HUDSON

Service MAGAZINE

INFORMATION ON PARTS • ACCESSORIES AND TECHNICAL MATTERS

HUDSON 112 • HUDSON-TERRAPLANE • HUDSON-SIX • HUDSON-EIGHT

Issue 5 **February 1938** **1938 Series**

HUDSON 112

Mechanical Features and Service Information

THE HUDSON 112 model, while a new car in every sense of the word, does not contain any new or untried innovations. All of the features of design and construction throughout this car have been time proven for their outstanding performance and durability. Many of these have been pioneered and developed by Hudson and are found in no other cars.

The Hudson 112, Hudson's entry to the lowest price class, is built to Hudson's high standards in workmanship and materials. In this issue you will find a description of the various mechanical features; specifications and service adjustments and new service procedure information pertaining to the Hudson 112.

HUDSON MOTOR CAR CO. DETROIT, MICH., U. S. A.

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HUDSON 112

Mechanical Features and Service Information

ENGINE

The engine is a six-cylinder "L" head type with a 3" bore, 4⅛" stroke, 175 cubic inch piston displacement, and develops 83 brake horsepower at 4000 r.p.m. Figure 1 shows the general design and relationship of the various parts. A cast-iron cylinder head of 6.50 to 1 compression ratio is used which permits the use of non-premium fuels, thus contributing to economy of operation.

The cylinder block and crankcase of high chrome alloy provides hard-wear-resisting cylinder bores and valve seats and increases engine life tremendously.

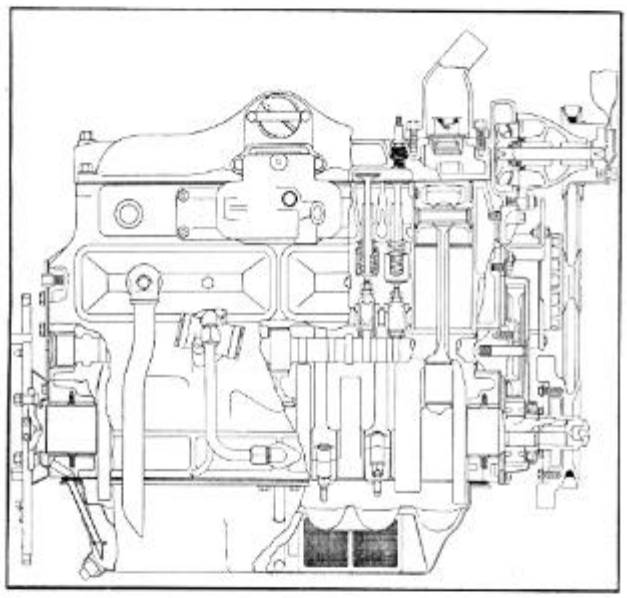

Fig. 1

Valve seats are machined in the cylinder block. This construction allows quick dissipation of heat, prolongs valve life and freedom from frequent valve grindings.

The cylinders and crankcase are cast integrally. The crankcase is heavily ribbed internally, the ribs supporting the massive main bearings. This "bridge truss" construction makes an unusually rigid crankcase which maintains perfect alignment of the heavy inherently compensated crankshaft and camshaft.

The cylinder bores are machined to a smooth finish and are fitted with T-slot, low expansion silicon aluminum alloy, cam ground pistons which permits them to be fitted to .002" clearance without danger of seizing or scoring.

The pistons are fitted with four rings, two of which are $\frac{3}{32}$" wide compression rings, pinned in place above the piston pin, and two are $\frac{3}{16}$" oil control rings, one located above the piston pin and the other below the piston pin. The oil control rings, likewise, are pinned in place to prevent rotation in the ring grooves.

The piston pins are of full-floating design of glass-smooth finish which insures close fitting in the diamond-bored piston pin bosses in the pistons. This feature also permits fitting to .0003" clearance in the broach-finished bronze piston pin bushings pressed in the upper ends of the connecting rods.

The connecting rods are of drop-forged steel, provided with spun babbitt lower bearings. The connecting rod bolts are of the centerless ground type fitted in reamed holes, preventing possible misalignment between rod and cap. The cap and rod are machine finished while assembled as a unit which permits closer fitting, thereby making unnecessary the use of connecting rod shims. The connecting rod bolt nuts are locked in place by means of special spring steel companion nuts which replace the cotter keys ordinarily used. The connecting rod length is 8⅝ inches from center to center.

Complete sets of piston and connecting rod assemblies are selected for uniform weight to insure perfect engine balance.

