing the solution with a specific gravity hydrometer until it reads 1.300. It is well to continue the charge, even after obtaining the proper specific gravity reading, until two successive readings, taken one-half hour apart, show no further rise in gravity.

Then empty each cell of its liquid electrolyte. Do not attempt to save the solution, but pour **it on the ground**—not in a sink or drain—as the sulphuric acid contained in the solution is a powerful acid which will damage any metal drain.

Then fill each cell with distilled or clean rain water and empty that out. Replace the vent plugs and **thoroughly seal** them, not only the small hole through the top but around the edges. To seal the vents use melted paraffine or beeswax. **Be absolutely sure that each vent is thoroughly sealed**, as this will retain the moisture which has adhered to the plates and keep them in good condition.

Under no circumstances attempt to dry out the battery, as a certain amount of moisture must be retained in it; otherwise the active elements will become useless, requiring replacement before the battery can be used again.

When it is desired to place the battery in service, each cell should be filled with electrolyte of 1.300 degrees specific gravity at 70 degrees Fahrenheit (21 degrees Centigrade).

(See article on mixing electrolyte.)

WHAT TO DO UPON RECEIVING THE CAR

Every Chevrolet Car is thoroughly tested before it leaves the factory, and all places requiring oil or grease are supplied with it. It has been our purpose to deliver into your hands a perfectly balanced, well built automobile of honest and painstaking workmanship.

Your car, therefore, will be ready for use as soon as you have filled the cooling system with clean water and the fuel tank with a good grade of gasoline. After filling the tank with gasoline, tighten the tank cover securely to prevent evaporation.

As a precaution, however, and to avoid mistakes, examine your car: See that the tires are pumped up hard (air pressure

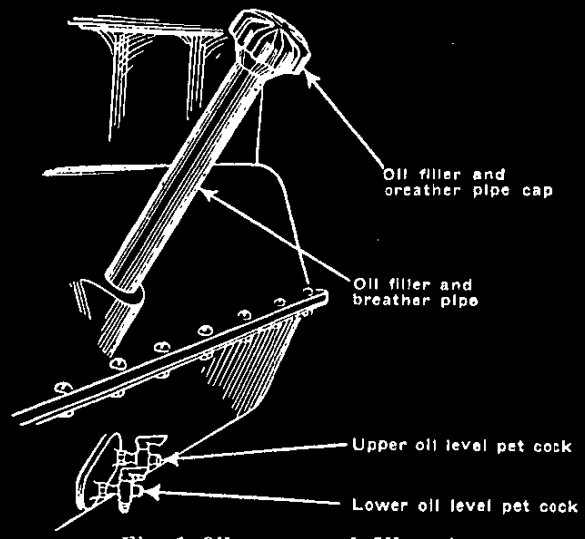


Fig. 1—Oil gauge and filler pipe.

should be about twenty pounds per inch of tire diameter), remove the caps on all grease cups and see that they are full. Raise the hood and examine the wiring—see that the terminals are tight upon the spark plugs, that no dirt or water covers the coil or ignition system, in short, see that all parts of the motor are clean and free from surplus oil or dirt. Make it your business thereafter, during the life of the car, to keep it in this condition and you will be sure of securing the maximum of service from your motor.

On the left side of the oil basin are two pet cocks. (Fig. 1.) Open the upper pet cock by turning the valve handle so that its face is parallel with the outlet and then pour a good grade of cylinder oil into the oil filler pipe until the oil begins

to drip from the pet cock. Do not put more oil into the basin than is required, as the level of oil is predetermined to give best results and any over-filling will simply mean increased consumption, smoking and carbonization. The lower of the two pet cocks is for draining off old oil. Occasionally mud or dirt will stop up the openings in the pet cocks, so to avoid overfilling open the valve and insert a wire into the opening to clean it.

STARTING THE MOTOR

These few details attended to, you are ready to start the motor. Before you can do so, however—in fact, before you can start

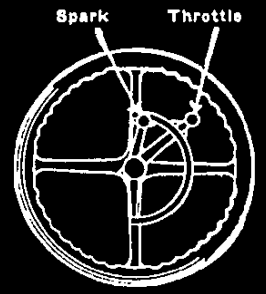


Fig. 2—Position of spark and throttle levers when starting motor.

the motor at any time—you must make certain of *three* things.

First, that the gear shifting lever is in neutral position, that is, it should be free to move from right to left.

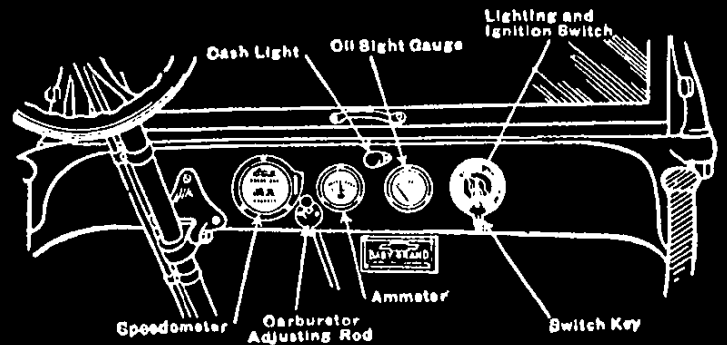


Fig. 3—Instrument Board.

Second, that the spark and throttle levers are in the proper positions for starting. (Fig. 2.)

Third, that the ignition switch is turned on (Fig. 3). To do this insert key in slot through the lighting switch button and turn to the left as far as it will go. This performs the double operation of turning on the ignition and unlocking the lighting

which may have adhered to them. After removing the tires, thoroughly clean the inside of the wheel rims and apply a coat of enamel to prevent rust, which is very injurious to the fabric of the tire.

If the tires are not removed, jack up the car so that the wheels clear the floor at least two inches, and let the air out of the tubes.

Under no circumstances should the car be stored in a barn or other building in which horses or cattle are kept at the same time. The ammonia fumes given off will quickly discolor the paint and enamel. Select a building having a good roof, and preferably a wooden floor raised several inches from the ground.

All bright metal parts should be thoroughly coated with slab oil, vaseline, cosmic or gun grease to prevent rusting.

CARE OF TOP

The top of the car should be thoroughly cleaned and all dust brushed out. Never attempt to clean the top or curtains with gasoline or kerosene—use a good brush or broom.

If possible, the top should be kept open, which will keep it well stretched and smooth. If this cannot be done, use care in folding it—see that the folds are straight and that none of the fabric is pinched between the bows or supports.

Do not fold the top until it is thoroughly dry, because any moisture remaining in the fabric will likely cause mildew, resulting in an unsightly and leaky top.

CARE OF CLOTH UPHOLSTERY

To clean the cloth upholstery on Sedan Bodies, use warm water and Ivory Soap only. Gasoline has a tendency to spread the grease and leave a discolored spot.

After cleaning, wipe dry with a clean cloth.

TREATMENT OF BATTERIES IN STORAGE

Before storing the car the engine should be run long enough to thoroughly charge the storage battery. The hydrometer should show that the gravity of the electrolyte **in each cell** is up to 1.280.

At intervals of two weeks the engine should be run until the solution gases freely and assumes a milky appearance. Test with a hydrometer—if it reads less than 1.280, continue to operate the motor until the proper reading is obtained. If the owner does not possess a specific gravity hydrometer, the engine should be run at a speed equaling 20 miles per hour for from two to three hours. If at the end of that time the solution is not "gasing" freely, keep the motor going until it does.

Always—and be sure about this—add distilled water to each cell if the solution does not cover the plates (see care of storage battery).

If it is impracticable to operate the engine, the owner should either install a charging outfit or remove the battery from the car and take it to a garage which makes a business of charging batteries and have it charged every two weeks.

In exceptional cases the battery can be drained and stored in a cool, dry place; however, this should only be done when it is not possible to follow the suggestions given above.

SHORT CIRCUITS

A short circuit occurs when any two wires of opposite polarity come in contact at exposed places or with any metallic conductor. This will discharge the storage battery in a very short time, therefore, **the greatest care should be taken to see that all connections remain tight and that the insulation of all wires is not broken or cut.**

To prevent a short circuit from damaging the lights a fuse is inserted in the lighting switch box. When this "blows" it can be easily replaced; however, before doing so be sure everything else in the wiring system is in good order.

If the ammeter hand shows a discharge when the lights are turned off and engine idle, disconnect the positive (+) wire from the battery, and if the hand goes back to zero it shows that there is a leak or short circuit, which should be remedied at once. If the hand does not go back to zero, the needle is bent. (See care of ammeter.)

After satisfying yourself that the wiring is in good working order test each of the electrical instruments.

Examine the generator brushes, see that they work freely, and that the commutator is clean.

Examine the circuit breaker; see that the points make contact. If not, close them with your fingers. Then if the ammeter registers "charge" with the engine running at fair speed, remove the circuit breaker and send to the makers for repairs as instructed.

Examine the ammeter: With the lights turned on and engine idle the ammeter hand should register "discharge." If it stands at zero, remove the ammeter and return to the manufacturers as instructed.

Examine the storage battery: See that the solution in each cell covers the plates, and add distilled water if it does not. See that the top of the battery is clean and terminals tight. In case of leakage of the electrolyte in one or more cells, take your battery to the nearest service station maintained by the battery manufacturers for examination and replacements.

It should be remembered that the efficiency of any storage battery decreases with a drop in temperature, and for that reason the starting motor and lights should be used sparingly in cold weather, and the engine run for several minutes at good speed after each start.

Winter Storage of Cars

When it is found necessary to store the car during the winter months, the water should be thoroughly drained from the radiator and motor, after which the engine should be run under its own power until it becomes thoroughly heated. Do not run the motor too fast, but keep it going long enough to evaporate every particle of water that may be "pocketed," to prevent the water freezing and possibly bursting the water jackets.

It is desirable to remove the tires and place them in a room where they are not subjected to extreme temperature changes. The casings should be thoroughly cleaned to remove all oil

switch which can then be operated and any combination of lights turned on that may be desired.

Be absolutely sure that the spark lever is properly retarded, as shown. Failure to do this may result in a premature explosion or "back fire" which will cause serious damage to the starting equipment and subject you to unnecessary trouble and expense.

We will not be responsible for such damage, so observe this point without fail.

After being absolutely sure that all *three* rules given above have been carefully observed, start the motor.

Located on the floor boards (Fig. 4) within reach of the right foot is the starting button. Press this down as far as it will go and hold it until the engine starts under its own power. Remove

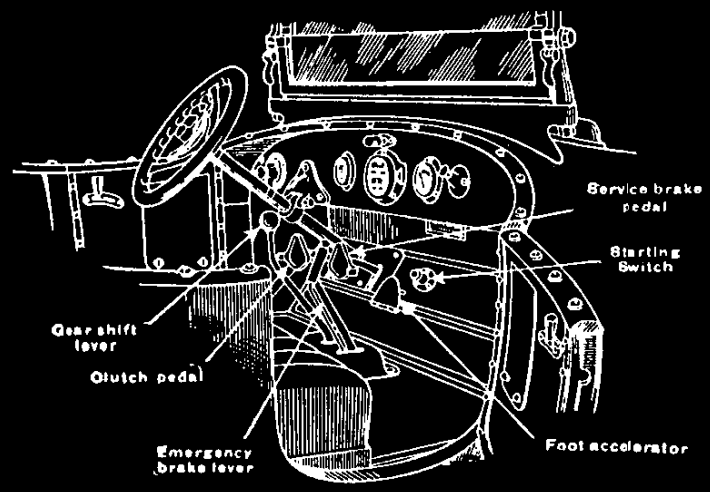


Fig. 4—Controlling devices.

your foot the moment the engine starts. Serious damage can be done to the starting motor unless this is watched very carefully.

Owing to the difference in specific gravity of gasoline obtainable in various localities, and also to difference in atmospheric conditions, it is sometimes necessary to feed the motor a fuel mixture rich in gasoline and poor in air. This is particularly true in cold weather when the motor has become thoroughly chilled. This is done conveniently by means of the carburetor adjusting rod located on the instrument board. (Fig. 3.) In very cold weather it may be necessary to pull this rod all the way out. As the motor warms up the rod may be pushed inward again until, when the engine is running smoothly, being warmed up to the temperature of best efficiency, the rod should again be returned to its original position. The carburetor, before leaving the factory, has been adjusted so that the motor will run at its

best efficiency with the least gasoline consumption, therefore always see that as soon as the motor warms up to the proper temperature the rod is returned to its original position as quickly as possible.

A mixture which is "rich" in gasoline heats up the motor, causing lubricating troubles, with the consequent danger of "scoring," besides being wasteful of fuel.

MOTOR STARTED

It is not a good thing to let the motor "race" idle (run at considerable speed). Therefore, you should now "retard" the *throttle lever*, thereby cutting down the gas supply. At the same time advance the spark lever until both have the position indicated in Fig. 5.

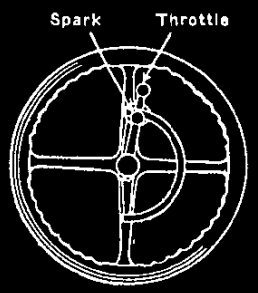


Fig. 5 — Position of spark and throttle levers, when motor is running idle.

It is best to retard the throttle lever until the motor turns very slowly, just fast enough to maintain its operation.

For the novice who has yet to learn how his engine works with the motor running but with the car standing still, it is well to try the engine-controlling devices—advancing and retarding the spark, opening and closing the throttle. In this way a fair idea may be gained of the effect of these controlling devices on the action of the motor.

ACCELERATOR

With your feet resting lightly on the foot pedals, you have near your right foot a small pedal (Fig. 4) called an accelerator. Pressing down upon this pedal causes the motor to be speeded up or "accelerated." When pressure is released a spring returns it to its normal position. The hand throttle lever and the accelerator pedal are interconnected. Advancing or retarding the hand throttle lever will move the accelerator pedal down or up, but pressing the accelerator pedal down will not actuate the hand throttle lever. It is possible, therefore, to set the hand throttle lever for any desired minimum speed so that when pressure is removed from the accelerator pedal the motor will not stop, but will drop to the minimum speed which you have selected. This arrangement gives greater freedom to the operator's hands, especially when it is necessary to shut off power when going around bad spots in the road, approaching turns or in passing other vehicles.

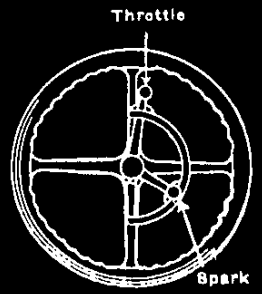
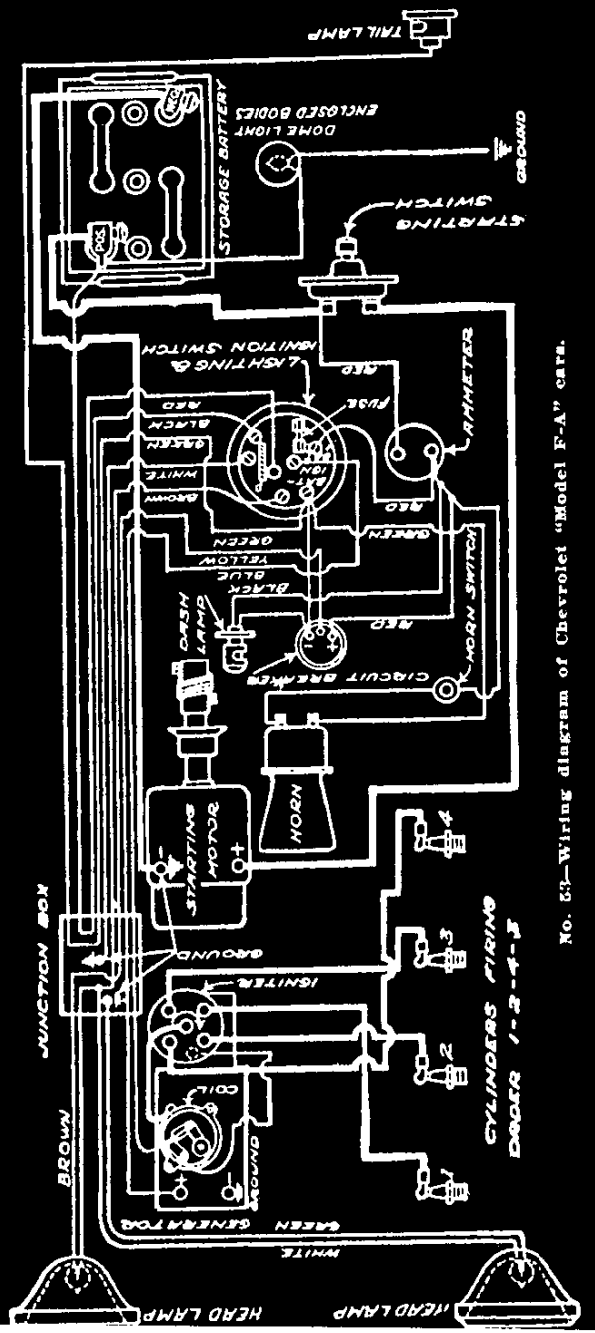


Fig. 6 — Position of spark and throttle levers—car in motion.



No. 53—Wiring diagram of Chevrolet "Model F-A" cars.

fail to operate properly, it should be returned to the manufacturer for adjustment. If the circuit breaker is removed, the car must not be operated until a short piece of copper wire is connected between the two terminal posts on the generator.

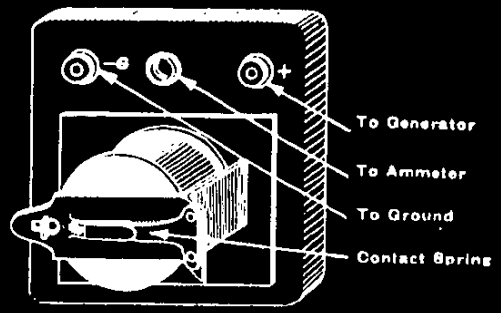


Fig. 52—Circuit breaker, cover removed.

AMMETER

The ammeter is self-contained, and requires no lubrication or attention. The accuracy of its reading should be checked up occasionally to make certain that no short circuit has bent the pointer or otherwise injured its internal parts. To test for accuracy, remove the wires from the ammeter terminals or the positive (+) wire from the storage battery. The ammeter pointer should now stand at "zero," and any difference between where it actually stands and "zero" is the degree of error, and should be allowed for when observing ammeter readings.

When for any cause it is necessary to remove the ammeter and operate the car without it, the two wires which were attached to the ammeter terminals should be firmly fastened together and the bare spots covered with electrician's tape.

LIGHTING AND IGNITION SWITCH

The lighting and ignition switch is contained in an insulated metal case, and needs no attention or adjustment. The ignition key performs the double operation of turning "on" or "off" the ignition and "unlocking" or "locking" the lighting switch. To protect the switch from short circuits a small fuse is mounted on the back side. Should both lights and ignition fail to work, examine the fuse first. It will usually be found "blown." If one or more lamps fail to burn, examine the bulbs. If these are in good condition probably the switch contact springs have weakened. Remove the switch from the instrument board and take out the three flat-headed screws holding the fiber back to the barrel of the switch. This will permit necessary repairs.

LOCATING TROUBLES

When the electric system gives trouble do not jump at conclusions. Only when you have made sure that the wiring is in perfect condition, all terminals tight and connected up according to the wiring diagram (Fig. 53), should trouble be looked for in the electrical instruments themselves.


Fig. 7—Sketch showing change from neutral to low speed.

The hand throttle is used in starting the motor and in touring as an occasional relief to rest the foot at times when the car is run considerable distances without material changes in its speed.

PUTTING THE CAR IN MOTION

When you are seated behind the steering wheel in the car you have at your right hand a vertical lever moving in a ball and socket called the *gear shifting lever* (Fig. 4). This lever controls the various speeds of the car.

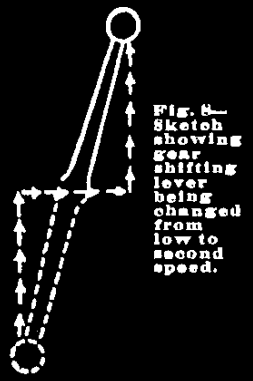


Fig. 6—Sketch showing gear shifting lever being changed from low to second speed.

The motor is still idling along slowly and the gear shifting lever is still in the neutral position (vertical and free to move to right or left).

You are now going to set the car in motion on the first or low speed.

First, **advance the spark and throttle levers** to the position indicated in Fig. 6. The motor speed will be increased.

Second, **push down on the clutch pedal**, the one under your left foot (Fig. 4).

Third, move the gear shifting lever from the neutral position into first or low speed position by moving it first to the left as far as it will go, and then backward as shown in Fig. 7.

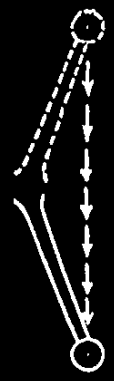


Fig. 8—Sketch showing position of gear shifting lever when changing from second to high speed.

In moving the gear shifting lever be sure to avoid the left hand forward or reverse position.

While you have been moving the gear-shifting lever you have kept the clutch pedal pressed down with the left foot.

Now, let it come up, not suddenly, but gradually and smoothly, little by little, until the car moves slowly ahead. A little practice will soon show the proper clutch manipulation

Remember, letting the clutch in suddenly is not only unpleasant to the occupants of the car, but very injurious to the entire mechanism.

Since you are in first or low speed your motor will run comparatively fast, but your car will travel slowly. Do not permit your motor to "race" at this stage.

Be in no hurry to change into a higher speed, but let the car gain some momentum. If you are a novice run along for some distance on the first speed to get the "feel" and to gain the confidence of handling.

After the car has gained sufficient momentum, prepare for changing to second speed.

Speed the car up just a little by opening the throttle.

Release the clutch by depressing the clutch pedal, the one under your left foot, and while the car retains its slightly increased speed, and while you keep the clutch released, move the gear-shifting lever forward to neutral, thence to the right and right-forward position. (Fig. 8.)

Now, let the clutch pedal come back easily as before, and at the same time advance both the spark and throttle levers slightly.

Allow the car to gain some speed (do not permit the motor to race), then prepare for changing to high or third speed.

Release the clutch as before and, while the clutch pedal is depressed, pull the gear-shifting lever straight back into the right rear position as indicated in Fig. 9. At the same time advance both the spark and throttle levers a little.

When you have become accustomed to changing gears, try using the accelerator pedal to "accelerate" the motor after making shifts from second to high or high to second. You will find it less awkward besides giving greater freedom of the hands.

It is possible to move the gear shifting lever from any one position to another, only be careful:

To keep the clutch released while moving the gear shifting lever.

To avoid the left forward or reverse position while the car is moving.

To avoid "clashing" when engaging the gears.

When the gears clash press down a little more upon the clutch pedal and wait a moment before trying again. Remember, clashing the gears burrs up the edges of the teeth, injuring them and in time making gear changes exceedingly hard, besides necessitating an early renewal of the gears.

Be deliberate: It is well to pause a moment or two after disengaging the gears before moving into the next speed. The fundamental requirements in every case are that the gears to be meshed shall be revolving at as nearly the same speed as possible. By waiting a moment, time is given for this to take place.

In changing to a higher gear, slow down the motor while the gears are disengaged. When changing to a lower speed, speed up the motor while the gears are disengaged.

STOPPING THE CAR

When you have decided that you want to make a stop, release the clutch and at the same time retard the throttle lever, or remove your foot from the accelerator pedal. Allow the car to coast for a moment or two on its own momentum, then gradually press downward upon the service brake pedal, the one under your right foot (Fig. 4) until you have reached its limit of downward movement, or until the car comes to a stop.

By applying the pressure on the brakes gradually, and by permitting the car to coast for a distance on its own momentum, you can gauge your stop to a nicety and come to a stop exactly at the desired spot.

You must keep the clutch pedal depressed while the car is

teeth on the fly wheel and keeps on moving along until it reaches a stop at the end of the threaded sleeve. The pinion and the fly wheel gear are then fully meshed. Fitted over the end of the armature shaft is a second sleeve, held securely to the shaft by a clamping bolt. A heavy coiled spring connects the outer sleeve with the threaded sleeve. After the pinion has reached the stop it now must turn with the threaded sleeve, but since it is engaged with the fly wheel gear the shock of starting the engine would be very great were it not that the armature shaft is connected to the threaded sleeve through the coiled spring. Instead of picking up the load immediately, this spring keeps coiling until the torque of the starting motor overcomes the resistance of the engine and starts to revolve the fly wheel.

As soon as the gasoline engine starts under its own power, the fly wheel revolves at a much higher speed than it did when the starting motor was cranking the engine. This increases the speed of the pinion, but because it is running faster than the threaded sleeve, it will be screwed on the threads of the sleeve like a nut on a bolt until it has been screwed out of mesh with the fly wheel gear. Should the operator of the car, through error, not immediately remove his foot from the starting button, the unbalanced weight of the pinion causes it to twist on the threaded sleeve and clutch the threads, preventing it from again meshing with the fly wheel gear. This demeshing movement and clutching action is entirely automatic.

The coiled spring should be examined occasionally to see that it is clamped tightly, and that no distortion has taken place. Should this occur, replace the spring, as this must be in good working order to prevent damage to the teeth on the fly wheel gear.

While the coiled spring absorbs much of the starting torque, the vibration of the car, coupled with the shock of starting, may cause the clamping bolts holding the starting motor to the motor support to loosen, and possibly shift the starting motor slightly, throwing the pinion out of proper alignment with the fly wheel gear.

If, when starting the engine, the pinion goes into mesh with a "bang," accompanied with considerable noise while cranking, take your car to a garage and have the bolts examined and the starting motor lined up properly. By turning the threaded sleeve with the fingers, the pinion can be moved into mesh with the fly wheel gear, and any disalignment observed and corrected.

In general, the instructions given for the care of the generator will apply as well to the starting motor. The brushes and commutator are easily accessible for examination by removing the sheet metal cover on the commutator end of the machine.

CIRCUIT BREAKER

The circuit breaker is entirely automatic and requires no lubrication or attention. If for any reason the instrument should

in warm weather and every two weeks in cold weather, and **make certain that the electrolyte covers the tops of the plates in each cell.**

Don't forget that the proper treatment of a storage battery is absolutely necessary to secure uniformly good results from the entire electrical system.

Figure 50 tells a story more graphically than a hundred pages of text. Here you see what happens to the interior parts or plates when the battery is neglected. The center and upper portions of the plate, as shown by the white coating, are sulphated. This white coating, or sulphate, is an obstruction to the free passage of the electric current; in fact, when it has reached the stage that this one has it is almost impossible to recharge it. A new set of elements is usually the only recourse.

Don't let this happen to your battery. Examine your battery regularly every week and follow faithfully the instructions we have given, and always **keep the plates covered with solution** by adding **distilled** water when needed, and your battery will not sulphate, but will continue to give you good service day after day.

STARTING MOTOR

The starting motor is mounted on the rear motor supporting arm, having a pinion, which automatically engages the toothed

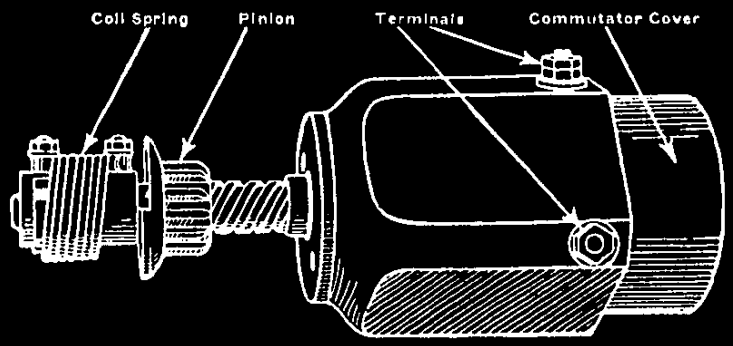


Fig. 51—Starting motor.

edge of the fly wheel when the motor armature is rotated rapidly, as in starting. The armature shaft of the starting motor has an extension or sleeve provided with square threads. The pinion is also threaded, and, in addition, carries an eccentric weight which holds the pinion in the position shown in Fig. 51, with the weight underneath. Because of the weight, the pinion is too heavy to turn on the threaded extension, and because the pinion does not turn, it must move along the screw sleeve. After the pinion has moved along the threaded sleeve it engages the

coming to rest, and **never under any circumstances take pressure off the clutch pedal** until after you have moved the gear shifting lever from the high speed position into the neutral position.

When the gear shifting lever is in neutral the transmission gears remain out of engagement, and although the pressure on

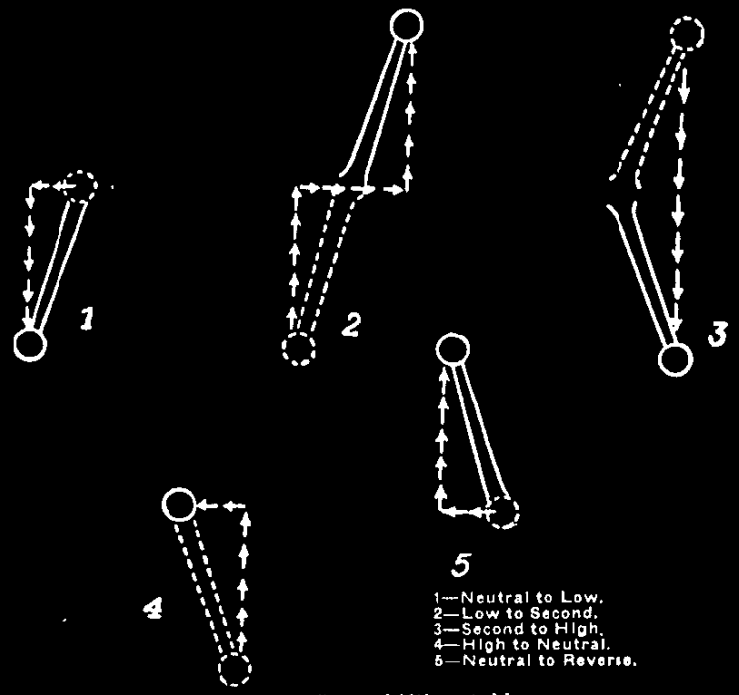


Fig. 10—Gear shifting table.

the clutch pedal now be removed, the car will remain motionless although the motor continues to run.

If the stop is to be of some duration, always before leaving the car set the emergency brake (Fig. 4) by pulling the emergency brake lever straight back towards you as far as it will go. Be sure that the plunger ratchet attached to the lever engages the toothed segment, otherwise the brake will not hold. To release the brake pull the lever towards you and at the same time press down upon the button extending through the top of the lever handle. This causes the plunger ratchet to disengage from the toothed segment and the lever can be pushed forward into its original position. Do not take your finger off the button until you are sure the lever has been pushed forward as far as it will go, otherwise your brake may be partially "set," using up power, besides wearing out the brake linings.

To stop the motor turn the ignition key to the right and remove. This locks the ignition, also the lighting switch, and prevents tampering or theft. Turning off the ignition does not

affect the position of the lighting switch button, therefore it is possible to leave your car with whatever combination of lamps burning you desire.

It is also good practice to turn the steering gear so that the wheels "turn in" towards the curb or side of the road. Should the brake, for any reason, be released, this will prevent the car from starting on a "wild plunge" should your stop be on a down grade.

MAKING AN EMERGENCY STOP

There are times when the ability to bring the car quickly to a stop is of the greatest importance. When this occurs, release the clutch by pressing the pedal under your left foot and at the same time press down hard on the service brake pedal, the one under your right foot. If this braking action is not sufficient to bring the car to a stop in the required time, "set" the emergency brake by pulling the emergency brake lever (Fig. 4) towards you as far as it will go. By applying both the service and emergency brakes you apply braking effect in opposite directions, which will have immediate results.

As soon as possible retard the throttle to prevent the motor "racing."

If a full stop is not desired, merely a temporary slackening of the speed, release the brakes first, then let the clutch pedal come up.

If the speed of the car has been decreased to any great extent, it is advisable to shift into a lower gear. Never allow the motor to pick up a slowly moving car on high gear. The strain placed upon it is very great, and the likelihood of "stalling" the motor easily offsets the small effort necessary to change speeds.

Be considerate; the manufacturers have placed three forward speeds at your disposal, each ratio of which is designed for certain loads and conditions. Don't overload the motor; the next lower gear, while a little slower, is in the end an insurance for longer life and more efficiency.

BRAKING EFFECTS

When the brakes are applied suddenly and with full force to the wheels of a car going at a considerable speed, the braking action will be so powerful as to immediately stop the rotation of the driving wheels. But the car will not come to an immediate standstill, its momentum will carry it forward, and the locked rear wheels will slide over the ground with most destructive effect on the tires.

The best method of using the brakes is that which applies pressure on them so gradually that the forward movement of the car and the rotation of the wheels come to a stop *together*.

Avoid spectacular stops; they are not only unnecessary, but indicate a desire to "show off" which is so disgusting to the average motorist. There may also come a time when through constant "showing off" the brakes will fail. The inevitable result will be a bad smash up, with its consequent danger to others.

The careful driver shuts his power off before he reaches the

continuously for at least 36 hours. Test the specific gravity, if less than 1.280 continue the charge until the proper reading is obtained and the battery gases freely.

It is best to intrust the charging and refilling of the battery with electrolyte to a competent battery man who is equipped to do such work, as the strain of keeping the gas engine running the proper length of time is very great.

It is absolutely essential that the battery be charged immediately after placing the electrolyte in the cells, also that the charging be done thoroughly.

In replacing the vent cap covers be sure to remove all wax or paraffine from the small hole in the top, as this must be open to give proper "vent."

DON'TS FOR THE STORAGE BATTERY

Don't allow your storage battery to stand in a discharged condition for any length of time. Should the battery for any reason become discharged, have it fully charged at once at the nearest garage or charging station. A battery, when in a discharged condition, sulphates rapidly, making charging extremely hard, and in time entirely destroying the elements.

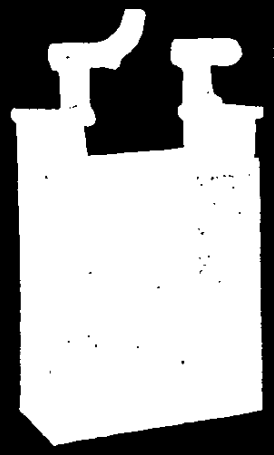


Fig. 50—Battery plates sulphated.

Don't allow dirt, water, or any pieces of metal to come in contact with or remain on the top of your battery. Inspect regularly and keep clean.

Don't continue to crank your engine with the starting motor if it does not start after a few revolutions. Something is wrong with your ignition system or carburetor. Locate and remedy the trouble before again cranking the engine. Just turning the engine over will not help you start, but it will exhaust your battery, if continued for any length of time.

Don't forget to turn "on" the ignition switch before attempting to start the motor.

Don't forget that you must restore in the battery whatever current has been withdrawn for starting. It requires about twenty times as long to restore current to the battery as it takes to start the engine.

Don't turn on all the lights of your car and leave it standing for several hours. Conserve the battery supply by using only such lamps as are absolutely needed to prevent accident.

Don't allow the battery to become loose on the brackets.

Don't allow the battery terminals to become coated with a greenish deposit. Wipe off with diluted ammonia water and thoroughly coat the terminals with vaseline or petroleum jelly.

Don't forget to examine your storage battery once every week

Test each cell separately after the automobile motor has been running for several minutes. If the solution does not cover the plates, **add distilled water and thoroughly mix** before taking a reading. **Do not add acid.**

Withdraw enough solution to float the hydrometer and read the number on the stem at the point where it emerges from the solution. If the gravity is less than 1.250, use the lights and starting motor sparingly, but run the car or engine long enough to bring it up to the proper reading.

If the specific gravity is less than 1.150, have the battery charged immediately at a garage or charging station.

Under no circumstances add acid to the solution. The electrolyte will remain in proper condition indefinitely if the instructions not to add acid but to add distilled water as directed are followed.

Preparing Storage Batteries for Export Service

The insurance laws and regulations of steamship companies require that storage batteries be shipped to foreign countries without electrolyte.

Immediately upon receipt of the car the special vent plug caps should be removed and replaced with standard vent plug caps, a sufficient number of which accompany each battery.

The battery should then be filled with electrolyte of 1.300 degrees specific gravity at 70 degrees Fahrenheit (21 degrees Centigrade) and placed on charge immediately. Never fill the battery with electrolyte at a temperature over 90 degrees Fahrenheit (32 degrees Centigrade).

The charging rate should be at 8 amperes, and should be continued for 36 hours continuously at this rate. If, during the charge, the temperature exceeds 100 degrees Fahrenheit (38 degrees Centigrade), the current should be reduced and the length of charging time proportionately increased. If, at the end of 36 hours, the specific gravity of the solution has not reached 1.300, the charge should be continued until the gravity stops rising. At this point the cells will gas freely, and the voltage should read at least 2.45 volts per cell, or 7.35 for the three cells connected in series.

Mixing Electrolyte

Secure from a reliable supply house *Concentrated Pure* sulphuric acid—not commercially pure. Measure 100 parts of distilled or clean rain water in a glass or earthenware container and mix with it 30 parts of acid.

In mixing, the acid should be poured into the water—**never pour water into the acid.** When mixing, the temperature of the solution will rise—allow it to cool off until it is between 70 and 80 degrees Fahrenheit.

Then fill each cell until the solution stands above the top of the plates at least ⅜ inch, and place the battery on charge immediately.

Do not attempt to use the battery until it has been on charge

stopping point, and permits the car to carry him along on its momentum, bringing it, with a gradual application of the brakes, to a halt at the exact spot.

Never apply the brakes with the clutch in engagement. **Release the clutch first, then, if necessary, apply the brakes.** Applying the brakes first would destroy the braking effect, besides being very injurious both to the motor and clutch lining, with a liability of injuring the transmission.

STEERING

Steering is not a difficult task. Perfection comes from confidence, not from knowledge. Within a few minutes the novice will have learned just how much of a movement on the steering wheel is required to turn a corner, pass other vehicles or obstructions.

Turning the steering wheel to the left will cause the front wheels to turn in the same direction, and the car will travel to the left. Turning the steering wheel to the right causes the car to travel to the right. This applies when backing up as well as when going forward.

Proceed cautiously, preferably on a road that is little frequented, and wide enough to give plenty of room for your first attempt at automobile driving.

Don't forget that after turning a corner the front wheels should be "straightened" up, otherwise you will run off the road.

REVERSING OR BACKING THE CAR

Always bring your car to a "dead" stop before attempting to back up. Failure to observe this may result in serious damage to the transmission and cause unnecessary expense. With the car at rest and the gear shifting lever in neutral, release the clutch by depressing the clutch pedal and move the gear shifting lever forward into the left forward position (Fig. 11). Now let the clutch pedal come back easily and at the same time accelerate the motor speed by opening the throttle slightly.

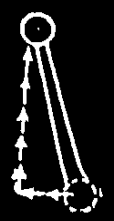


Fig. 11—Sketch showing gear shifting lever being moved from neutral to reverse.

Remember that in moving backward the same movement of the steering wheel will cause you to turn to the right or left as it would were you going forward.

Proceed cautiously—more accidents occur when backing up than when going forward, as you cannot see clearly; so take your time, look around, and make sure that you have your car under such control that a stop can be made instantly.

A FEW HINTS ON DRIVING

Never drive your car at high speed over any road, much less a rough or slippery one. The slight gain in time saved will not offset the liability of an accident nor the pounding and racking to which the car is subjected. Usually the time saved is unimportant when figured in dollars and cents. The resulting repair

bills, which in time are sure to follow, are never unimportant.

It has been demonstrated that the motorist who drives his car at average speeds of from twenty-five to thirty-five miles per hour over all sorts of roads pays much more per mile for gasoline, oil and tires than the one who is more conservative and averages from eighteen to twenty miles per hour.

In addition, a car which is driven at high speeds all the time is in the repair shop at frequent intervals, which adds to the cost per mile of operation.

It is not the question of how many miles are covered in a given time that counts, but the number of miles of useful travel that can be obtained at the least cost for fuel, oil, tires and repairs.

In times of emergency, when to stop suddenly is absolutely necessary, remember the speed at which you are traveling combined with the road surface may spell safety or disaster for you, the occupants and your car. One cannot always observe closely road surfaces when traveling at high speed; the necessity of watching the road far ahead prevents. So, avoid excessive speed, is a rule to be observed.

Observe the "rules of the road." Have due respect for those who are using the same highway, remembering that courtesy and consideration to others will always win for you the same return.

When approaching a turn slow down. Some one else may be traveling in an opposite direction. Have your car under absolute control so that a stop may be made quickly and within a few feet.

When making a turn it is a good plan to release the clutch, at the same time retarding the throttle and allowing the car to coast under its own momentum. This releases the power from the driving wheels and lessens the liability of skidding.

Avoid, unless absolutely necessary, the application of the brakes when rounding a turn. Unless the road surface is very hard and dry, the liability of skidding is great. If it is necessary to apply the brakes, and the car "skids," release them at once. They can then be reapplied gradually.

When approaching a stretch of road covered with sharp, broken stones or ruts, it is advisable to speed your car a little before you reach it, and then, when passing over it, release the clutch and permit the car to coast over. This action not only saves the tires, but relieves the motor and driving mechanism of the strain.

During the first few days after you receive your car, drive slowly; avoid "speeding," and watch carefully for any unusual noises. Every bearing and working part has been "set up" tight before leaving the factory to insure long life, consequently the liability of "heating" will be greater then than a little later when the parts have "run in."

FINALLY

In order that you may get the maximum of enjoyment and comfort out of your car, you must be as considerate and thoughtful about it as you would of a fine horse that was as fine and as costly as your car is.

The liquid in which these plates are immersed is called *Electrolyte*, and is composed of dilutic sulphuric acid.

The passage of current from the generator through the positive and negative elements of the battery arouses a definite chemical action, separating the lead paste into its several component parts. When the battery is fully charged this composition is soft or spongy.

The chemical action of a battery while undergoing a charge emits a fine spray, called "gasing," composed principally of water. Therefore, loss of chemical ingredients by evaporation constantly takes place. These ingredients are the component parts of water (H_2O), therefore, it is absolutely essential that **distilled water be added every week in warm weather, and every two weeks in cold weather.**

At the top of each cell is a vent hole or opening accessible by unscrewing the vent cover. These vents are for the purpose of inspection, adding water and reading the specific gravity of the electrolyte.

Immediately upon receipt of a battery or a new automobile the battery should be inspected. This requires but a few minutes and may prevent trouble. All vent covers should be removed and the level of the solution in each cell ascertained. The battery plates should be well covered with solution, and if it is not up to the inside cover (Fig. 44), **add distilled water.**

Filling one cell does not fill all, so examine each one and fill as required.

Fig. 49—Bulb hydrometer.

If inconvenient to obtain distilled water, use melted **artificial** ice or rain water that has been caught in a wooden (not metal) tub. **Under no circumstances should ordinary water be used.** Do not store water for batteries in metallic vessels—use glass.

Remember that if the battery plates are exposed (not covered by liquid) they become hardened and the battery capacity greatly reduced.

Never add acid except to replace spilled solution. In that case use one part of **chemically pure** sulphuric acid and three parts of pure **distilled** water by volume.

Specific Gravity Tests of Battery Charge

The best method to ascertain the real state of charge of a storage battery is by comparison of the specific gravity of the electrolyte under various conditions.

To measure the specific gravity of the electrolyte, secure from a battery supply house a specific gravity hydrometer. (Fig. 49.) This instrument, which has a rubber bulb to draw a portion of the solution from the battery cell, shows the specific gravity of the electrolyte in each cell.

For a fully charged battery in good condition the hydrometer should read from 1.280 to 1.300.

operate the engine until it is again connected. Should it be necessary to operate the car under such conditions, be sure to connect a short piece of copper wire between the terminal posts of the generator. Remove this when again connecting up the battery.

In case of any trouble with the generator windings or serious damage to an important part, the machine should be returned to the manufacturer for adjustment and repairs. **Do not use the starting motor** while the generator is undergoing repairs, as serious damage will be done to the storage battery. When necessary to set the automobile motor in motion, crank it by hand, using the hand crank provided for such purposes.

Once every 500 miles lubricate the bearings with a few drops of good machine oil through the oilers provided. Do not use too much oil, as only enough to soften the grease in the bearings is necessary. **Do not, under any circumstances, get oil or grease on the commutator or brushes.**

STORAGE BATTERY

The battery may be described as the heart of the system. Its function is to become charged when the generator is running and to discharge this energy for lighting the lamps and cranking the engine. It does not in itself produce an electric current, but simply receives and discharges the electric energy stored in it by the generator.

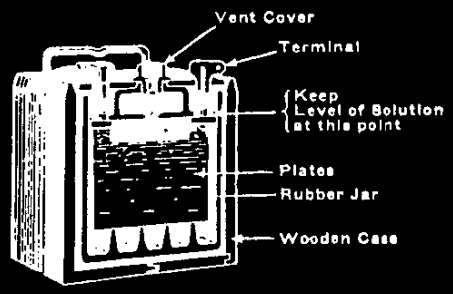


Fig. 48—Sectional view of battery.

The battery may be likened to a water tank. The tank is filled by a water pump (generator), and is stored for use. When the discharge pipe is opened (lamps or starting motor), the volume of water (charge) in the tank is reduced by whatever amount is withdrawn. As the water discharges the pressure per square inch (voltage) becomes less and the rate of flow (amperes) slower until, when the tank is nearly empty, it reaches zero. The action of the water flowing from the tank will not replenish the supply.

From the foregoing it will be seen that the efficiency of the storage battery is in direct proportion to its state of charge or volume of energy accumulated, also, that to obtain the fullest efficiency whatever amount of current is withdrawn must be replaced by running the generator long enough to reproduce the same amount.

A battery possesses three compartments or cells. Within each cell are two elements, one positive (+), the other negative (—). Each element consists of a number of plates called "grids," the openings of which are filled with a lead paste. Each group of plates is connected together and separated from the opposite group by wooden separators between each plate.

Therefore:

Do not race the motor unnecessarily.

Be warned by every abnormal noise; if it is a squeak, locate it and lubricate the part. If it is some other noise, locate the loose parts that cause it, and tighten the bolts.

Don't tinker. Half the ability to make an adjustment or repair is the ability to discover its necessity.

Some motorists are said to have "luck" with their cars. There never seems to be any trouble, everything is trim and neat, the motor always starts when wanted and runs as long as is needed, without any of the exasperating breakdowns on the road with which the unfortunate one thinks himself cursed through the carelessness of the manufacturer. With all adjustments carefully made when needed, every bearing and working part well lubricated, the whole car will work very sweetly and will continue to do so with only a very small fraction of the attention that would be absolutely necessary for the care of a horse.

By neglecting details you will save yourself some time and inconvenience in getting on your way, but the day of reckoning is sure to come. What you have saved will be spent in expensive roadside repairs.

COOLING SYSTEM

The cooling system as used on the Chevrolet is by means of a large cellular-type radiator and a belt-driven centrifugal pump. As the circulating pump is connected to the lower radiator outlet the water is drawn through the radiator before being delivered to the water jackets surrounding the cylinder walls, which insures a proper circulation of cool water at all times, regardless of engine speed. (Fig. 12.)

The circulating pump is readily accessible by removing the bolts holding it to the cylinder jackets. Should water leak through the stuffing box on the end of the pump shaft, tighten the nut. If this does not stop the leak, unscrew the stuffing box and wrap ordinary candle wicking around the shaft and tighten the nut again.

The radiator at all times should be kept full, or trouble is sure to follow. It is a good plan to form the habit of inspecting and filling the radiator before the car is taken from the garage. On long tours, especially when you have been traveling over hilly roads, or those with a loose top surface, examine the water supply quite frequently. Consider always that the proper amount of water is as important as your supply of gasoline and oil. It is well to examine the water supply every time a stop is made for oil or gasoline.

Always use clear water. If rain water can be had, use it, as less scale or deposit will result.

Keep the cellular openings clean. Never allow mud to remain in them, as it cuts down the radiation and prevents proper cooling. The entire circulating system should be thoroughly flushed out occasionally. This can be done in ordinary cases by disconnecting both the upper and lower hose connections and allowing fresh water to enter the filler neck and flow down

through the radiator and out the lower hose. The motor water jackets can be flushed out in the same way.

When hard water has been used, a scale or deposit will be formed, which, unless removed will obstruct the circulation, causing unnecessary heating and frequent refilling. In this case a good way to clean out the scale is to dissolve a half pound of lye in about five gallons of water. Strain the liquid through a cloth and put in the radiator. Run the motor for about five minutes, then draw off the solution through the radiator drain cock. Fill the radiator with fresh water and run the motor again for several minutes, then drain off the solution and refill with fresh water. Never use a more powerful chemical.

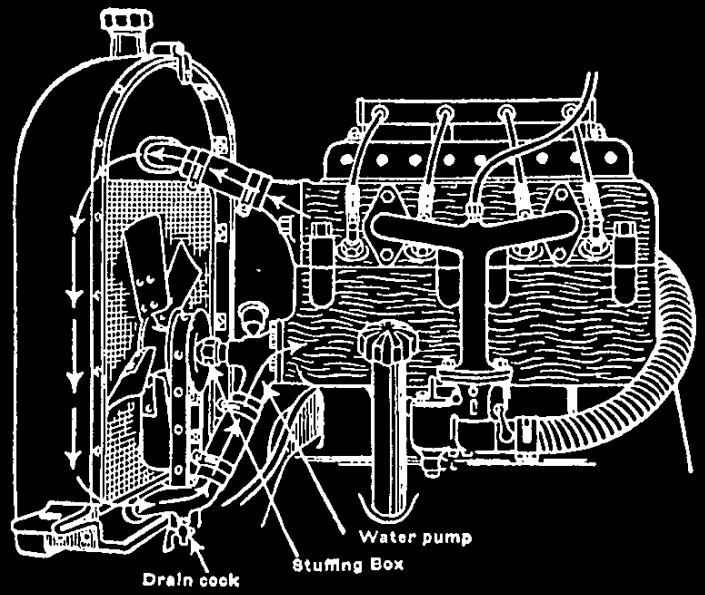


Fig. 12—Pump-driven cooling system.

Once a week it is a good plan to open the radiator drain cock and let all the water and accumulated dirt run out. If the water is very dirty, flush the radiator with fresh water.

Never—and be sure about this—put cold water into the radiator while the motor is hot. By "hot" we mean any temperature which is uncomfortable to the hand when held against the cylinder head.

When a motor gets "hot" the cylinder walls, and especially the cylinder head, around the exhaust ports, are thoroughly heated up. The danger of cracking these ports cannot be overestimated, so make it a point, should you stop for water after the motor has been running for some time, to test the temperature of the motor by raising the hood and placing your hand on the cylinder head. If you can hold it there with comfort, water can be placed in the radiator; if not, wait until you can. It will only take a few min-

The generator begins to produce a charging current of sufficient voltage at a car speed of about six miles per hour. At twenty-five miles per hour the generator is producing nearly its maximum output, or about fifteen amperes.

Care of the Generator

The generator should be examined occasionally to see that all connections are tight and that there is no undue wear on the moving parts. The commutator end of the generator can be reached by removing the steel band around the *Commutator Head.* (Fig. 47.)

If the commutator should be found blackened or rough it may be smoothed down with No. 00 sandpaper, while the generator is running. Never use emery cloth for this purpose. After smoothing down the commutator examine it carefully and re-

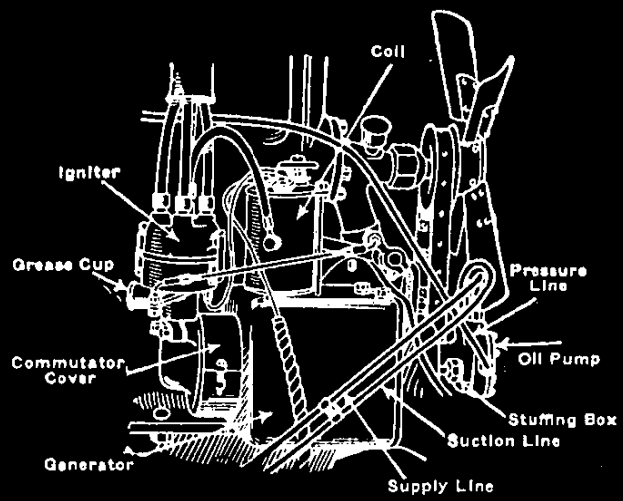


Fig. 47—Generator and ignition set.

move all particles of metal which may bridge across from one copper segment to another. Blow out every particle of carbon dust which may have accumulated in the generator case.

See that there is just enough spring tension on the carbon brushes to insure good contact on the commutator. Too much tension will cause heating and unnecessary wear to brushes and commutator segments.

See that the brushes are making even contact with the commutator. When they become worn to such an extent as to need replacement, order new ones from your dealer or direct from the factory. **Do not use cheap carbon brushes or substitutes.**

The brush holders must be entirely insulated from the generator case. Should any of the insulating plates or bushings become torn or broken they must be replaced with new ones.

Should the battery be disconnected for any reason do not

ELECTRIC STARTING AND LIGHTING SYSTEM

The system used on Chevrolet Cars is known as the two-unit type; that is, with a separate generator and motor, each performing its function independently of the other.

The system as a whole comprises three principal units:

The *Generator*, which produces an electric current and delivers it to the Storage Battery.

The *Storage Battery*, which receives and accumulates the current thus generated and delivers it to the igniter and lighting system or the starting motor when needed.

The *Starting Motor*, which receives current from the storage battery and cranks the automobile motor whenever it is to be set in motion.

In addition there are four auxiliary systems for the regulation and control of the different units, as follows:

A *Circuit Breaker* whose function is to "break" the charging circuit when the automobile engine is standing still or when the speed drops below the point where the generator will produce a charging voltage.

An *Ammeter* which registers on a dial the charging or discharging rate of current flowing through the system. When the car is at rest and no lights burning, the indicating needle or pointer should stand at "zero." When the lights are turned "on" the pointer will move to the right and indicate the amount of discharge or current flowing from the storage battery. With the automobile motor running at a fair speed, and no lights burning, the pointer will move to the left of zero and indicate the amount of current flowing into the storage battery, or "charging rate." Should the pointer indicate "discharge" when the car is at rest and no lights burning, the system is not working properly, and you should consult a competent electrician as quickly as possible.

A *Starting Switch* whose function is to make the necessary electrical connection from the storage battery to the starting motor when the automobile motor is to be set in motion. This switch is self-contained in an insulated steel box and requires no attention.

An *Ignition and Lighting Switch* by which the ignition and lighting systems are controlled.

THE GENERATOR

The construction of the generator is of the utmost simplicity, and beyond a few drops of oil every 500 miles requires no attention. The machine is enclosed in a dust and moisture proof shell which effectually protects it from oil and dirt. The generator is driven by a gear meshing with the cam shaft gear housed in the gear case at the forward end of the automobile motor.

The voltage output is controlled by a third brush, which increases or decreases the field strength in proportion to the motor speed, this doing away with mechanical governors and clutches, which are liable to get out of adjustment.

utes for the motor to cool off, and the repair bill saved will more than offset the slight loss of time and inconvenience.

Leaks in any system subjected to vibration are likely to occur, so don't be alarmed if you find your radiator has "sprung" a leak. As soon as possible it should be soldered, as a leaky radiator is not only a source of some annoyance by reason of frequent refilling, but a seam, once opened up, is likely to get larger, resulting in sudden loss of water, with disastrous results.

It is not a good plan to put corn meal, bran or other substances in a radiator to stop a leak. It clogs up the tubes, thereby decreasing the radiating efficiency. Make a permanent repair at the first opportunity.

WINTER DRIVING

As soon as the temperature begins to approach the freezing point an anti-freezing solution should be placed in the radiator. Wood alcohol or denatured alcohol is best for that purpose.

The following table may be used in estimating the quantity of alcohol required for different temperatures:

10 Deg. Fahr. above zero—4¾ pints of alcohol added to the water.

5 Deg. Fahr. above zero—9½ pints of alcohol added to the water.

Zero Fahr.—12 pints of alcohol added to the water.

25 Deg. Fahr. below zero—19 pints of alcohol added to the water.

Since alcohol evaporates more quickly than the water, it is well when filling the radiator to make up the loss by adding a solution of equal parts of alcohol and water.

The use of powerful chemicals, while sometimes cheaper in first cost, is very likely to cause damage later, costing more in repair bills than the amount saved, as they attack the metal system and rubber hose connections.

If the radiator should freeze, do not try to thaw it out by starting the motor, but thaw it by placing in a warm place.

It is a good plan, when making a stop in cold weather, to cover the radiator and hood with a blanket or other covering. This helps hold the heat, and in that way gives considerable protection from the liability of freezing, besides making the motor start easier.

VALVES AND VALVE SETTING

The valve mechanism used on Chevrolet cars is recognized as the highest type of engineering practice, not only from the standpoint of greatest efficiency, but of simplicity as well, allowing, as it does, absolute freedom in making adjustments and renewals.

To keep the valves in a state of continued efficiency, it is only necessary to give attention to a few simple rules.

Keep all rocker arms, push rods and tappets clean and free from dirt.

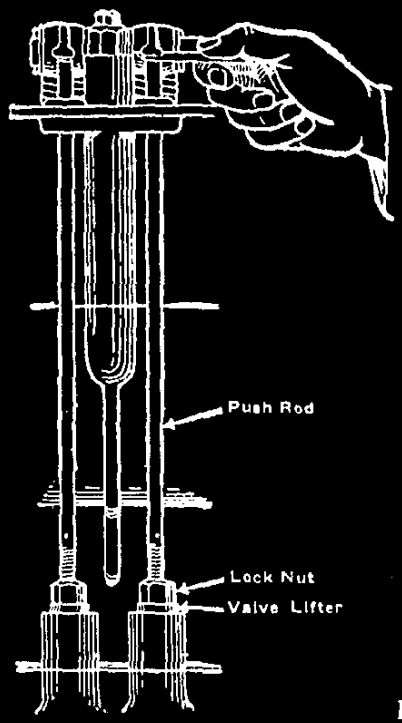


Fig. 13—Adjusting Push Rods.

Adjust, when needed, the clearance between ends of push rods and rocker arms.

Remove all pits and carbon deposits from valve seats when loss of compression or poor running indicates the necessity.

Too much stress cannot be laid upon the necessity of keeping the motor clean. The dust drawn through the radiator openings as the car travels ahead contains grit which, when wet with oil, forms a cutting compound that wears and scratches, leaving an irregular surface. This in time is sure to give trouble, so make it a rule to regularly clean all working parts. The slight inconvenience to yourself will be more than offset by the saving in repair bills later on.

HOW TO ADJUST PUSH RODS

The continual action of the valves, will in time produce wear which must be taken up.

To determine proper valve clearance, crank the motor by hand, turning the motor until the valve tappet has reached its lowest position.

The space between the top of the push rod and rocker arm (Fig. 13) should be about 0.008 inch. If more than this, loosen lock nut and turn push rod until proper clearance is had, after which—and be sure about this—tighten the lock nut to prevent the push rod working loose.

Caution: The necessity for valve adjustment will show itself first by excessive clicking of tappets, and second by poor running of motor. It is not necessary to make alterations under any other conditions.

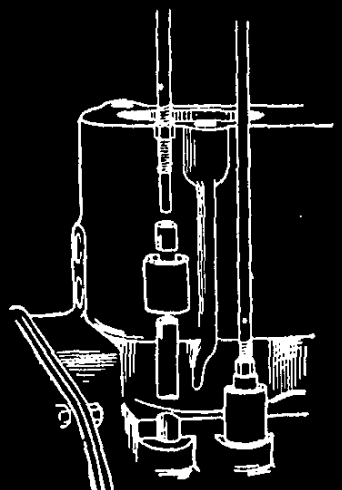


Fig. 14—Push rod and plunger removed.

following operations easier. Twist the tube so that the valve projects outward, as shown in Fig. 45, then, beginning at the opposite end, roll the tube up tightly.

Fig. 45

Still holding the tube as tightly as possible, insert the valve core and screw on the cap. Screw it on tightly with fingers only.

If the tube is a "punctured" one it may be bound securely with elastic bands or tape to distinguish it from a good one.

The tube can then be unrolled and folded, as shown in Fig. 46, into a flat package.

Fig. 46.

Before placing the folded tube into its bag, dust it with French Talcum or Soapstone and then close the end of the bag tightly.

The following are a few Don'ts it will pay you to observe:

Don't drive fast around corners. Aside from danger of skidding, this throws terrific strain on the tread and carcass of the tire.

Don't let the clutch in with a jerk, or jam on the brakes, when stopping. Spinning or sliding the wheels will quickly wear thousands of miles of service off the treads.

Dont scrape the side-walls against curbstones. This wears off the rubber and exposes the fabric to air and dirt and moisture, which soon starts to rot.

Don't drive fast across car tracks or other irregularities in the road surface. A sharp blow that hits the tire squarely may break the inner fabric and later pinch a tube or cause a blow-out.

Don't leave the car standing on the tires for a long period of time.

Don't store car where tires are exposed to bright light or allow it to rest on an oily, greasy floor.

Don't carry spare tires or tubes unprotected.

Don't drive on car tracks.

Don't overload either the car or the tires.

Don't drive on a flat tire for even a hundred yards. It will not only injure the casing, but will also tear the tube.

Don't drive with the front wheels out of alignment. Examine the casings every few days, and if you notice any undue wear have the wheel line-up checked at once.

Blow-Outs

A blow-out occurs when the tube is forced through the fabric of the casing, and is usually accompanied by a loud report like a gun shot. Stone bruises, tread cuts and sand blisters, when

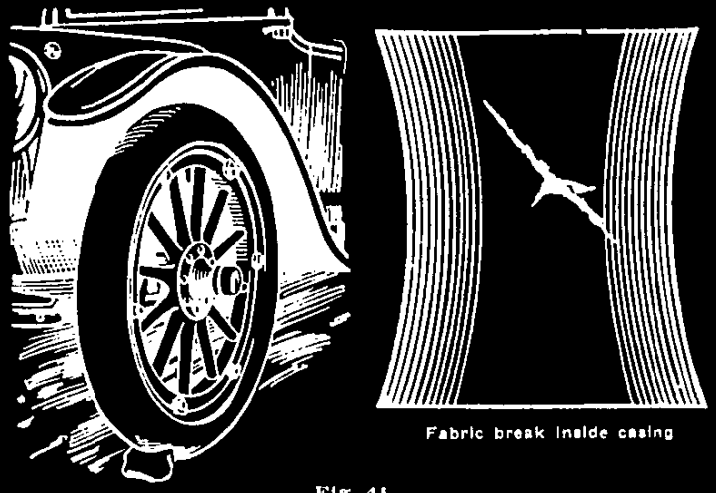


FIG. 44

not promptly repaired, will usually lead to a blow-out. When this occurs the casing should be sent to a competent repairman for vulcanizing. Casings on which the tread has become badly worn will, of course, blow out in time.

Repairing Tubes

In each tire repair kit are complete instructions for the repair of tubes. Large breaks or cuts should be vulcanized, as this is the only safe method.

Care of Spare Tubes

The wise motorist always provides himself with one or more spare tubes, but few take the necessary precautions to keep these in good condition, usually throwing them under the rear seat, along with tools and accessories; also there is seldom any way of distinguishing between a "punctured" and a "good" tube.

Each motorist should provide himself with one or more small cloth bags, made with a draw string at one end, and keep spare tubes in these.

A good way to distinguish between a "good" tube and a "punctured" one is to have one of the bags specially marked, and put all punctured tubes into that bag. Another way is to employ different methods of folding.

Folding Tubes

Remove the valve core by unscrewing with the slotted end of the valve cap. This allows all the air to escape and makes the

In time the ends of the push rod plungers where they come in contact with the cams will become worn to such an extent as to require replacement.

Figure 14 shows one of the push rod plungers removed for inspection or replacement. The pressed metal guide is fitted into a slot cut in the top of the push rod plunger, and can be removed and installed in a new rod if needed.

CARBONIZED VALVES

As the motive power is obtained by burning or exploding a highly compressed gas mixture, it follows that a certain amount of carbon will be deposited on the valve seats, piston heads and combustion chamber. The amount of this deposit depends upon the severity of service and the quality and quantity of gasoline and lubricating oil used.

Small particles of burnt carbon will lodge under a valve, especially the exhaust, holding it open. As this exposes the valve seats to the heat generated by the explosion, small pits or burned spots will in time cause the surface to be so roughened as to prevent the proper seating of the valves. This will cause a leakage of gases resulting in loss of power and uneven running of the motor.

GRINDING VALVES

When this occurs, grinding the valves is the only remedy. To determine which valves need attention, turn the motor over slowly

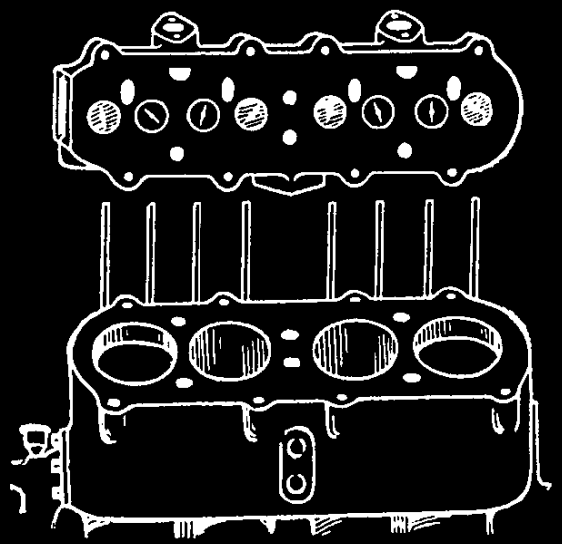


Fig. 15—Cylinder head removed.

by hand and note whether the same degree of resistance is met with in each cylinder. The ones offering the least resistance are those whose valves "leak". (Note: Except piston rings leaking. See page 21.)

The grinding of a valve is not a difficult operation when undertaken with patience. First, it is necessary to remove the valve from its seat.

Remove the cylinder head as follows: Remove the metal cover over the top of the valve rocker arms. Disconnect the upper radiator hose connection. Remove each of the bolts holding the cylinder head to the cylinder casting and lift the head off (Fig. 15). The valves, rocker arms and bearings, being attached to the head, will remain with it.

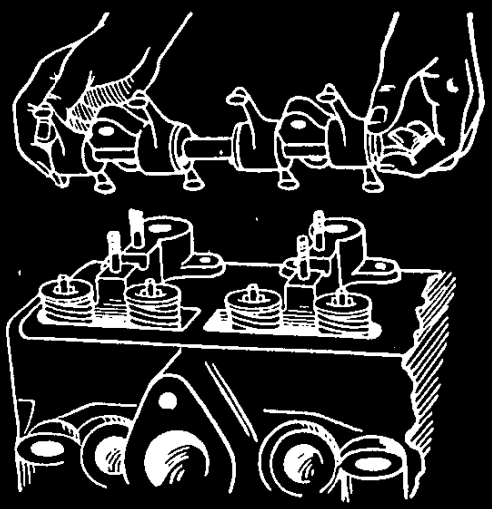


Fig. 16—Rocker arms and shaft removed.

Remove the rocker arms and shafts as shown in Fig. 16. Do not mix the bearing caps; it is always a good plan to mark them before removing to insure putting back in exactly the same place when reassembling.

To remove the valves, proceed as follows: Remove the small wire holding the valve spring cap pin in place. With a screwdriver and your fingers press down upon the valve spring cap until the spring has been compressed enough to admit pulling out the valve spring cap pin (Fig. 17).

Fig. 17—Removing valve springs.

Remove each valve separately, using care not to mix them in any way, as they must go back into the same valve holes.

Secure a light coil spring and place it around the valve stem before replacing it for grinding. Use a good

to pry the casing over the rim flanges with the tire iron; however, use care not to injure the tube in any way.

The tire can now be pumped up to its proper pressure.

Replacing Rim on Wheel

Grasp the tire and rim at the sides, lift and insert the valve stem into its hole through the felloe. The tire can then be pressed into position. Turn each of the lugs so that their wedge edges slip under the rim, after which tighten each nut a little at a time until all are tight and snug. Be careful about this, as the rim must stand away from the felloe band an equal distance all around. Rim squeaks, which are so annoying, are usually the result of improperly tightening the lugs.

The dust cap over the valve can now be replaced, jack removed, and the car operated.

Punctures and Blow-Outs

The most common tire troubles encountered are nail or glass punctures, tube pinches and blow-outs.

Punctures

These are the result of running over nails, tacks, sharp pieces of metal, broken glass, and sometimes by sharp stones or gravel. If the "puncture" through the casing is not large, repairs need only be made to the tube. If, on the other hand, the hole is pronounced, stick a small blow-out patch (a supply is in each repair kit) over the opening, on the inside of the casing, and press down firmly.

Tube Pinches

There are two kinds of tube pinches, one caused by fabric breaks and the other by rim pinches.

Fabric breaks, or what tire experts call stone bruises, are the direct result of underinflation. The accompanying drawings illustrate this injury and show how it is caused. When the tires are not properly inflated, any obstruction which strikes the tire squarely may rupture the fabric in this way. Generally the rupture is on the inside fabric next to the tube, and cannot be noticed from the outside, but as the smooth surface on the inside of the casing is broken the tube will be forced into the fracture. The action of the tire passing over the road will cause this fracture to open and close, pinching the tube until it breaks.

If this should happen to you on the road, remove the casing and stick over the break a small blow-out patch which you will find in the repair kit. This will keep the new tube from being pinched until you get home.

As soon as possible have a repairman cut out the injured section and insert a permanent repair; otherwise the break is likely to grow bigger and eventually cause a blow-out.

A rim pinch may be caused by using an oversized casing; by not properly inflating the tube before inserting in the casing; or by running the car with tires not properly inflated. The remedy in this case is obvious.

tion the rim can be removed very readily. Care should be taken in inserting the tire iron not to injure the tube in any way.

Removing Tubes

Lay the casing on the ground, then slip your fingers under the tube and around the valve. With the other hand spread the casing and lift the tube out. Keep repeating this until the tube is free from the casing. **Do not attempt to pull the tube out,** as you run a great risk of tearing the tube, spoiling it beyond repair; so take your time, as the extra precautions will easily repay you.

Inserting Tubes

Before inserting a new tube in a casing, inflate the tube enough to make it hold out round. This makes it much easier to slip into the casing, besides will prevent the tube from folding under or being pinched between the bead and rim.

Leaky Valves

After inflating the tube, wet the end of the valve stem to make sure that the valve does not leak. If a bubble forms, insert the slotted end of the valve cap and tighten the valve core. If this is not sufficient, unscrew the core and examine the rubber seat, as occasionally a small obstruction is preventing a perfect "seat." If the core is too badly damaged, or fails to hold, insert a new one, a supply of which is provided with each tire kit. Leaky valves are a frequent source of trouble, and are usually apparent by a gradual loss of air, and unless it is corrected will lead to trouble.

Examine Inside of Casing

Always examine carefully the inside of the casing before inserting a new tube, and remove any foreign substance, as this will surely cause trouble if allowed to remain. In the case of nail or glass punctures it often happens that the offending object is driven into the casing with considerable force and imbeds itself in the fabric in such a manner that it cannot be seen from the outside. Locate and remove this before inserting a new tube.

In applying tubes, always be sure to dust the inside of the casing thoroughly with French talcum furnished in the tire repair kit. This acts as a lubricant and prevents the tube from heating in the case and sticking to the sides.

Keep Rims Free From Rust

Before applying a new tire or tube, examine the rim carefully, and if rusty have it sand-papered smooth and treated with a coat of rim paint or graphite.

Replacing Tire on Rim

Lay the casing (with tube inserted) on the ground. Grasp the rim by its free ends and compress it enough to slip inside the casing. Be sure that the beads on the casing are inside the rim flanges, then slip the loose rim segment over the valve and securely lock it with the pivoted lever. It may be necessary

grade of grinding material, the best being none too good if a satisfactory job is to be done. Smear the compound thinly on the beveled edge of the valve head and on the seat in the cylinder head. With a brace and a screwdriver of good size rotate the valve back and forth (Fig. 18). Do not turn the valve through a complete circle, as this will cause the compound to cut ridges on the surfaces. After rotating the valve a few moments release the pressure on the brace. This will cause the coil spring to act, lifting the valve off its seat. Turn the valve slightly before again reseating for further grinding. Continue this method until the entire contact surfaces on both valve head and seat are polished and show no dark spots.

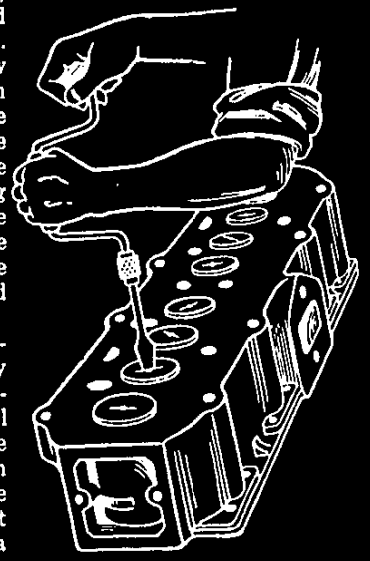


Fig. 18—Grinding valves.

After the surfaces have become apparently properly ground, test the seats for evenness as follows: With a pencil mark lines on the beveled edge of the valve head about ¼ inch apart and reseat the valve. Give it one-half turn to the right and then to the left, using a little extra pressure on the brace. If the valve has been ground accurately, each one of the pencil marks will be wiped away, but, on the other hand, if one line, or a part of one, remains untouched, there is an uneven spot and the valve must be reground until it seats accurately.

The secret of good valve grinding comes only with experience; however, if care is taken to properly rotate the valve back and forth with a reciprocating motion and at the same time turning the valve so that at the end of several such movements the valve has been turned through a complete circle a good job will result.

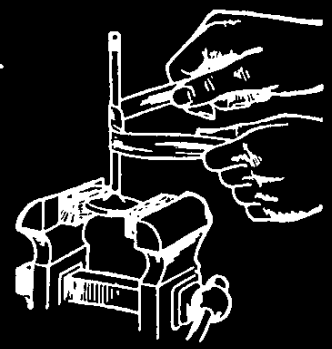


Fig. 19—Polishing valve stems.

Never grind a valve more than is required to secure a good accurate seat. Excessive grinding will lower the valve seat so that in time the valve head will fall below the top edge of the seat and cause trouble. When this occurs the only remedy is to have an expert reseat the valves with proper tools and replace the worn valve heads with new ones.

After having secured a good finish and accurate seat remove

with clean cotton waste every atom of grinding compound from the valve head, valve seat and combustion chamber. Wash with gasoline or kerosene and then flush the valve guides. Be sure about this, as it requires only a small particle of abrasive to cause trouble.

While you have the valve out, examine the stem, removing every particle of carbon and grit. Do not use a file for this purpose, but a fine grade of emery cloth. A good way to do this without the liability of getting the valve stem out of round is to clamp the valve head between wooden blocks or copper jaws (Fig. 19), then with a strip of emery cloth about ¼ inch wide wrap it around the stem one and one-half turns. Grasp the free ends of the cloth and pull back and forth at the same time causing it to slide up and down the stem.

REMOVING CARBON DEPOSITS

Before finally replacing the valves it is a good plan to scrape off all carbon deposit from the combustion chamber; however, care must be exercised not to scratch the surfaces of the valve seats. Do not leave any projections of carbon, as they will heat up and cause preignition

At the same time remove the carbon deposits from each piston head. Scrape clean, but use care not to scratch the surfaces, as this will provide a "pocket" to catch carbon more easily. Brush out all the particles of carbon, and finally wash with clean kerosene.

Before replacing the cylinder head examine carefully the copper asbestos gasket. If any weak spots appear, it is better to replace the gasket than to try to use the old one, as much depends upon a good fitting gasket. In replacing the cylinder head bolts run each one down until the head just touches the boss on the cylinder head, then—and be sure about this—**tighten each one evenly a little at a time until finally all are tight.** No one bolt should be drawn down tight until all are set snug.

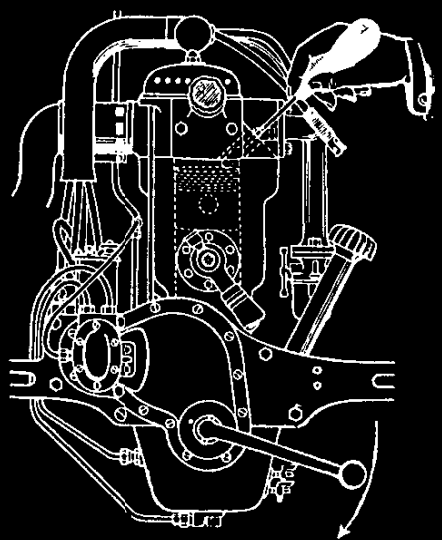


Fig. 20—Locating "Top Center" position of piston

VALVE TIMING

The retiming of motor valves is an operation requiring experience, and should be entrusted to a person thoroughly competent to do such work.

After having assembled the motor, with the

Oil

Keep tires out of grease and oil. Oil rots the rubber quickly and causes the tire to peel off. If necessary to drive over oiled roads, it is a good plan on returning to wipe the tires with a piece of waste soaked in gasoline. This cuts the oil and leaves the tires clean.

Removing Tires

When it becomes necessary to remove a tire, place a jack under the axle and raise the car high enough so that the wheel clears the ground. Turn the wheel so that the valve stem is at the top, then set the emergency brake. This will prevent the wheel from turning and make the work easier. Unscrew the dust cap on the valve stem and push the valve back into the casing as far as it will go. With the special rim wrench provided with each car loosen the nuts holding the clamping lugs enough so that the lugs can be pulled away from the rim.

Grasp the tire and rim at the bottom and pull outward until the rim clears the felloe band, after which move upward and lift the valve out of its hole.

Removing Casings

If the tire is to be removed from the rim, release the rim segment by turning the pivoted lever far enough to disengage the round lugs. Then lift the rim segment off the valve stem. (Fig. 43.)

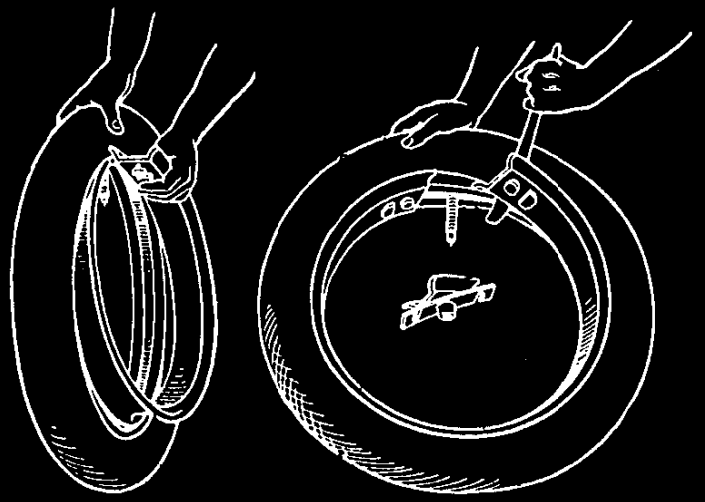


Fig. 43—Removing casings.

Insert the tire iron supplied with each car between the casing and rim (see sketch), and pry the casing from the rim, at the same time pulling inward and upward on the free end of the rim. By sliding the tire iron around the rim during this opera-

It is, therefore, possible to run your car at slow speeds with an even flow of power, also to accelerate the motor without stalling.

Very little attention beyond keeping the terminals tight and the instrument clean is required.

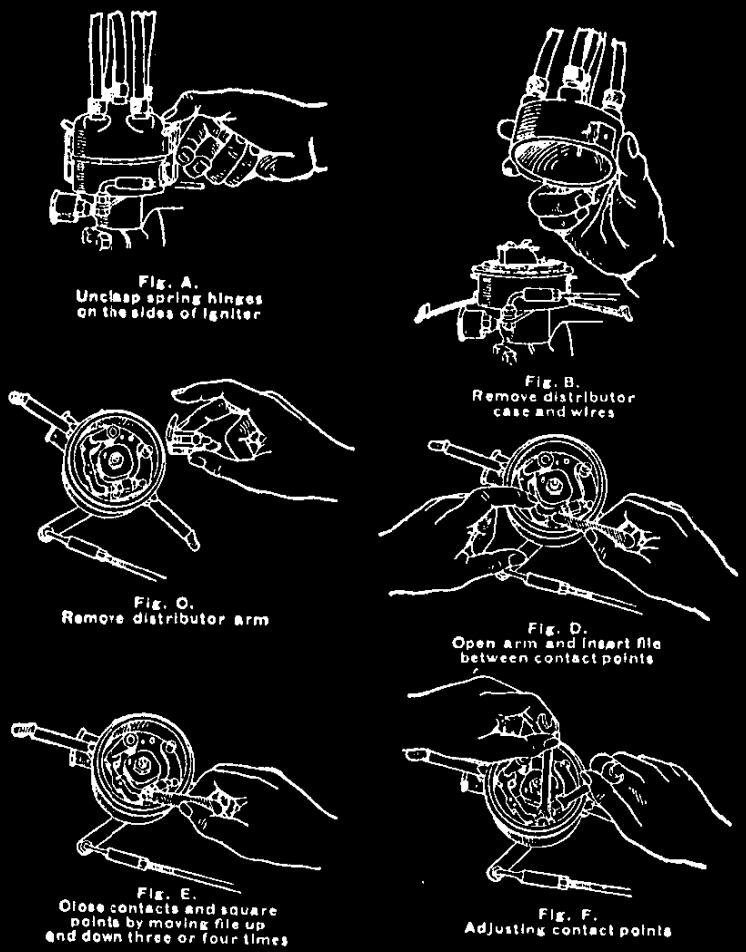


Fig. 23—Disassembling Igniter to clean points.

Contact Points

The contact points will require little attention or refiling, even though they may be very rough and irregular. When they become so badly burned as to cause missing, they should be "trued" so that their contact surfaces are exactly parallel. The best way to do this is to secure a thin Swiss or jeweler's file—insert the blade between the contact points, then press them together firmly with the fingers (Fig. 23), at the same time withdrawing

user than the brakes. They are of the utmost importance, however, and there should be no disregard for the precautions necessary to insure their dependable condition at all times.

How to Adjust Brakes

It is important that the brakes be adjusted evenly, that is, that when applied both grip the brake drums with the same pressure and at the same time.

The rods connecting the foot pedal and the emergency brake lever with the brake shaft on the propeller shaft housing are provided with a turnbuckle and an adjustable yoke, respectively (Fig. 33). By turning these the rods can be shortened or lengthened, which in turn tightens or loosens the brake bands.

Caution: Do not adjust the brakes too tight, otherwise they will "drag," using up power and wearing out the brake linings in a very short time.

Should one of the service brakes take hold too quickly and grab, causing the car to skid, turn the *Service Brake Adjusting Nut* (Fig. 39) so as to lessen the tension on the spring.

If the emergency brake grabs, shorten the rod connecting the operating shaft to the lever on the propeller shaft housing by turning the yoke end back on the rod the required distance.

Examine your brakes regularly and make absolutely sure that they are in good dependable condition, as your safety may depend upon them. Grease cups have been provided on the bearings of all operating shafts. Turn down the grease cup caps regularly, otherwise the brakes will not operate freely, wearing out the linings besides using up power.

FRONT WHEEL BEARINGS

The front wheel bearings used on Chevrolet Cars are of the cup and cone type and are very durable and easily adjusted.

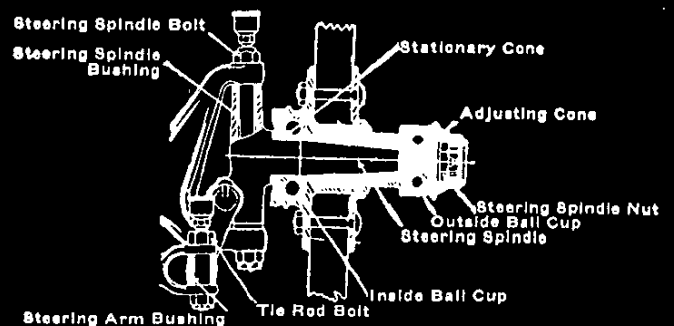


Fig. 40—Front wheel bearings.

To keep the bearings clean and well lubricated is an absolute necessity if you are to secure maximum efficiency. Once a month the front wheels should be removed and the bearings thoroughly washed in gasoline or kerosene.

To remove the wheel unscrew the hub cap, spindle nut and adjusting cone. The wheel can then be slid off the spindle. The adjusting cones screw on the spindle and can be removed with a wrench, gripping the milled faces.

The front wheels should fit the steering spindle snugly without end play. To adjust the bearings spin the wheel and at the same time screw the adjusting cone up until it is tight enough to stop the rotation of the wheel, then unscrew the adjusting cone just enough to allow the wheel to spin.

Be sure to draw the spindle nut up against the adjusting cone, **insert the cotter pin and spread it.**

To lubricate the bearings, remove the hub cap and pack it full of cup grease and replace. If the bearing is dry repeat this operation two or three times.

Front Wheel Alignment

To make steering easy it is required that the front wheels should "toe" in—that is, the distance between the inside faces of the wheel felloes, measured at the height of the wheel hubs,

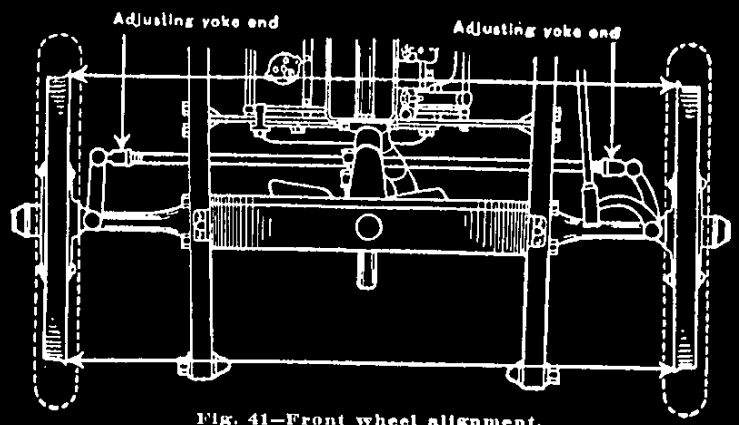


Fig. 41—Front wheel alignment.

should be ⅜ in. more at the rear than at the front. This causes the wheels to grip the road better and allows the car to hold its course without undue action on the steering mechanism.

As the car passes over uneven road surfaces the front wheels are subjected to considerable strain, therefore, about once every 2,500 miles their alignment should be checked to make sure that none of the connecting links has changed its adjustment, otherwise there is the possibility that the front tires will become unduly worn, necessitating early renewal.

To adjust the front wheels loosen the tie rod connecting the two wheels and screw in or out upon the *adjusting yoke end.* After securing the proper alignment be sure to draw the check nut up against the yoke end, otherwise there is danger that the yoke will wear the threads on the rod, finally allowing the yoke to slip off the rod, with bad results.

When a bearing becomes worn a peculiar knock or thump is heard, which must be located and remedied without loss of time. A motor which is "pounding" in its bearings is not only unpleasant to hear, but if not attended to will quickly become dangerous in that the probabilities of broken bearing studs and resulting breakage will be increased materially with time.

Unless you are an experienced mechanic, familiar with that class of work, it is best to take your car to the nearest Chevrolet dealer. Scraping in bearings is an art requiring time and patience, and is the only successful method of tightening loose bearings which have become worn.

To those who have not had previous experience in scraping bronze backed bearings, a word of caution will not be amiss. Tighten the bearing caps snugly and evenly, but have the "tension" on the shaft just snug enough so that it will turn freely with a slight "drag," but no end play or "shake". Be sure that the oil grooves and holes are clean so that the oil can spread over the entire bearing surface. Good mechanics always "spot" their bearings with Prussian blue and we recommend this prac-

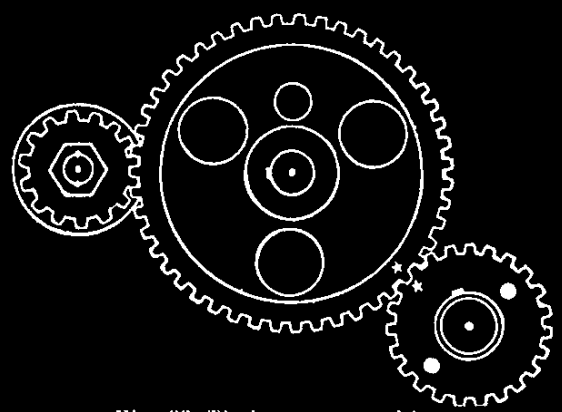


Fig. 22—Timing gear markings.

tice as being superior to all others in securing a good even bearing surface, as it shows quickly and accurately the high spots on the bearing surface.

TIMING GEARS

These are housed in an oil-tight compartment at the forward end of the motor. They are the *crank shaft gear, cam shaft gear and generator shaft gear.* They are lubricated by the motor and will not require attention in themselves. However, should it be necessary to remove them, care should be exercised in replacing to see that the marks on the rims of the gears match, as shown in Fig. 22.

IGNITION

The ignition equipment used on Chevrolet cars is designed to give an even hot spark at all times regardless of engine speed.

The upward movement of the piston compresses the gas into a very small space between the top of the piston and the depression in the cylinder head known as the combustion chamber. At this point the electric spark, produced by the igniter, explodes the gases—driving the piston downward—thus producing the power which turns the crank shaft. On the next stroke upward the piston drives the exploded gases out through the exhaust valve and pipe to the muffler.

As it would be impossible to fit the piston snug enough in the cylinders to prevent the gas from escaping during the compression stroke without causing undue friction and power loss, three spring-like rings are fitted into grooves around the top of the piston. The expansion of these rings reduces this friction to a minimum, and still prevents any loss of power through a leakage of gas.

As all friction is absorbed by the piston rings, it follows that they, in time, will become worn to such a point as to impair their efficiency. When grinding the valves does not make the resistance in each cylinder nearly equal, it is a pretty good indication that the rings need renewing. Before doing this, however, it is best to consult a good mechanic, preferably your Chevrolet dealer.

If it is necessary to do the work yourself, proceed as follows:

Remove the lower crank case and cylinder head. Withdraw the cotter pins holding the nuts on the connecting rods and remove the caps. Before doing this, however, mark both the upper and lower bearing so that, when reassembled, they can be put back again in exactly the same position. Push upward upon the connecting rod until the piston is far enough "out" of the cylinder so that it can be withdrawn.

The piston rings are sufficiently elastic so that they can be sprung out of the grooves and slipped over the end of the piston. New rings can then be installed. See that the "split" in each ring is about one-quarter turn away from the next one to it so as to prevent gas from leaking through.

In sliding the piston back into the cylinder the rings should be "compressed" as they enter the bore. Don't crowd the piston —take your time—as much depends upon getting the rings into the cylinder without damaging them.

The cap can then be replaced upon the connecting rod and tightened. In replacing the cap be sure that the same number and size of liners or shims that were originally between the cap and upper bearing are replaced. Finally—and be sure about this —insert and properly spread the cotter pins in each nut.

In replacing the lower crank case be careful to draw the flanges together evenly, being sure that no dirt or grit is allowed to remain between them.

BEARINGS

The main engine and connecting rod bearings are bronze backed babbitt lined, the most efficient known. They are properly fitted before leaving the factory and, with proper lubrication, will require no attention for several thousand miles.

The lubrication of the *Spindle Bolts* and *Tie Rod Bolts* is very important, so make it your business to follow the instructions contained on the oiling chart regularly.

SPRINGS

It is of the utmost importance that regular attention be given to the springs on your car if you are to realize their fullest riding qualities. Even the best designed spring will become squeaky as soon as moisture enters between the leaves and causes rust. The fullest action and resiliency of the springs is obtained only when the different leaves are free to slide on each other. A spring which is "rusted up" cannot do this, causing unequal strains to be placed on each leaf, especially the larger or main one. It follows, therefore, that to lubricate the springs as soon

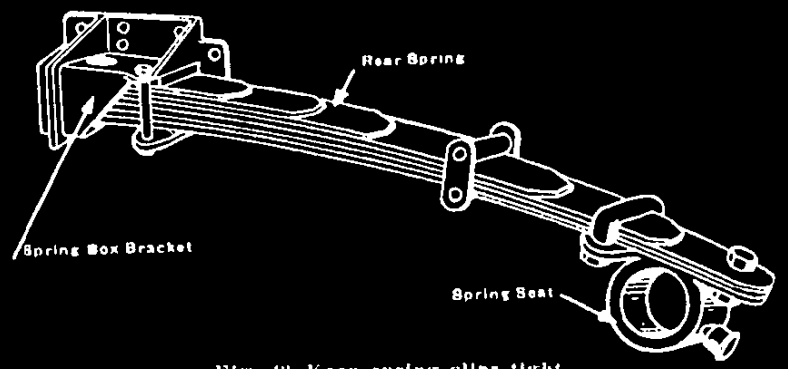


Fig. 42—Keep spring clips tight.

as they begin to squeak is the surest way to secure easy riding and prevent spring breakage.

The best way to lubricate the springs is to place a jack under the frame or body and raise the car (not the wheels) until the spring leaves separate far enough so that graphite grease can be spread between them.

Once a week examine the clamping bolts and spring clips holding both front and rear springs to the axles and **see that they are absolutely tight.** (Fig. 42.) No matter how "tight" they were drawn up at the last examination, the action of the spring will cause them to "stretch" or loosen up. Nearly all spring breakage can be traced to loose spring clips and bolts, so observe this rule carefully.

TIRES

Tires represent one of the principal items of your upkeep expense. By following the suggestions and simple precautions offered here you can keep your tire upkeep expense very low.

Inflation.

First and foremost, keep the tires fully inflated. Remember the car rides on air—not on the side walls of the tires. To

insure long life and protection against stone bruises and blow-outs, tires must contain enough air to support the car's weight.

The best average pressure for the Model FA is given in the following table. These figures are based upon regular passenger and equipment load. If extra weight, in the form of passengers or equipment, is added, the tire pressure should be raised accordingly (about 5 pounds pressure for each 50 pounds increase in car weight per wheel). However, the maximum pressure should in no case be greater than the carrying load of the tire, which is plainly marked on the side of each casing.

INFLATION SCHEDULE

Four-Inch Tire

Model	Total weight with passengers	Weight per wheel (Front)	Weight per wheel (Rear)	Inflation (Front)	Inflation (Rear)
FA-5 Touring	3290	600	1000	50	80
FA-2 Roadster	2835	590	680	50	55
FA-5 Sedan	3750	690	1185	55	80

(To find actual load on each tire, weigh front and rear of fully loaded car separately and divide each by two.)

Tires should be tested about twice a week or every morning when touring. If the pressure has fallen 10 pounds or more, reinflate at once. This, more than any other one thing, will help prolong the tire's life and prevent trouble.

Do not let out any of the air on account of hot weather. Heat has comparatively little effect on air pressure, and will never cause trouble from undue expansion. By diminishing the air pressure because of hot weather you encourage new tire troubles.

Fill Small Cuts in Tread

In a few minutes at night you can clean out any small cuts with gasoline; apply some of the cement from the repair kit and squeeze in a little tire putty. This putty hardens over night and effectually closes the cuts.

Vulcanize Big Cuts or Snags

Long cuts, tears or mud blisters that start before you notice them should be vulcanized at once by a competent repairman.

Unusual Wear on Tread

A common trouble especially hard to account for is sudden wearing down of the tread, either unevenly or around the entire circumference. This may be caused on the rear tires by quick starting or stopping, or on the front by improper alignment of the wheels. (See page 52.)

Chains

If you find it necessary to use chains, apply them loosely enough so they can slip around the tire. Chains that are too tight quickly cut and tear the tire tread. If too loose they will fold under and produce the same result.

exception of the cam shaft gear, insert the starting crank and turn until the piston in cylinder No. 1 is at its uppermost position. By removing the spark plug in that cylinder a screwdriver or rod can be inserted (Fig. 20) and the position of the piston at its farthest upward movement can be determined. This is called the top center position of pistons 1 and 4.

Rotate the cam shaft so that the push rod operating No. 1 intake valve lightly touches the rocker arm. The opposite end of the rocker arm should be against the valve stem. The cam shaft gear then can be installed and properly secured.

Adjust the clearance between the end of the push rod and rocker arm so that it is 0.008 inch, or the thickness of an ordinary sheet of letter paper. The intake valve will then "open" at the proper position.

The exhaust valve should be set up in the same way, that is, it should "close" at the same time that the intake valve begins to open.

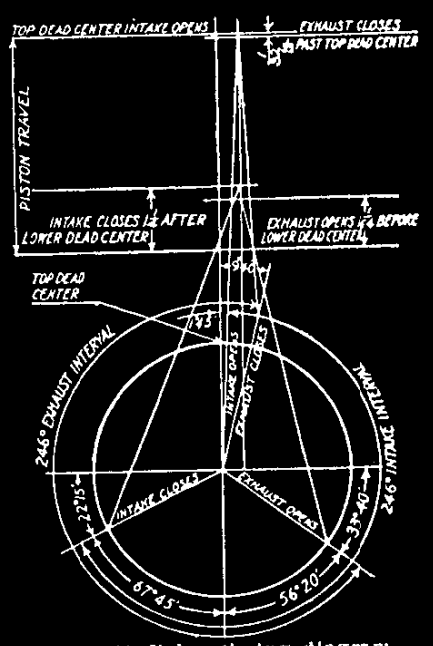


Fig. 21—Valve timing diagram.

As the cams are integral the opening and closing of the valves on cylinders 2, 3 and 4 will come at the proper time, so it is only necessary after having secured the settings for cylinder No. 1 to adjust the push rods for proper clearance.

In Fig. 21 is shown *a valve timing diagram*, from which the relative positions of the valves can be seen. The intake valve begins to open when the piston has traveled 1/32 inch below top center.

The motor cylinders are numbered from the front of the car, cylinder No. 1 being nearest the radiator, No. 2 next and No. 4 nearest the dash. Cylinder No. 1 fires first, No. 2 next, then No. 4, and next No. 3.

PISTON AND PISTON RINGS

The piston is a cylindrical drum having a closed end, sliding up and down inside the cylinder walls. On the downward stroke the suction of the piston draws the fresh gas from the carburetor, through the inlet pipe and valve, into the cylinder.

able method is to place a muff or stove around the exhaust pipe and connect the hot air to the *Fixed Air Intake* by means of a flexible tube.

In very warm climates, and especially in the hot summer months, it may be necessary to disconnect the hot-air connection, as the heat, drawn through the intake, combined with the difficulty in keeping the motor parts cool, may become so intense as to vaporize the gasoline in the float chamber so that instead of the gasoline being drawn through the jets in its raw state—that is, as a moist spray—it will pass through in the form of a vapor which will not mix readily with air.

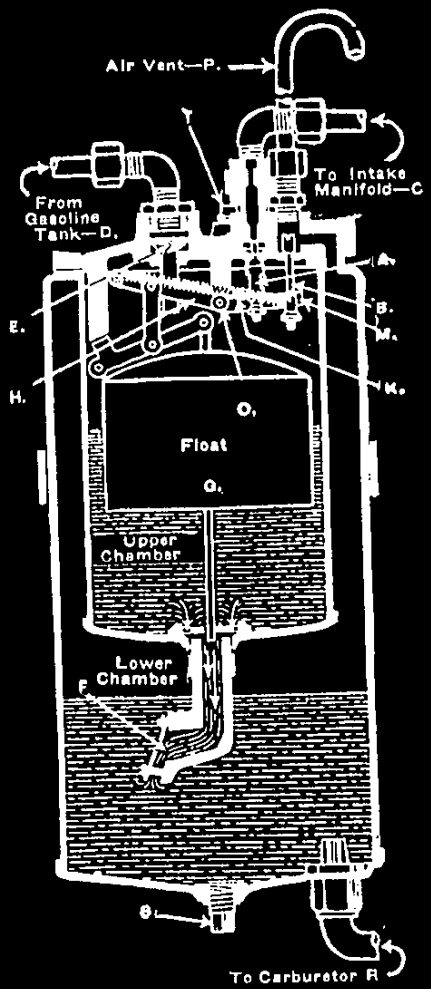


Fig. 27—Sectional view of vacuum tank.

The necessity for disconnecting the hot-air tube will manifest itself by the action of the motor after it has been run for some distance and become thoroughly heated—the motor will start off beautifully, but after going for some distance becomes sluggish, and at the first grade shows a marked loss of power. As soon as the outside temperature becomes cooler the hot-air tube should again be connected.

GASOLINE TANK

The gasoline tank is mounted on the rear of the frame, and is made from heavy pressed steel, thoroughly lead-coated to prevent corrosion. A gasoline gauge in the top of the tank shows at all times the quantity of gasoline in the tank.

The copper tube running from the tank to the vacuum tank enters at the top and extends to the bottom, so that all the gasoline can be utilized. In new cars, in spite of our best efforts, a small amount of scale or sediment may remain in the tank. The

Should neither of these adjustments take up the play in the steering gear, remove the *steering crank arm* from the worm wheel shaft and turn the steering gear hand wheel one-quarter

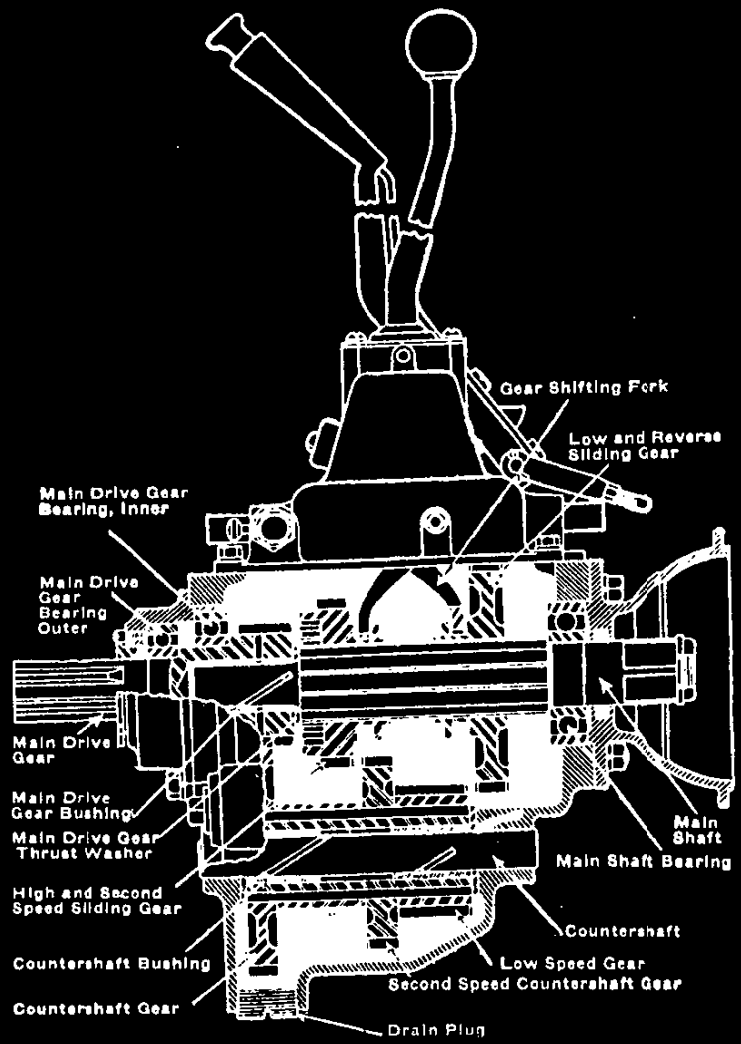


Fig. 36—Sectional view of transmission.

turn. In time the worm and wheel gear teeth become worn and the turning one-quarter turn brings new teeth into action.

Grease should be put into the gear case every 250 miles. This is quite important, as your safety depends upon a well-lubricated gear.

Every 500 miles the ball and socket connection on the *drag*

down" the grease cup caps and you will prolong the life of your car and avoid trouble.

HOW TO REMOVE THE UNIVERSAL JOINT

With the axle removed from under the car, take out the five cap screws holding the *Joint Ball Retainer Collar* and pull the ball joint from the socket. Remove the four clamp screws holding the two universal joint rings together (Fig. 38) and separate the rings. The nut holding the universal joint yoke to the

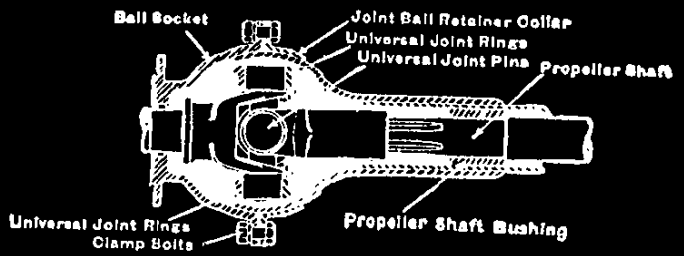


Fig. 38—Sectional view of ball and socket.

transmission shaft can then be removed and the yoke pulled off the shaft.

BRAKES

As will be shown by reference to illustration Fig. 39, the service brake is the outside or external, and the emergency the

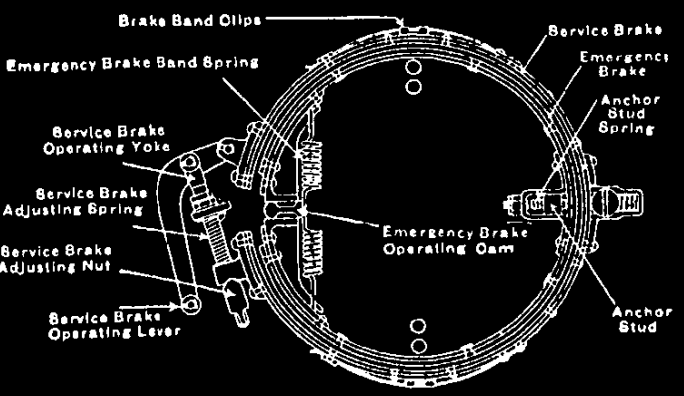


Fig. 39—Chevrolet brake mechanism.

inside or internal. One, the service, contracts on the outside of the brake drum, and the other, the emergency, expands against the inside of the drum.

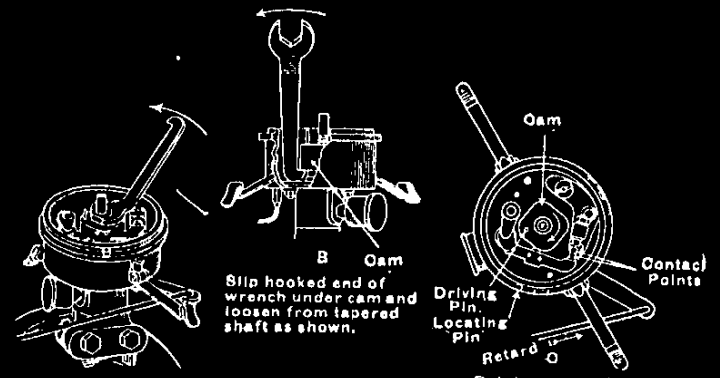
No part of an automobile is more neglected by the average

the file. Repeat this operation two or three times, then adjust the contact points so that when the cam holds them open the space between is 1/32 inch.

Caution—The contact points are made from thin discs of platinum welded to alloy buttons, so care must be taken to remove only enough metal (when truing points) to get parallel surfaces. When the platinum has been removed by reason of frequent refiling, a new adjustable point and contact arm can be secured by writing us or the maker of the instrument.

RETIMING IGNITER

Should it become necessary to remove the igniter assembly, loosen the two clamping bolts through the split collar on the generator housing and lift the entire assembly. In replacing



Models Four-Ninety, FA, FB, T.
Fig. 61—Timing igniter.

Fig. 24—Timing igniter.

care should be taken to see that the shoulder on the machined end of the igniter comes in contact with the generator housing, otherwise the igniter gears will not be in proper engagement.

The clamping bolts can then be tightened securely and the advance rod connected. Remove the distributor cover and distributor arm as in Fig. 23, then with the special wrench supplied with each car remove the lock nut holding the igniter cam to the shaft (Fig. 24)—slip the hooked end of the wrench under the cam and pry it loose from the shaft (the igniter shaft is tapered and the cam is held to this taper by friction so that it should not require a great effort to loosen it).

Insert the starting crank and turn until the intake valve on No. 1 cylinder begins to open—remove the spark plug on that cylinder and insert a screw driver or rod (Fig. 20)—continue to turn the motor until the piston has traveled downward and again returned to its uppermost position. By holding the screw driver or rod firmly the position of the piston at which no further upward movement takes place can be readily determined.

link (connection between steering crank arm and front axle) should be packed with grease—any looseness in the connection can be removed by tightening the screws in the end of the drag link tube. Be sure to replace the cotter pin after making this adjustment.

TRANSMISSION

The transmission is of the selective type, having three speeds forward and one reverse. Stripped of technicalities it is composed of a countershaft on which are keyed three gears and a main or splined shaft on which slide two gears, which by a lengthwise movement can be made to engage the gears on the countershaft. (Fig. 36.)

The fundamental requirement is in every case to first engage the gears so that the entire tooth "face" of the sliding gears mesh with those on the countershaft, and second, to properly lubricate all working parts. Proper engagement can be had by being sure, when shifting gears, that the gear shift lever travels as far forward, or backward, as it will go without straining before re-engaging the clutch.

To lubricate the transmission fill every 1000 miles with No. 600W steam cylinder oil, not grease, so that the oil level stands at the bottom of the upper or splined shaft.

Once every 2000 miles it is a good plan to wash out the transmission with kerosene to remove any chips of metal knocked off the gears or other foreign substances. To do this remove the drain plug at the bottom of the transmission case and allow the oil to drain off, after which flush out thoroughly and refill with oil.

REAR AXLE

The rear axle used on Chevrolet Cars is the floating type in which the load is carried by the axle housings instead of the main axle shafts, their only function being to rotate the rear or driving wheels. The manner of supporting the load between the hub and the axle housing is a patented device controlled only by this company.

A glance at the illustration (Fig. 37) shows the construction, the different units being so marked as to show their relation to each other. That you may be familiar with its general construction, we will describe briefly the different units.

The driving torque is transmitted from the motor crank shaft, through the clutch and transmission to the propeller shaft.

On the end of this shaft is mounted a bevel pinion called the *Drive Pinion*, which meshes with a large ring gear called the *Differential Drive Gear*. This in turn is securely bolted to a housing called the *Differential Gear Case*.

Inside the differential gear case are mounted five gears. Two of these, called the *Differential Main Shaft Gears*, are fastened to the ends of the axle shafts. The other three gears, called *Differential Pinions*, are mounted on the *Differential Spider*, and mesh with the two Differential Main Shaft Gears.

The function of a *Differential* is to permit one rear wheel of the car to travel faster than the other, or independent of the

gasoline which the *Compensator D* allows, further, the more rapid becomes the power or suction strokes per minute, the less will be the amount of gasoline spray sucked up per stroke.

Boiled down it simply means that at low engine speeds the spray passing from the *Cap Jet K* is stronger than that from the *Main Jet C*, but as the motor gains speed and the suction becomes greater the *Main Jet C* gains in strength while the *Cap Jet K* becomes weaker. Both jets are in action at all speeds, the defect of one nozzle, starting poor and growing richer until it is about right at high speed, is compensated by the defect of the other, which also starts too poor and keeps growing poorer. One supplements the other so that at every motor speed there is a constant ratio of air and gasoline to supply efficient combustion.

The speed of the motor is controlled by the opening or closing of a throttle or damper called a *Butterfly Valve* which is placed in the upper part of the carburetor. The more this is closed the greater becomes the obstacle in the path of the incoming gases and the less each cylinder will fill with gas on each stroke, therefore the power impulse will be weaker and the motor speed reduced.

When starting the motor, especially when it is cold, an excess of gasoline is necessary to insure combustion. With the *Butterfly Valve* only slightly opened the amount of air drawn into the motor is not enough to lift the gasoline from the jets, but at the point where the *Priming Hole P* enters the carburetor there is a powerful suction rushing through this narrow space.

In the *Main Well* is inserted a *Secondary or Priming Well R* into which the gasoline flows so that, when the motor is at rest, it will stand in it as high as it does in the float chamber. The suction at starting empties the *Secondary Well R* and supplies the necessary gasoline. The *Secondary Well* also supplies gasoline through the *Priming Hole* at low motor speeds—that is, as long as the suction on the *Cap Jet K* is not great enough to use up all the gasoline supplied by the *Compensator D*.

Air is permitted to enter the *Main Well G* through holes in the casting, and also finds its way into the *Secondary Well R* through the *Regulating Screw S*. This screw increases or decreases the amount of gasoline drawn up according to its position, but has no influence whatever on the carburetor action beyond low motor speeds. *Screw S*, once set for best results, should not be touched.

It will be seen from the foregoing explanation that, aside from the carburetor casting and the float mechanism, the action of the carburetor depends simply upon the size of the *Choke or Venturi* and the different gasoline nozzles—*C*, *D* and *R*. When once adjusted to the motor, and this is carefully done at the factory, these sizes cannot change through use; if the holes become clogged with lint or dirt, which may happen, it is a simple matter to take the carburetor apart and clean it. *Jets C*, *D* and *R* can be taken out by removing *Plugs A* and *B*. By using ordinary care in putting it together again, screwing the jets tight, the adjustment will not have been disturbed.

To obtain perfect results in carburetion it is necessary that the temperature shall remain nearly constant. This makes heating in cold weather imperative to obtain perfect results. The prefer-

firing and pop or sputter, the filter plug should be removed. This allows the gasoline inlet connection to slide off the boss on the end of the carburetor. Surrounding this boss is the filter screen or strainer. Remove and clean thoroughly. In replacing care should be taken not to damage it, as this must be in perfect condition or trouble will result.

The principle around which the carburetor is built is known as the compound nozzle—one on which the suction created by the motor acts directly on a column of gasoline passing from the float chamber through the *Passage E* and into the *Main Jet C*—the other on which the suction acts on a measured quantity of gasoline passing through the *Compensator D* into the *Open or Main Well G*, thence through the *Passage H* into the *Cap Jet K*.

Fig. 26.

This can be better understood by reference to the following illustration. (Fig. 26.)

Here we have two glasses—one full of liquid and the other having a measured quantity poured into it from a bottle. Take the glass which is full and suck the liquid through a straw. The harder you suck the more you get, because you are sucking directly from a full glass. The rate of flow through the straw is controlled entirely by the suction and the liquid comes out in a continuous stream. This represents what actually takes place in the *Main Jet C*—the speed of the motor which produces the suction controls the amount of gasoline spray passing through the jet. This would be ideal were it not that the basic law of liquid flow says, in substance, that the flow of gasoline from the jets increases under suction faster than the flow of air, therefore, if at a given motor speed the volume of air drawn through the *Fixed Air Intake M* were fifteen times that of the gasoline passing from the *Main Jet C*, any increase or decrease in the motor speed would change the carburating ratio and the motor would run poorly.

Now, take the second glass, which is empty, and let a tiny stream pour in from a bottle at a constant rate of flow, and suck on the straw. This time you only get what the tiny stream allows, and if you suck too hard the liquid will come through the straw in bubbles because you are not sucking direct—the bottle ignores your suction. The more you pull the weaker grows your drink.

This illustrates the action of the gas through the *Cap Jet K*. The gasoline flows from the float chamber through the *Compensator D*, which is so gauged that only a measured quantity can pass into the *Open or Main Well* in a given unit of time. The *Main Well* is open to atmospheric pressure, therefore the motor suction acting on the *Cap Jet K* will pick up only the amount of

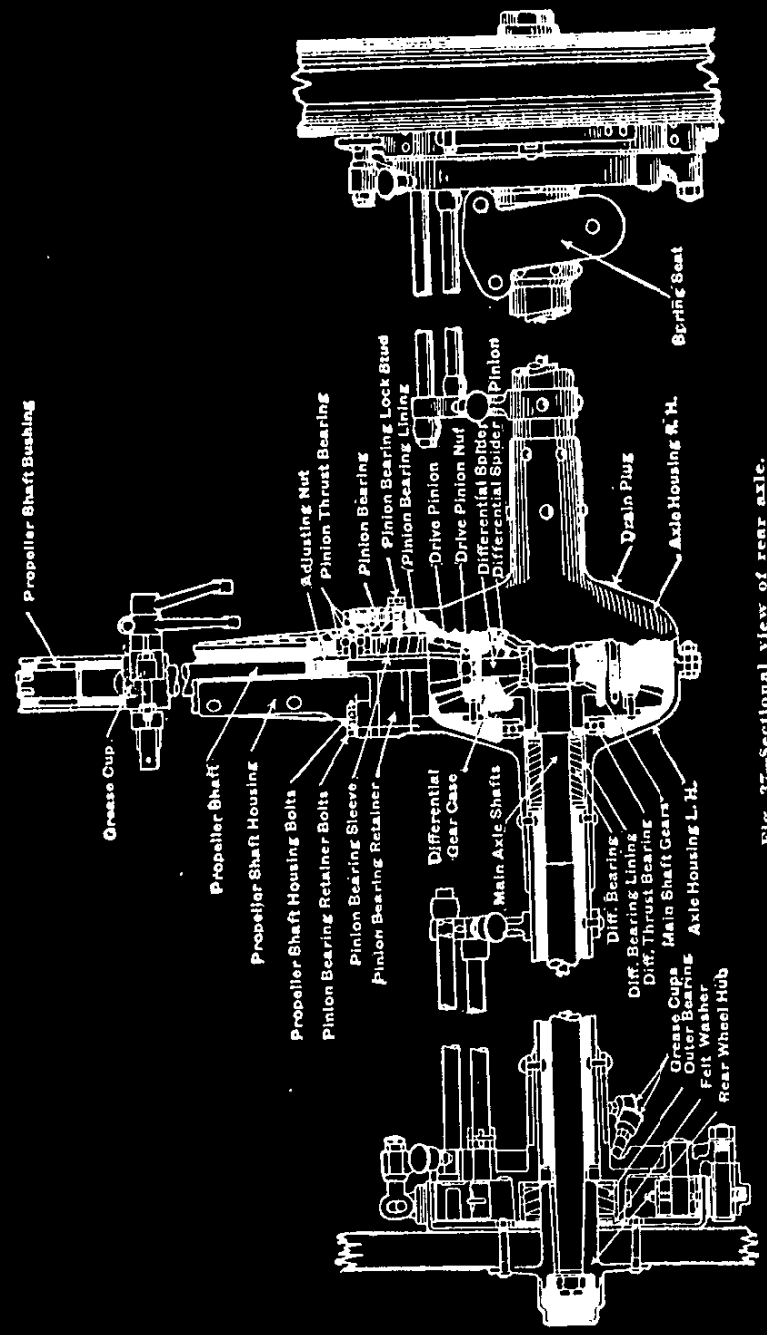


Fig. 37—Sectional view of rear axle.

other when required. If such a device were not used turning corners would be almost an impossibility, as without it both wheels would have to move at the same speed, whereas a turn demands that one wheel travel faster than the other.

When the car is traveling over uneven road surfaces, turning corners or on the side of the roadway, considerable end play or "thrust" is transmitted to the differential. To prevent injury and to reduce the power loss due to friction, a suitable bearing called a *Differential Thrust Bearing* is used, composed of hardened steel balls mounted between steel washers.

The weight of the differential and the driving torque is carried by two roller bearings on either side and bearing on the main axle shafts.

The propeller shaft is housed inside the *Propeller Shaft Housing* and is supported at its lower end by a roller bearing and at the upper end by a bronze bushing. A ball bearing called the *Pinion Shaft Thrust Bearing* absorbs the end play of the shaft and driving thrust.

One end of the Propeller Shaft Housing is flanged and bolted to the axle housings. The opposite end is supported by a *Ball and Socket Joint* (Fig. 38), inside of which works a *Universal Joint* connecting the propeller shaft with the main or splined transmission shaft.

How to Remove the Rear Axle Assembly

Jack up the car and remove bolts and clips holding springs to axle housing. Disconnect all brake rods from foot pedals to rocker shaft mounted on the propeller shaft housing, and slide axle from under the car.

How to Remove the Propeller Shaft

Slide the axle assembly from under the car. Remove the wire passing through the heads of the *Propeller Shaft Housing Bolts* and take out the bolts. The propeller shaft housing assembly can then be lifted off. Between the flanged base of the propeller shaft housing and the axle housings is a metal spacer called the *Pinion Bearing Retainer* (Fig. 37) into which is fitted the *Pinion Bearing*. By removing the two *Pinion Bearing Retainer Bolts* the propeller shaft and bearings can be removed without disturbing the adjustments. To remove the *Pinion Bearing Lining* unscrew the *Pinion Bearing Lock Stud.*

Replacing Drive Pinions

Should it become necessary to replace the drive pinion extreme care should be exercised to see that the tapered hole of the gear fits the taper on the shaft snugly and at all points. Always, before putting the new pinion on the shaft, remove the cotter pin holding the adjusting nut and turn the nut back two or three turns. As it is impossible to machine two tapered holes exactly alike, one gear may "go on" a little farther than the other, so if the adjustment were not changed the gear would

particles of gasoline and thoroughly mixing with the air passes into the cylinder through the intake pipe in the form of a carburated gas.

The proper carburated mixture is composed of fifteen parts of air to one part of gasoline vapor, but since in the ordinary carburetor the flow of gasoline from the jets increases under suction faster than the flow of air, it is necessary to provide a means of regulating the flow for all motor speeds so as to maintain this ratio.

In reality this means the combining of two carburetors, one for low motor speeds and the other for higher speeds. By reference to Fig. 25 the following explanation will serve to give you a more clear understanding of your carburetor and its action.

The gasoline from the tank passes through the gasoline inlet, filter screen and needle valve into the float chamber, raising

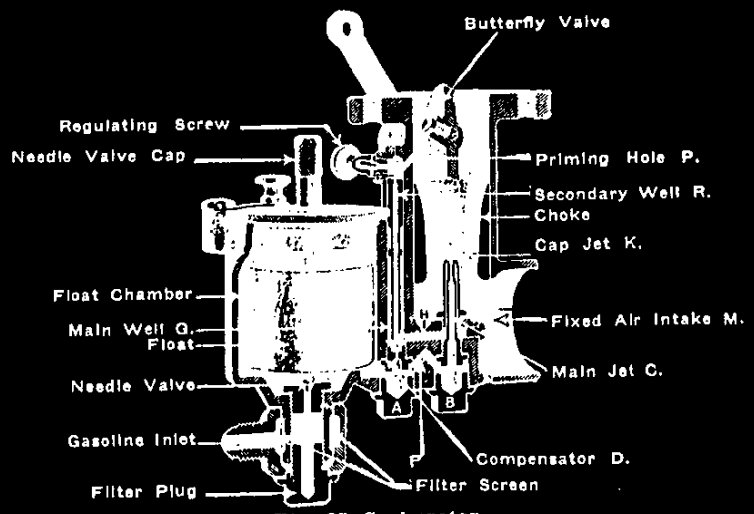


Fig. 25—Carburetor.

the float as the volume increases. Passing through the center of the float is a rod or needle valve having a pointed end. This rod is attached to fulcrums which are actuated by the float so that as it rises the needle valve moves downward and the conical end engages and closes the needle valve seat, thus shutting off the gasoline flow when the proper volume has been obtained.

All gasoline before being placed in the tank should be strained through chamois to remove water and dirt; however, in spite of care a certain amount of dirt or lint will get into the system and interfere with the best working of the carburetor. To remove as much as possible the liability of dirt getting into the instrument itself, a wire gauze strainer is inserted between the gasoline inlet pipe and the float chamber.

Once every three months, or oftener, should the motor miss

The piston is then on "top dead center" of the compression stroke and the gases have been compressed ready for firing.

Next turn the cam on the igniter so that the driving pin assumes the position shown in Sketch C, Fig. 24, then turn the cam in the direction of the arrow until the two contact points begin to open—by the term "begin to open" we mean that point at which the two contact surfaces no longer touch each other.

The lock nut can then be slipped on the shaft and securely tightened against the cam; however, in doing this use care not to disturb the position of the cam. The distributor arm and cap can now be put in place and the car operated.

The sequence of firing is 1-2-4-3, the No. 1 wire being the one immediately above the small slot on the edge of the distributor case. This slot fits over the locating pin on the rim of the igniter body. The rotation of the igniter is called "clock wise," that is, it turns in the same direction as the hands of a clock, therefore, in the same direction will come the No. 2 wire, then No. 4 and lastly No. 3.

Remember that for every revolution of the motor the igniter shaft is revolving at the same speed, therefore, it is necessary to turn down the grease cup one-quarter turn every day to insure proper lubrication at this important point.

Keep the top of the igniter clean—examine the wires occasionally to see they are in good condition and that no oil or grease is allowed to remain on them—in short, make it your business to see that the entire ignition assembly is kept in a clean and healthy condition and you will have no cause to fear exasperating breakdowns or delays on the road.

CARBURETOR

The carburetor used on the Chevrolet has been carefully tested and adjusted to the motor before leaving the factory. No adjustments should be made, as it has been found by experience that those made at the factory are proper for all changes in gravity and atmospheric conditions when the motor has been heated to the proper temperature. Too often adjustments to the carburetor are made when in reality something else is causing uneven running, or the motor has not thoroughly warmed up.

It is well to remember that any change in the carburetor's action will come gradually and not suddenly; therefore, if your car was operating properly when run last you may depend upon it that some other part of the motor is at fault and the trouble should be located and corrected before attempting alteration to the carburetor.

Carbureting Principle

On each suction stroke of the piston a partial vacuum is created which causes a fine spray of gasoline to flow from the carburetor jets. This spray is picked up by the air which is also drawn through the fixed air intake (Fig. 25), and as it passes through the choke or "venturi" a rotative action is produced (by the special shape of the choke) which breaks up the fine

"shoulder" against the bearing before obtaining a good seat on the shaft.

Before fitting the gear examine the key. If this is loose in the shaft, or worn, **replace it with a new one.**

It is a good plan to "try" the fit of the gear on the shaft before finally assembling. The best way is to secure a little *Prussian Blue* and spread it thinly around the bore of the gear. Press the gear on the shaft, then remove, and note the marks made on the shaft. If the "bearing" is uneven, smear a little valve grinding compound on the shaft and with a reciprocating motion "grind" the gear to its seat. Much depends upon securing a good snug fit, so take your time, as it is a good insurance against roadside repairs.

After having secured a good fit, securely lock the nut and **spread the cotter pin.**

The adjusting nut should then be set up and securely locked with a cotter pin. Care must be used not to get the adjustment too tight; however, it should be snug. If the holes for cotter pin will not "line up" without getting the bearing too tight or too loose, make a washer of tin or brass and insert between the nut and center thrust bearing washer.

How to Remove the Differential Assembly

Remove the propeller shaft housing assembly and rear wheels. The axle housing is in two parts, right and left, bolted together in the center. Remove the bolts and slide the housings off the shafts.

The differential gear case is in two halves and can be separated by removing the clamping bolts, after which the axle shafts with the main shaft gears can be withdrawn.

The main shaft gears are keyed to the axle shaft, and can be removed by pressing the gear off in the direction of the tapered end of the shaft.

After the axle is assembled remove the drain plug (Fig. 37) and pour oil into the housing until it runs out the drain plug hole. No. 600W steam cylinder oil is the best for summer use and light cylinder oil for freezing weather.

Before connecting the axle with the transmission, pack the universal joint with cup grease.

Rear Wheel Bearings

Large roller bearings carry the car load and are mounted on special one-piece drop-forged hubs, hardened and ground. The method of mounting is covered by patents controlled by this company, and insures to the owner a minimum of power loss and upkeep cost. Suitable felt washers are provided to prevent grease leaking from the differential, and can easily be renewed by removing the wheels.

Lubrication

Grease cups have been provided at different points to insure proper lubrication. Make it your business to regularly "turn

STEERING GEAR

The steering mechanism used on Chevrolet cars has been designed to give the greatest ease of handling with the least amount of wear and consequent adjustment. No part of the car is so vital, therefore it is absolutely essential that it be well lubricated and any looseness immediately corrected. Go over all the connections regularly and tighten any bolts or nuts which are loose,

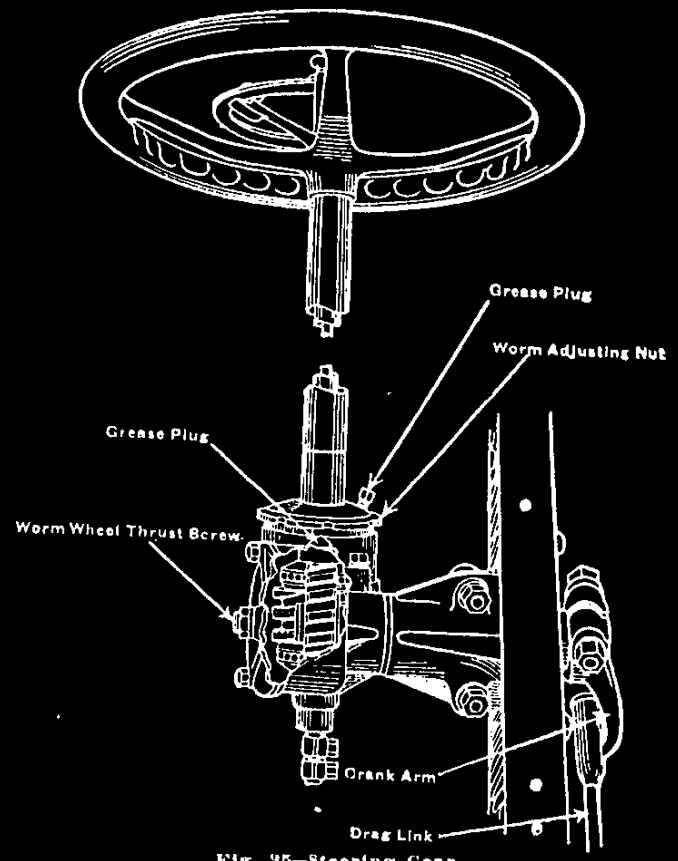


Fig. 35—Steering Gear.

supplying grease where needed, as this is the only safe insurance against a costly accident.

The steering gear is of the worm and worm wheel type, in which the worm on the steering gear shaft meshes with a worm wheel to which the crank arm is attached. To take up end play in the worm shaft loosen the adjusting nut clamp bolt and screw down the *worm adjusting nut* until all play is removed without binding the steering gear. Be sure to tighten the adjusting nut clamp bolt after securing the proper adjustment. To adjust end play in the worm wheel tighten the *worm wheel thrust screw.*

action of the car in passing over the road will loosen this scale or sediment and deposit it at the bottom of the tank. A suitable drain plug located at the lowest point permits this to be drained off. After operating the car for a few weeks this should be done, after which, if proper precautions are taken to properly strain the gasoline through chamois as it is put into the tank, little if any trouble will result.

The small hole through the top of the filler cap should be kept open at all times, as this is absolutely essential to the proper flow of gasoline to the vacuum tank.

VACUUM TANK

As the gasoline tank is mounted on the rear of the car, some distance from the carburetor, it is necessary to provide a means of drawing the fuel from the tank into the carburetor.

This is accomplished by the use of a vacuum tank mounted on the dash under the hood, the construction of which is illustrated in Fig. 27.

Every motor draws its supply of gasoline through the carburetor by reason of the pumping action of the pistons, which on their downward or suction stroke create a partial vacuum in the intake pipe. It is this same pumping action which draws gasoline from the main supply tank into the vacuum tank.

The vacuum tank is composed of two chambers. The upper or smaller one is the filling chamber, and the lower one the emptying chamber. To the upper chamber is connected a *Copper Pipe C,* which is attached to the intake pipe at the center of the two branches. Gasoline enters this chamber from the main supply tank, through the *Connection D,* at the base of which a small *Wire Strainer E* is placed to catch any dirt or lint which may have gotten into the main tank. At the base of this chamber is placed a *Flapper Valve F,* which, when closed, prevents the gasoline from running into the lower chamber.

The suction of the pistons on the intake stroke exhausts the air in the upper chamber, creating a vacuum, and this vacuum closes the *Valve F.* As the main supply tank is open to atmospheric pressure (through the vent hole in the filler cap), the vacuum created in the upper chamber will cause the gasoline to flow from the main tank through the supply line and into the chamber through the *Connection D.* Mounted inside of this chamber is a *Metal Float G,* and as the gasoline rises in the chamber the *Lever H* moves upward until, when the proper quantity has been obtained, the direction of pull on the *Springs K* is reversed, which causes the *Lever M* to move upward. This action closes the *Valve A,* thus shutting off the suction from the motor, and opens the *Valve B,* which allows air to flow into the chamber through the *Vent Pipe P.*

The admission of outside air destroys the vacuum in the chamber, which automatically releases the suction on the *Valve F,* and at the same time stops the flow of gasoline through the *Pipe D.* The weight of the gasoline in the upper chamber then causes the *Valve F* to open, allowing the gasoline to flow into the lower

chamber, from whence it flows by gravity to the carburetor, through the *Connection R.*

As the level of the gasoline in the upper chamber drops, the *Float G* moves downward, causing the *Lever H* to move, at its free end, in the same direction. The *Levers H* and *M* are pivoted on the *Pin O*, and connected together at their free ends by *Springs K;* therefore, when the free end of *Lever H* has dropped below the center line of the *Pivot O* the direction of pull on the *Springs K* will reverse, and the *Lever M* will move downward at its free end. This action opens the *Valve A*, thus permitting the motor suction to create a vacuum in the upper chamber and start the flow of gasoline through the *Connection D*, and at the same time closes the *Valve B*, shutting off the admission of outside air. The process of filling the upper chamber is then repeated.

As all lint and dirt cannot be kept out of the system, it is necessary to drain the lower chamber every three months, and to do this a *Drain Plug S*, is placed at the lowest point in the tank.

The manufacturers of the vacuum tank maintain a complete service repair organization in all principal cities, and we recommend that, should trouble be encountered with your system, you consult one of their experts, or write the factory direct.

Should this be impossible, the following instructions supplied by the manufacturers, if carefully followed, should give relief.

CARE AND REPAIR OF VACUUM SYSTEM

Before proceeding to repair vacuum tank make absolutely sure that the trouble is not due to some other cause.

Vent Tube Overflow

The *Air Vent P* allows an atmospheric condition to be maintained in the lower chamber, and also serves to prevent an overflow of gasoline in descending steep grades. If, once in a long while, a small amount of gasoline escapes, no harm will be done, and no adjustment is needed.

However, if the vent tube regularly overflows, the air hole in main gasoline tank filler cap may be too small, or may be stopped up. If the hole is too small, or if there is no hole at all, the system will not work. Enlarge hole to ⅛ in. diameter, or clean it out.

Failure to Feed Gasoline to Carburetor

Remember that this condition may be due to other causes than the vacuum system. Do not blame vacuum system until you are sure that the fault does not lie elsewhere. After flooding the carburetor, or "tickling the carburetor," as it is commonly called, if gasoline runs out of the carburetor float chamber you may be sure that the vacuum feed is performing its work of feeding the gasoline to carburetor.

Another test is to take out the inner vacuum tank, leaving only the outer shell. If you fill this shell with gasoline, and motor still refuses to run properly, then the fault clearly lies elsewhere, and not with the vacuum system—because you must certainly

turn each of the expander nuts to the right, until they lightly touch the clips, and then give them a half turn to the left. This unscrewing a half turn allows the expander to act properly under the clutch leather.

The clutch leather will in time "dry" out, resulting in "grabbing," or slipping. Once a month rub a little neat's-foot or castor oil on the leather to soften it. Should the clutch leather become greasy apply a little fuller's earth to it. **Do not use sand or other gritty substances** to make a slipping clutch hold. If you do you are simply inviting a large repair bill.

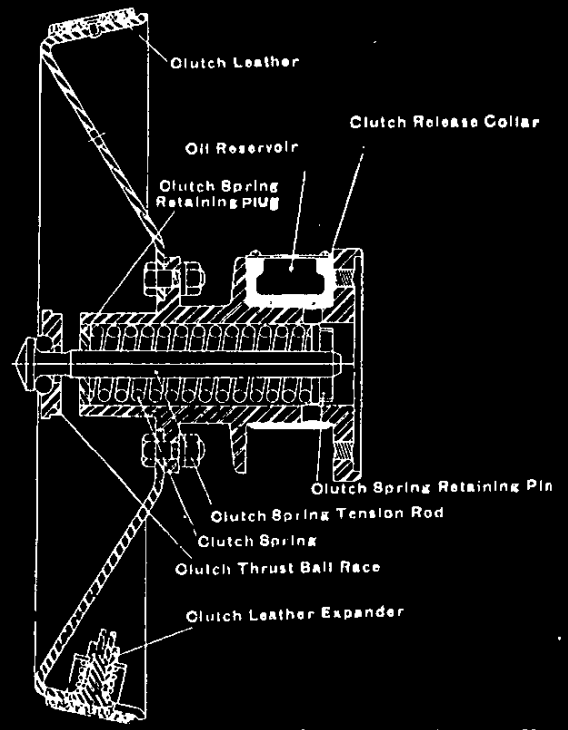


Fig. 34—Sectional view of cluth and release collar.

Should the clutch leather become worn because of continued slipping, it should be replaced. We carry in stock clutch bands ready for installation and recommend ordering from us or your nearest dealer when this becomes necessary.

To renew the clutch leather it is necessary to disconnect and remove the rear axle, transmission and clutch collar. Revolve the fly wheel until the hole passing through the clutch hub is exposed, and with a punch or drift drive out the *clutch spring retaining pin.* (Fig. 34.)

The clutch release collar used is a patented device controlled only by this company and when properly lubricated with steam engine oil every 250 miles will give no trouble.

repair bills, and that a slight inconvenience to yourself is necessary if you are to secure the maximum of useful service from your car.

Don't wait until you hear a "squeak" before oiling. A "squeak" means a rusted or dry bearing, and when once in that condition trouble soon follows.

The compact construction of a Chevrolet makes necessary the placing of oil holes and grease cups under the floor boards of the car. Don't because it might cause you a little extra trouble forget to remove them and lubricate as directed.

We guarantee that, when adjusted and lubricated, following the instructions contained in this booklet, your car will give you a maximum of service at a minimum of upkeep cost.

For those who wish we have prepared an enlarged cut of the oiling chart which can be tacked on the garage wall for handy reference. Write us for this chart.

CLUTCH

The clutch used is the conventional cone engaging with a beveled edge of the fly wheel. The "face" of the cone is covered

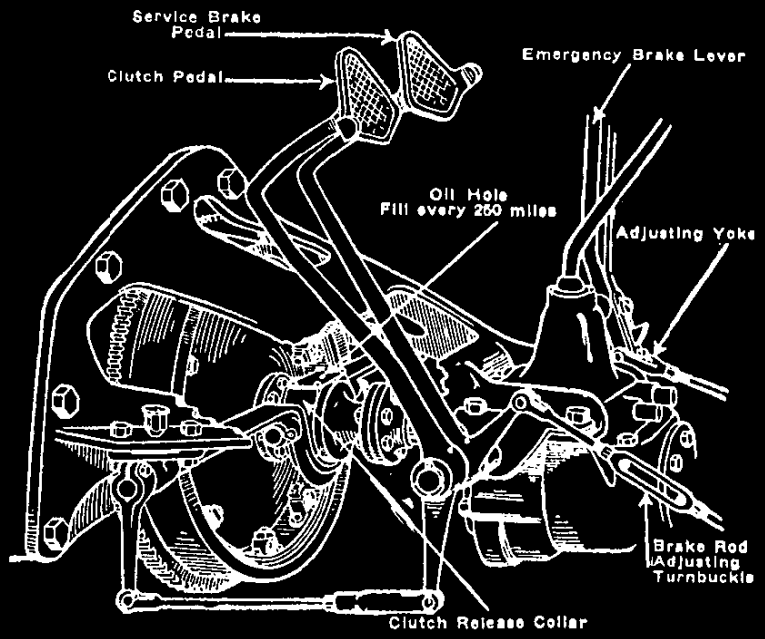


Fig. 33—Clutch and operating mechanism.

with a leather band firmly riveted to it. To prevent "grabbing," expanders are placed under the clutch leather so as to present slightly raised points of contact. If the clutch takes hold too quickly and causes the car to start with a jerk, it is an indication that the clutch leather expanders need adjusting. To do this,

get gasoline feed from this open, elevated tank of gasoline, unless there is stoppage in the connection line to carburetor.

To Remove Top

In removing top of tank, after taking out screws, run the blade of a knife carefully around top, between cover and body of tank, so as to separate gasket without damaging it. Gasket is shellacked to make an air-tight joint.

IF FAULTY FEED IS TRACED TO VACUUM SYSTEM, ONE OF THE FOLLOWING CONDITIONS MAY BE THE CAUSE

(A) The float, which should be air-tight, may have developed a leak, thus filling up float with gasoline, and making it too heavy to rise sufficiently to close vacuum valve. This allows gasoline to be drawn into manifold, which in turn will choke down the motor.

Proper operation depends upon the float being air-tight.

To Repair Float

Remove top of tank (to which float is attached) as above directed. Dip the float into a pan of HOT water, in order to find out definitely where the leak is. Bubbles will be seen at point where leak occurs. Mark this spot.

Next, punch two small holes, one in the top and the other in the bottom of the float, to permit discharge of the gasoline. Then solder up these holes and the leak. Test the float by dipping in HOT water. If no bubbles are seen, the float is air-tight.

In soldering float, be careful not to use more solder than required. Any unnecessary amount of solder will make the float too heavy.

In taking out float and repairing it, take care not to bend the float guide rod. If you do bend the rod it will strike against guide and retard float, producing the same effect as a leaky float, and allowing gasoline to enter manifold. Also note whether surface of rod is perfectly smooth, so that it cannot be retarded by guide.

To overcome the condition of a leaky float temporarily until you can reach a garage, remove *Plug T* at the top. In some cases the suction of the motor is sufficient to draw gasoline into tank even with this plug open, but not enough to continue to be drawn into manifold. If, however, you are not able to do this, close up *Plug T* with engine running. This will fill tank. After running engine until tank is full, remove *Plug T* until gasoline gives out. Continue repeating same operations until a repair station or garage is reached, when the leaky float can be remedied.

(B) The *Flapper Valve F* may be out of commission.

A small particle of dirt getting under the flapper valve might prevent it from seating absolutely air-tight, and thereby render the tank inoperative.

In order to determine whether or not the flapper valve is

Take a squirt can full of gasoline or oil and squirt around the intake pipe and connections. If any gasoline or oil is drawn in it indicates the leak, and the remedy is obvious.

We have given above the principal causes of trouble, but it is not possible to cover all. So if the remedies suggested do not correct the trouble, you should consult an expert.

MOTOR LUBRICATION

The oiling system used on Chevrolet cars is known as the constant level splash system. The oil is carried in a reservoir located at the bottom of the crank case and is filled through a filler tube on the left side of the motor just back of the fan.

Two pet cocks located on the side of the oil reservoir (Fig. 1) indicate the level of oil. When full, oil will begin dripping out of the upper pet cock when the valve is open.

Oil is drawn from the oil reservoir by a geared pump located on the end of the generator shaft and is then "fed" into a basin having four troughs or depressions into which the spoons or splashers on the ends of the connecting rods dip.

The rapid "splashing" of these spoons keeps the main bearings, connecting rods, piston pins and cylinder walls bathed in oil, from whence it drains back into the reservoir to be used over again.

Once every 1000 miles the oil pan should be drained by removing the drain plug, and thoroughly flushed with kerosene. This removes all "old" or "burned" oil and prevents clogging of oil holes and pockets.

Be absolutely sure that all the kerosene is drained off, otherwise it will mix with the fresh oil and will cut down its lubricating qualities.

Fresh oil is cheaper than repair bills, so observe this point regularly.

Light cylinder oil having a flash point of not less than 425 and a fire point of 475 degrees Fahrenheit should be used.

Use light cylinder oil to lubricate the rocker arms and push rod felts. Keep the felts saturated with oil. Oil the fan every time you do the rocker arms.

OIL PUMP

Upon the oil pump depends the successful lubrication of the motor The pump used on Chevrolet cars has been simply designed to give a constant, even supply of oil with a minimum of parts and a consequent lessening of pump troubles. Under normal conditions you will not experience the slightest trouble and will need to give no thought to this important part, however, as a safeguard and to avoid accidents, a registering dial is mounted upon the instrument board (Fig. 3) so that the motorist may observe the action of the pump.

Should this dial for any reason show that the pump has stopped working, the car should be stopped at once and the source of the trouble located and remedied. Usually this will be found to be

Connections and Tubing

Look over the connections to see that they are absolutely tight. Coupling and elbow connections should be always kept screwed down tight. Care should be taken that tubing contains no sharp flat bends that might retard gasoline flow.

Suction Valve A, also *Atmospheric Valve B*, can be easily ground, if it ever becomes necessary. However, the fact that these two valves are not required to seat against a pressure, but are drawn on to their seat, eliminates any possibility of their needing to be ground.

Clean Tank Every Three Months

(To clean tank: Don't take tank off car; you may not be able to put it back in exactly same position.)

Unless gasoline is filtered through a screen or chamois when filling the main gasoline tank, from which the vacuum tank draws its supply, some dirt or sediment will accumulate in main tank. Part of this dirt or sediment may be drawn into the vacuum tank. This dirt should be removed from the vacuum tank at least once every three months. To clean the tank, remove the top of the tank and take out the inner shell or vacuum chamber. (Be careful to observe instructions "To Remove Top.") This will give access to the lower chamber, from which the dirt and sediment should be removed.

If you find it necessary to send the tank to us, then ship the COMPLETE TANK to our nearest branch or service station.

DETECTING TROUBLE

Defective Ignition

First of all ascertain whether the trouble is in the ignition instruments, the wiring, or the spark plugs. In most cases it will be found in the external wiring or the plugs when one cylinder continually misfires.

To determine the location of the trouble, go about the task systematically — don't jump from one thing to another, but satisfy yourself that each part examined is working and in its proper position.

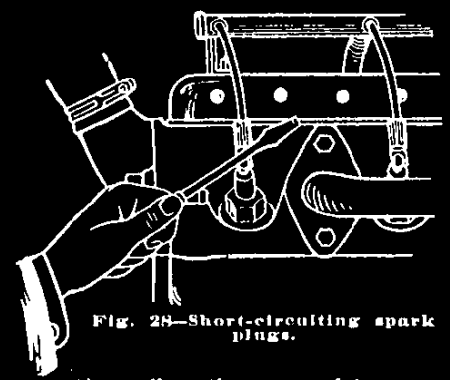


Fig. 28—Short-circuiting spark plugs.

When the engine misfires locate the particular cylinder at fault as follows: With a screw driver (having a wooden handle) touch the top or terminal end of the spark plug and at the same time allow the screw driver to come in contact with the cylinder head (Fig. 28). If a change in the motor running is noticed, that cylinder is working properly. Try each spark plug

out of commission, first plug up air vent; then detach tubing from bottom of tank to carburetor. Start motor, and apply finger to this opening. If suction is felt continuously, then it is evident that there is a leak in the connection between the tank and the main gasoline supply, or else the flapper valve is being held off its seat and is letting air into the tank instead of drawing gasoline.

In many cases this troublesome condition of the flapper valve can be remedied by merely tapping the side of the tank, thus shaking loose the particle of dirt or lint which has clogged the valve. If this does not prove effective, remove tank cover, as described on previous page. Then lift out the inner tank. The flapper valve will be found screwed into the bottom of this inner tank.

(C) *Manifold Connection C* may be loose, allowing air to be drawn into manifold.

(D) Tubing may have become stopped up, in *Lengths B* or *C*.

(E) *Gasoline Strainer E* is a screen located in the line from gasoline tank. This screen collects all foreign substances that might get in the rear tank and be carried through to the carburetor and clog it. If tank fails to work, it may be that this screen is clogged, preventing gasoline from getting into tank. Screen may be easily cleaned by unfastening connection at elbow. This cleaning should be done every three weeks. If tank should ever fail to operate, examine strainer FIRST.

Carburetor Trouble

(A) Carburetor trouble cannot possibly be attributed to vacuum system. If gasoline is delivered to carburetor, vacuum feed has done its work.

(B) If carburetor pops and spits, carburetor adjustment is needed.

(C) If car slows down, or if you cannot get usual speed out of car while running with open throttle, although the car still continues to run, you may be sure the trouble is not due to vacuum system. If all the gasoline in vacuum tank is exhausted the car will stop.

Filling Up Tank in Starting

To fill the tank, should it ever become entirely empty, with the engine throttle closed and the spark off, turn the engine over a few revolutions. This takes less than ten seconds, and will create sufficient vacuum in the tank to fill it. If the tank has been allowed to stand empty for a considerable time, and it does not easily fill when the engine is turned over, this may be caused by dirt or sediment being under the *Flapper Valve F*. Or, perhaps, the valves are dry. Removing the *Plug T* in the top and squirting a little gasoline into the tank will wash the dirt from this valve, and also wet the valves, and cause the tank to work immediately. The flapper valve sometimes gets a black carbon pitting on it, which may tend to hold it from being sucked tight on its seat. In this case the valve should be scraped with a knife.

due to air leaks in the suction pipe (Fig. 32) and can, in most cases, be corrected by tightening the connections at the upper and lower ends. Occasionally dirt and unburnt carbon will form as a sediment and will be drawn into the suction and feed pipes, obstructing them, in which case they should be taken off and blown out.

Get into the habit of noting the action of the registering dial regularly—not in the expectation of trouble, but to avoid its possibility and resulting large repair bill. Every few minutes,

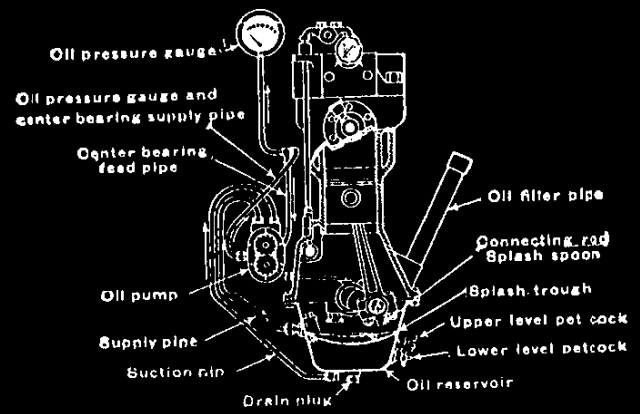


Fig. 32—Sectional view of engine lubricating system.

as you drive along, look at the dial—it only takes a second and requires no special effort. Failure to make proper observations may cost you in time and money several times this amount.

Oil Gauge

The needle or hand of the oil gauge is actuated by the pressure of oil against a column of air in the tube from the oil pump to the gauge. The instrument is self-contained and will require no attention in itself. Should the dial indicate that the pump has stopped working disconnect the *Oil Feed Pipe* (Fig. 32) at the pump. If the pump is working oil will be discharged and the trouble is in the air line or dial. Examine the air line, especially the connections, and see that they are tight. If tightening the connections does not remedy the trouble, take a squirt can full of oil and, with motor running slowly, squirt oil along the entire length of the air line. If the tubing has split bubbles will appear at the leak. If the air line is in good condition then it is evident that the gauge is at fault and it should be returned to the makers for repair.

GENERAL LUBRICATION

The chart on lubrication (Fig. 30) shows where and when to lubricate the different units of a Chevrolet car. The thing to bear uppermost in mind is that oil and grease are much cheaper than

until one is found where "short circuiting" the plug causes no change in the motor running. You have then located the particular cylinder which is missing.

Examine carefully the wire running from the distributor cap on the igniter to the spark plug for a loose connection or broken insulation.

Should this be found in good condition, remove the spark plug.

Spark Plugs

The faults generally occurring in the spark plugs are as follows:

(1) Fouled or sooted plugs. These may be very easily cleaned with a brush dipped in gasoline.

(2) Broken insulation or porcelain. A close examination of the plug will determine if this is the cause of the trouble. Replacing the plug is the only remedy.

(3) Too wide gaps between the sparking points. The best width of spark gap is .020 inch or slightly less than 1/32 inch. Larger or smaller gaps are detrimental to the ignition.

(4) The sparking points or electrodes have become burned to such an extent as to increase their resistance. Replacement of the plug is the best remedy.

If after satisfying yourself that none of the things listed above is the cause of the trouble, find a cylinder that you know is working and put the assumed bad plug in that one and the good plug in the bad cylinder. If the trouble goes with the plug you are sure it is the plug; if not, look elsewhere.

Spark Plug Wires

To determine if the spark plug wire is at fault disconnect it from the spark plug and hold the end about one-quarter inch from the plug. If no spark jumps across the gap with the motor running, examine the terminals and insulation. Sometimes the copper wires break but do not damage the insulation. If no exterior damage can be found replace the wire on the plug, and, with motor running, slip the wire out of the socket on the distributor cap and hold it about one-quarter inch away from the brass ring on the socket. If a spark is given off you are sure the wire is at fault and should replace it with a new one. If no spark is obtained remove the distributor cap and examine the passing contact pins. If any are found burned or blackened on their points thoroughly clean and polish.

Motor Will Not Start

If for any reason the motor does not start immediately under its own power, remove your foot from the starting button at once. One of the following things may be causing the trouble:

(1) Gasoline supply exhausted.

(2) Shut-off cock under gasoline tank closed. When closed the valve handle should point downward, and when open, at right angles to the bottom of tank.

(3) The terminals are loose either on the spark plugs or distributor cap.

The contact points in the breaker box may be badly worn and need cleaning.

The spark plug gaps are not adjusted properly.

Motor Misses at High Speed Only

You have a bad spark plug.

A valve may be sticking slightly and does not come to its seat in time.

You have a loose electrical connection.

A valve spring may be weak and does not bring the valve back to its seat properly.

The spark plug gaps are not set correctly.

Motor Misses at Low Speed Only

A weak exhaust spring.

A bad spark plug.

Exhaust valves need grinding.

A leak in the intake pipe or connection.

Weak Valve Springs

As the valve springs are subjected to considerable heat it follows that in time their "temper" will be affected.

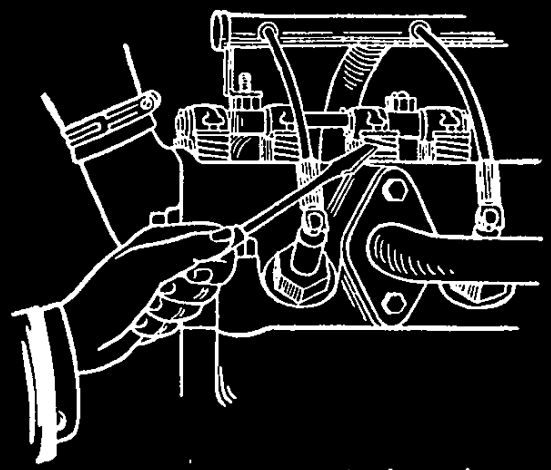


Fig. 31—Testing tension of valve springs.

By inserting a screw driver or other suitable tool between the coils of the spring (Fig. 31) and turning it (while the motor is running) the tension of the spring can be increased. If the motor picks up and runs properly, replace the spring. If you have no new spring at hand remove the old one and stretch it about an inch. As soon as possible, however, a new spring should be secured and installed to insure a permanent repair.

Locating Leaks in Intake Pipe or Connections

This is a common cause of missing at low speeds and it is best detected by allowing the motor to run idle at the missing speed.

(4) The ignition switch has not been turned "on."
(5) The gasoline supply pipe may be clogged.
(6) There may be water in the gasoline system.
(7) The contact points in the igniter may be badly burned or some obstruction may have caused the contact arm to stick and remain open.
(8) The primary wires from coil to igniter, coil to switch and to battery may be loose, broken or making poor contact.
(9) The igniter may be "grounded."
(10) The coil may be "burned out."
(11) The switch may not be making proper contact.
(12) The storage battery may be exhausted.

Water in Gasoline System

If there is water in the gasoline it will not mix, but, being heavier than gasoline, will find its way to the bottom or lowest point in the system, which is at the carburetor. In cold weather it may freeze. By pouring hot water or applying hot cloths to the supply pipe and carburetor this can be loosened up. If poured on, be careful that none enters the carburetor.

Grounded Igniter

If trouble is suspected with the igniter, see if a spark is delivered to the plugs. Failing to get a spark at the plugs disconnect the high tension wire (running from the central terminal of the igniter to the coil) from the coil (Fig. 29) and hold it within one-quarter inch from the point from which it was removed, turning the motor over by hand with the ignition switch "turned on." If no spark occurs at this point, first examine the wire to see that it is in good condition and that it is properly secured to the distributor cap. After satisfying yourself that this is in proper shape, slip the distributor cap off the igniter and examine the small button-headed spring on the distributor arm. See that this is not broken, and that it is making good contact with the high-tension terminal. If this part of the assembly is in good condition some ground exists in the breaker box.

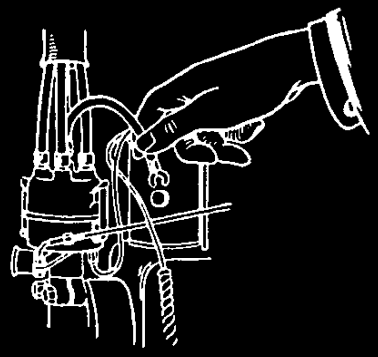


Fig. 29—Testing Igniter.

Examine the primary wire—see that the insulation is good and that it is properly fastened to the igniter. Occasionally oil or grease will get into the breaker box and form a connection between the case and the insulated contact point. Wipe out thoroughly.

Testing Coil

In order to determine if the coil is operating properly, secure a piece of wire and, holding one end to the frame of car, motor casting, or other metallic "ground," bring the other end to within one-quarter inch from the point where the high tension wire (running from the coil to the central terminal of the igniter) leads from the coil, and turn the engine over by hand with the switch on. If a spark occurs at this point and not at the igniter, the trouble is in the high tension wire which leads from the coil to the igniter.

If, however, no spark occurs at either point and the primary circuit is intact, it is evident that the coil should be replaced or returned to the makers for repairs.

Test of Primary Circuit

When testing the primary circuit there are practically only two things to be taken into consideration, namely, the condition of the contact points in the breaker box and the wiring.

When tracing the primary circuit, first see if the fuse has "blown," then trace all the wiring following the diagram shown in this booklet.

Testing Ignition Switch

In order to test switch and determine if current flows through it, remove the wire from the terminal marked "Bat" on coil. Attach a wire to the negative terminal on the storage battery and bring its free end around so that it can be brought in contact with the free end of the wire which was removed from the coil. Then turn on the ignition switch and make and break the circuit with the two wires by touching their free ends together. If no spark occurs bring the free end of the wire attached to the negative terminal of the battery up to the switch and make and break the circuit by touching the screw on the back of the switch marked *IGN*. If a spark is given off, then the wire from the switch to the coil is broken or faulty, and should be replaced. If no spark is given off, there is doubtless an open circuit in the interior which can be reached by removing the four flat-head screws passing through the side of the switch and holding the fiber back.

Motor Misses at All Speeds

One or more spark plugs may be fouled. Thoroughly clean the sparking points and connecting chamber with a brush dipped in gasoline.

One or more valves are stuck. Remove and thoroughly polish stems.

The valves may require grinding.

A valve spring may be broken.

You may have a bad leak between the carburetor and motor.

One of the ignition wires may be loose and due to vibration of the machine makes and breaks contact.

One of the push rod plungers may be worn, and a valve may not open far enough.

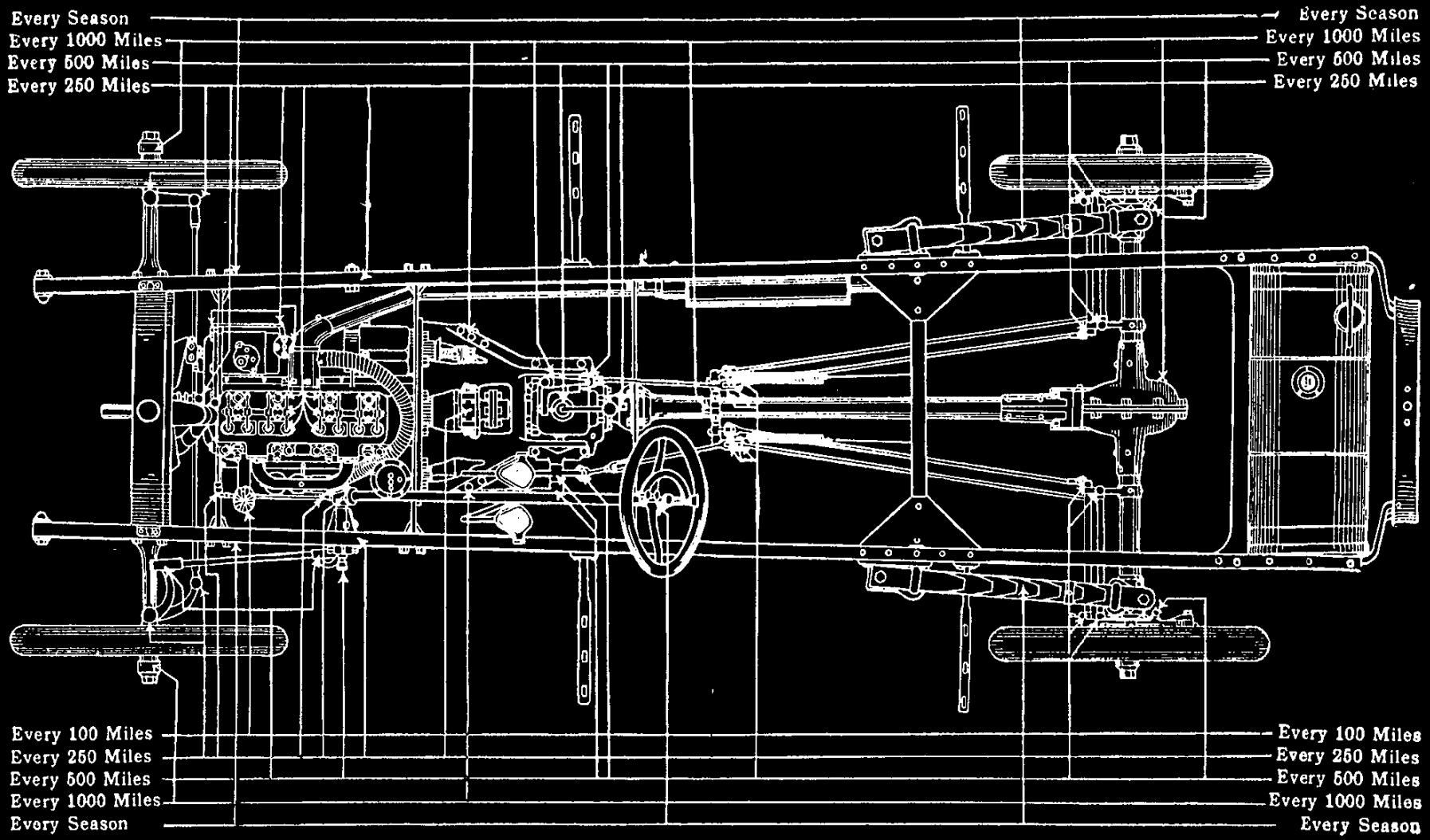


Fig. 30—Lubricating chart for Chevrolet "Model F-A" chassis

Standard Warranty

Approved as to Form by National Automobile Chamber of Commerce, Inc.

We warrant each new motor vehicle manufactured by us to be free from defects in material and workmanship under normal use and service, our obligation under this warranty being limited to making good at our factory any part or parts thereof which shall within ninety (90) days after delivery of such vehicle to the original purchaser be returned to us with transportation charges prepaid, and which our examination shall disclose to our satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on our part, and we neither assume nor authorize any other person to assume for us any other liability in connection with the sale of our vehicles.

We do not make any guarantee against, and we assume no responsibility for, any defect in metal or other material that cannot be discovered by ordinary factory inspection, or in any part, device or trade accessory.

This warranty shall not apply to any vehicle which shall have been repaired or altered outside of our factory in any way so as, in our judgment, to affect its stability, nor which has been subjected to misuse, negligence or accident.

We make no warranty whatever in respect to tires, rims, ignition apparatus, horns or other signaling devices, starting devices, generators, batteries, speedometers or other trade accessories, inasmuch as they are usually warranted separately by their respective manufacturers.

CHEVROLET MOTOR COMPANY.

Important Notice

We consider that a Chevrolet Car has been "altered" when any of its original parts have been replaced with others not made or furnished by us.

It is Your Turn Now—

¶ We have employed the best engineering skill and used only first grade materials in building Chevrolet Cars.

¶ We have provided service facilities in every part of the world.

¶ But, unless the operator of a Chevrolet knows how to properly handle and care for his or her car, the maximum of satisfaction and enjoyment, which our painstaking efforts have provided, will not be realized.

¶ It is to give this desirable, if not entirely necessary, knowledge, that this Instruction Book has been prepared.

¶ It has been made simple, with technical terms eliminated, for the benefit of the Chevrolet operator who is without previous experience.

¶ The simplicity and accessibility of Chevrolet cars, combined with ease of operation, make it possible for one without previous mechanical experience, to secure entirely satisfactory results.

¶ At our factories and distributing branches we maintain a service organization that is at all times at your disposal and will be glad to give you any information you may desire.

CHEVROLET MOTOR COMPANY

75 years of CHEVROLET

George H. Dammann

1918

A move, expected for well over a year, was made on May 2 of this year. Chevrolet became a part of General Motors, though its corporate headquarters remained at 57th and Broadway in New York, and would remain there for several more years. Still, one of the country's fastest growing automobile companies had joined one of the world's fastest growing automobile empires, and the result would be that Chevrolet would eventually become the largest single auto producer in the world while General Motors would become the largest auto complex in the world.

In another move that would have widespread ramifications over the years, Chevrolet this year decided to enter the commercial vehicle market. It did this by introducing both commercial chassis in the 490 Series and by coming out with a brand new 1-ton truck, called (of all things) the Model T.

The 490 Commercial Chassis differed from the auto chassis in that it had heavier springs and retained the cowl and vertical windshield of the 1916 open models. Chevrolet at this point had no desire to produce its own truck bodies, but instead contracted with several commercial body makers to produce a variety of styles. Notable among this group was the Martin Parry Co. of Indianapolis.

The Model T was an unusual looking truck, having all of its own chassis components, but using the engine and transmission of the Series FA automobiles. Again, Chevrolet made only the chassis, fenders and cowl, upon which were mounted the headlights, and it was up to the buyer or the dealer to have the body built and installed. The Model T's standard equipment consisted of windshield, seat, complete electrical system, tools, horn, and a governor locked at 25 MPH.

In the auto line, the F Series was replaced by the FA Series, which used the former's 108-inch wheelbase chassis but had a redesigned engine. The new power unit had a bore and stroke of 3-11/16 x 5.25 and a displacement of 224 cubic inches. It used the same head and bearings as the Series H, but featured a circulating-type oil pump and cooling was by water pump rather than thermo-syphon. The Royal Mail and Baby Grand names were dropped, but the styles continued as the Roadster and Touring. A new style was the Sedan, with an unusual door arrangement consisting of the right door leading to the rear compartment and the left door leading to the driver's compartment.

The Series D V-8 entered its official production year, and in reality, its only full production year. The car was identical to those built in 1917.

In the 490 Series, a Coupe and a Sedan were added, but at mid-year, the All-Season Tourer was discontinued. In the 490's engine room, several mechanical improvements appeared, including a gear-type oil pump to replace the former plunger type, and a water pump to replace the thermo-syphon cooling. An oil pressure gauge was made standard, and closed cars were equipped with rear mounted fuel tanks and Stewart vacuum tank feed mechanisms.

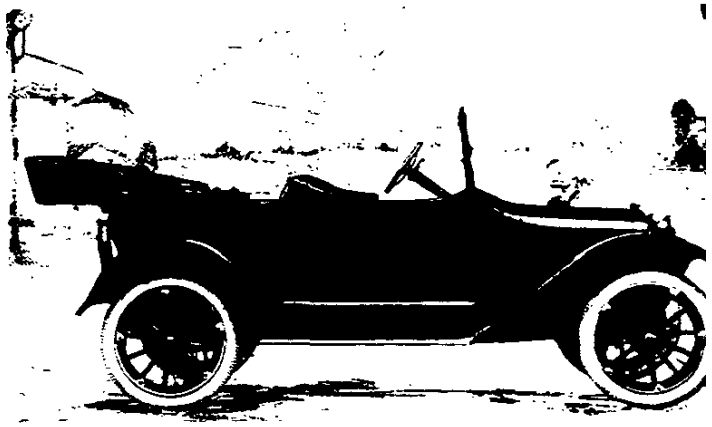
Production of the 490's totaled 22,205 built at Flint; 23,471 at Tarrytown; 9,000 at St. Louis; 10,007 at Oakland; 9,267 at Ft. Worth, and 12,250 in Canada. Series FA production totaled 6,810 at Flint; 3,318 at Tarrytown, and 1,275 in Canada. In the Series D V-8, production amounted to 1,315 at Flint; 3,324 at Tarrytown, and 194 in Canada. Model T truck production was 61 at Flint; 269 at Tarrytown, and 27 in Canada. Note that the newly-opened St. Louis assembly plant concentrated strictly on the 490 models, as did the plants at Oakland and Ft. Worth.

As an aside to the Chevrolet story, the William Small Co. of Indianapolis, which had been a distributor of the Monroe car, bought the ailing Monroe firm and transferred production to Indianapolis. Recognizing that there were some flaws in the car's design, he hired a noted local automotive engineer to go over the vehicle and upgrade its design. Yes, ironically, that engineer was none other than Louis Chevrolet.

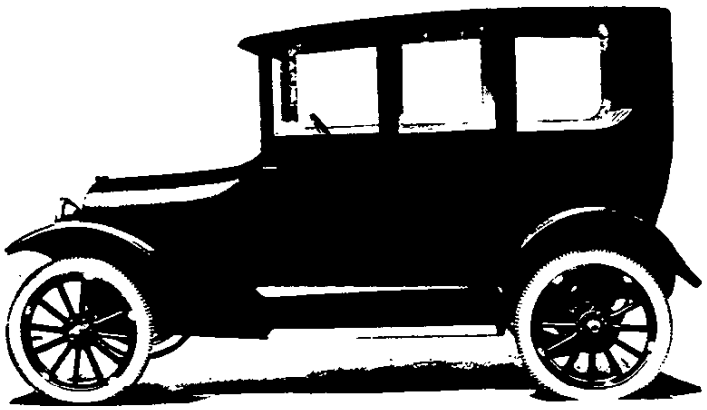
Louis Chevrolet stayed with the Monroe project as a consultant for only a short time, but the Small company continued manufacturing until 1922. At that time, with Small apparently in financial trouble, the Monroe car line was sold to the Premier Motor Corp. of Indianapolis in a deal which also included control of Strattan Motors Corp. also of Indianapolis. Sounding almost like a junior Durant, Frank E. Strattan, in a thoroughly muddled series of moves, apparently first bought the Monroe line, then sold it to Premier, and then bought back the whole works. Along with this, he made plans to offer in 1923 a car bearing the Strattan name.

As far as can be ascertained, only one or two experimental vehicles were built under the Strattan name. On the other hand, Premier had been producing a small number of well-respected cars since 1903, and so the Monroe line was marketed as a new model of the Premier. This did not prove successful either, and by 1924 the old Monroe was dropped, while shortly thereafter the Premier too became a memory.

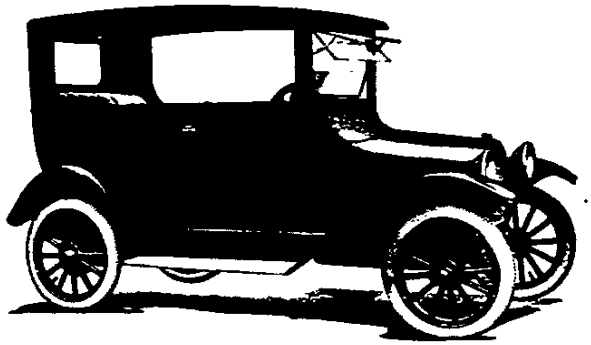
The Series 490 Touring was little changed, but up again in price, now selling for $685. The car still weighed 1,890 pounds. The 490 Series continued to use its 102-inch wheelbase chassis, now equipped with 30 x 3½ tires. Quarter elliptic springs were used on all four corners, which made the 490 an exceptionally stable car in turns, but created a rougher ride than found in some of the competition, especially Ford. The tops on all open 490s were of Mohair, consisting of an upper and lower layer of fine gray cloth, vulcanized together by a thin center sheet of rubber.



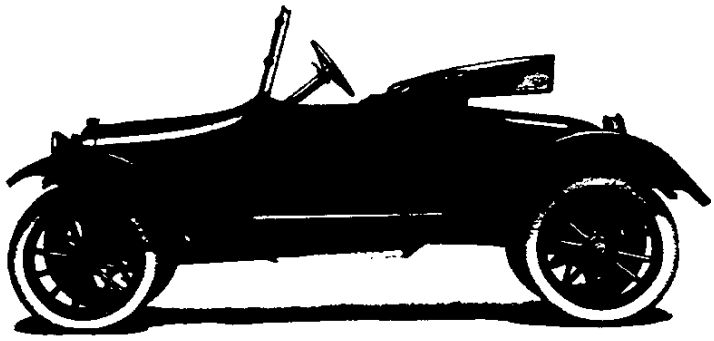
1918



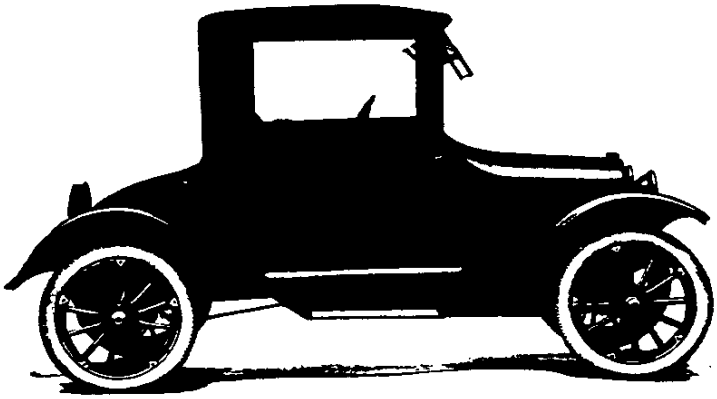
New for the year was the 490 Sedan, priced at $1,060 to $1,185, and weighing 2,160 pounds. Shown here with windows up and door posts in place, the car made a snug winter vehicle. Entry to the front seat was from the left side, while rear seat passengers entered through the right hand door. Access to either compartment could also be made via a narrow aisle between the front seats.



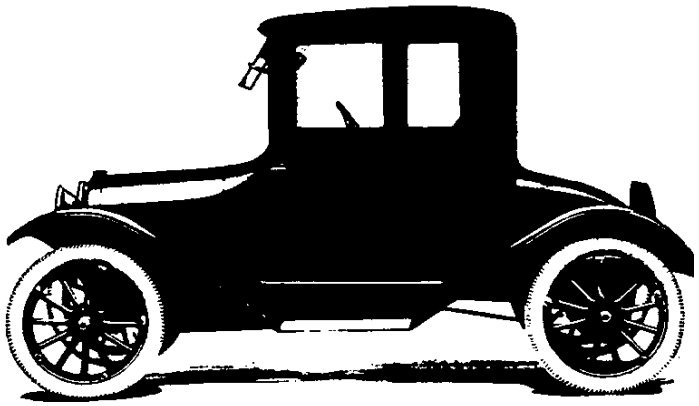
An interesting feature of the 490 Sedan was the fact that all glass could be lowered and the door posts removed, thus making the car into an early version of the hardtop sedan — a style that would not return to popularity until the 1950s. The resulting openness of this style was similar to that of the All-Weather Touring car, but the sedan's body was more practical and weathertight. Because of this, the All-Weather Touring was discontinued during the year. Conflicting information exists here, with some indications being that the All-Weather model was built through mid-year, while other information tends to show the car never got into 1918 production. Possibly the models shown on 1918 dealer lists and price books were hold-over 1917 models.



The Series 490 Roadster this year featured a pronounced slant to its windshield. It weighed 1,820 pounds, and like all 490s, continued to use the 102-inch wheelbase and 21.7 S.A.E. horsepower 4-cylinder engine. Different lists show that the price rose from a low of $620 to a high of $660 during the year. Major changes on the engine included a water pump rather than the former thermo-syphon cooling system, and a new gear-driven oil pump rather than the old plunger type. Still, the open rocker arms had to be hand lubricated with an oil can every 100 miles or so. The oil can resided in its own place under the hood. A new style oil pressure gauge was also included.

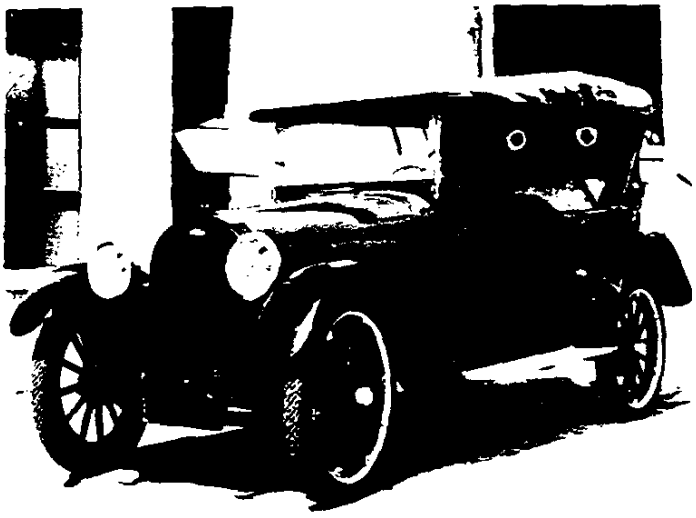


New to the 490 Series was the Coupe, a 2-passenger closed car that weighed 2,040 pounds and cost $1,060. Similar to the Sedan, the Coupe's centerposts could be removed, as shown here, thus creating a hardtop of sorts with the windows down. Both the Coupe and Roadster used the same sweeping fenders this year.

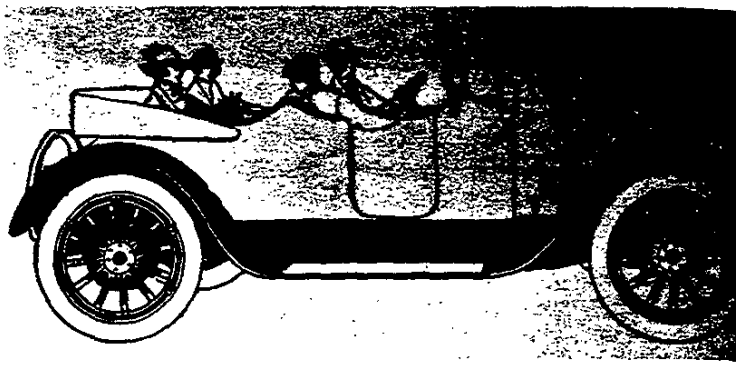


All buttoned up for inclement weather, the Coupe displayed a nice 5-window style that was certainly in keeping with the times. Bodies were built by the Hayes-Iona Body Co., but finished by Chevrolet. This year, all 490 rims were supplied by Jackson, and were of the 5-lug type. These were demountable clincher rims, listed as "Jackson No. 10." This ended the dealer practice of installing aftermarket demountable rims for customers, which resulted in cars being shown with both 5 and 6-bolt pattern rims. The open cars featured a 15-degree slant to the windshields, but closed cars used a vertical plane.

1918

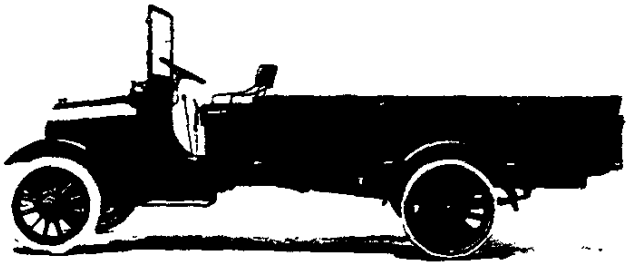


Unchanged was the Series D Touring Car, Model D-5, which at 3,200 pounds, was the heaviest car Chevrolet produced this year. And, with its price the same $1,550 as the Roadster, the Series was also the most expensive. Upholstery continued to be in black French-pleated leather, and the inside doors were paneled in matching leather and equipped with large storage pockets. The color didn't change, but in 1917 Chevrolet referred to this car being available only in "Brewster Green," while this year it was available only in "Chevrolet Green."

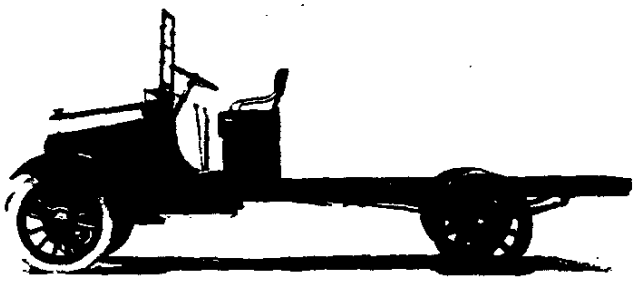


Entering its only full year of production was the Series D V-8. The same two body styles introduced in 1917 remained unchanged, but the price rose from $1,385 to $1,550. The 4-passenger Roadster, Model D-4, weighed 3,150 pounds. It was a large car, using a 120-inch wheelbase, but not quite as large as the little people in this drawing would make it seem.

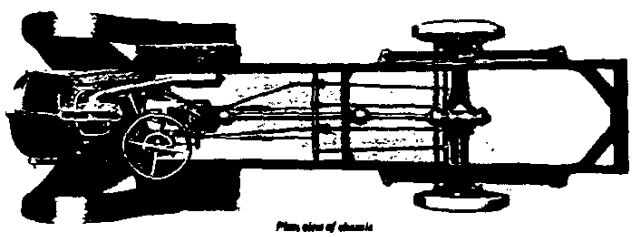
The NEW CHEVROLET ONE-TON WORM-DRIVE TRUCK



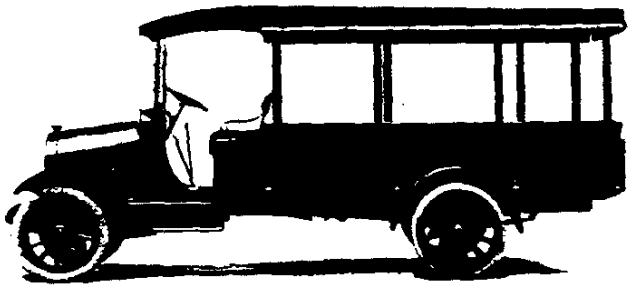
The Model T is shown here with an open delivery body which also could be fitted with a canvas top similar to those used on army vehicles. Although it does not name the maker, the body was probably supplied by Martin Parry Co. of Indianapolis, a major supplier of commercial bodies for Chevrolet.



Chevrolet's first entry into the truck field was with this Model T 1-Ton vehicle, shown here in standard chassis form. The vehicle utilized a 125-inch wheelbase, and was equipped with solid tires on the rear. Standard equipment is as shown. In addition, Chevrolet this year put out a commercial version of the 490 chassis, calling it the Light Delivery Chassis. The Light Delivery sold for $585 without body.



A top view shows the chassis layout and worm drive differential of the new Chevrolet Model T 1-ton chassis. The engine and transmission were the same as used on the new FA Series. Mechanical brakes operated only on the rear wheels. The front pneumatic tires were 31 x 4, while the solid tires on the rear were 32 x 4.



In addition to a covered wagon type of top, the open delivery body for the Model T could be fitted with an 8-post solid top with roll-down canvas curtains. The Model T had a ton rated capacity, and was governed for a maximum speed of 25 MPH.