The crankshaft is a heavy drop forging provided with integral counterweights and is dynamically and statically balanced to prevent vibration. The crankshaft is supported by three bronze-backed babbitt bearings adjustable by means of shims. The end thrust is taken by No. 2 bearing. Bearing sizes are as follows:

No. 1—$2\frac{11}{32}$" x $1\frac{5}{8}$"
No. 2—$2\frac{3}{8}$" x $1\frac{3}{4}$"
No. 3—$2\frac{13}{16}$" x $2\frac{3}{8}$"

A torsional vibration dampener, having a rubber working element, is fitted on the front end of the crankshaft which absorbs or dampens out any vibration tendencies of the crankshaft. The dampener requires no servicing or adjustments of any kind.

The electric furnace hardened iron alloy camshaft is highly polished and is supported by means of three large babbitt bearings. The bearing sizes are as follows:

No. 1—2" x $1\frac{3}{16}$"
No. 2—$1\frac{1}{32}$" x $1\frac{3}{16}$"
No. 3—$1\frac{1}{2}$" x $\frac{15}{16}$"

A compression spring in the front end of the camshaft prevents end play and holds the shaft against a fibre thrust washer under the head of the shaft.

The tappets are of the roller cam type which closely follows the cam, thus providing for quiet, long-lived operation. The tappets are adjustable to maintain proper operating clearances and are set to .006" for intake valves and .008" for exhaust valves.

The exhaust valves are of silchrome alloy steel and the intake valves are of a special nickel chromium steel, both having $1\frac{3}{8}$" head diameters. The exhaust and intake valves have $\frac{11}{32}$" diameter valve stems.

The valve springs are of special heat-treated steel wire and are encased in special steel cups to prevent flutter at high speeds. Valve guides are of the removable type.

The Hudson Duo-flo automatic lubrication system is employed which insures positive lubrication under all operating conditions. The oil is drawn from the oil reservoir sump by means of a large oscillating plunger pump which has only two moving parts—the oscillating plunger and the driveshaft of the pump which is driven by gears directly from the camshaft. A stream of clear, cool oil is directed to the front end of the engine from where it is fed into the oil reservoir troughs. A second stream of oil is directed to the check valve located at the right rear side of the engine from where it is fed to No. 6 oil reservoir trough for distribution to the rear of the engine. The oil in the troughs is vigorously agitated by the action of the connecting rods, thereby distributing the oil to all moving parts in the engine. As the oil drains down the side of the crankcase it is trapped in pockets and troughs located above the camshaft and crankshaft bearings from where it is fed to the bearings by gravity. The agitation of the oil tends to remove all traces of diluents consisting mainly of condensation and unburned fuel. As the temperature in the crankcase is near the boiling points of these diluents they are readily vaporized and expelled through the ventilator tube located at the rear of the engine on the right hand side.

As the oil returns to the oil reservoir it is cooled by passing through a series of labyrinthian passages and before returning to the sump it is strained free of all solid matters by passing through a No. 40 mesh copper screen.

The filter surfaces are so placed that they are flushed each time the crankcase is drained and therefore, require no special cleaning nor do they have to be replaced.

The oil reservoir capacity is 5½ quarts (4½ Imperial quarts—5¼ liters). The refill capacity is 4½ quarts (3¾ Imperial quarts—4¼ liters).

The flywheel is made of steel for lightness and strength and is ground and polished and perfectly balanced. A high carbon steel ring is shrunk on the flywheel for engagement of the starter drive.

The camshaft drive is by means of gears — one a cast-iron gear on the crankshaft and the other a laminated bakelite gear on the camshaft. These gears have helical-shaped teeth, are quiet, and long life is assured by the stream of oil directed to the front end of the engine by the oil pump.

The engine is mounted on live rubber cushions at three points. These prevent vibration and sound from being transmitted from engine to chassis and body. The engine can rock slightly as if cradled, providing further assurance against transmission of vibration and sound.

Refer to the Hudson-Terraplane Mechanical Procedure Manual, Section 7, for service procedure in repairing this engine.

CARBURETOR

The carburetor is a Carter single-throat 1⅛" downdraft, manual-choke type, incorporating vacuum-controlled metering pin, accelerating pump, anti-percolator valve and fast idle features.

The vacuum-controlled metering pin feature provides greater efficiency and economy of operation by permitting the use of a lean metering rod and reduces excessive choking. Figure 2 shows a sectional view of this arrangement. During the starting operation when vacuum is low, a rich mixture is provided due to the fact that the small spring under the vacuum piston tends to hold the metering pin high out of the jet. As the engine is started, and vacuum increases, the metering pin is drawn down into the jet against the tension of the spring and tends to lean out the mixture.

On quick acceleration when the vacuum is low, the piston spring forces the piston upward, producing a richer mixture during the acceleration period. As the vacuum increases, the metering rod is again drawn downward and the piston link rests upon a pin in the pump arm.

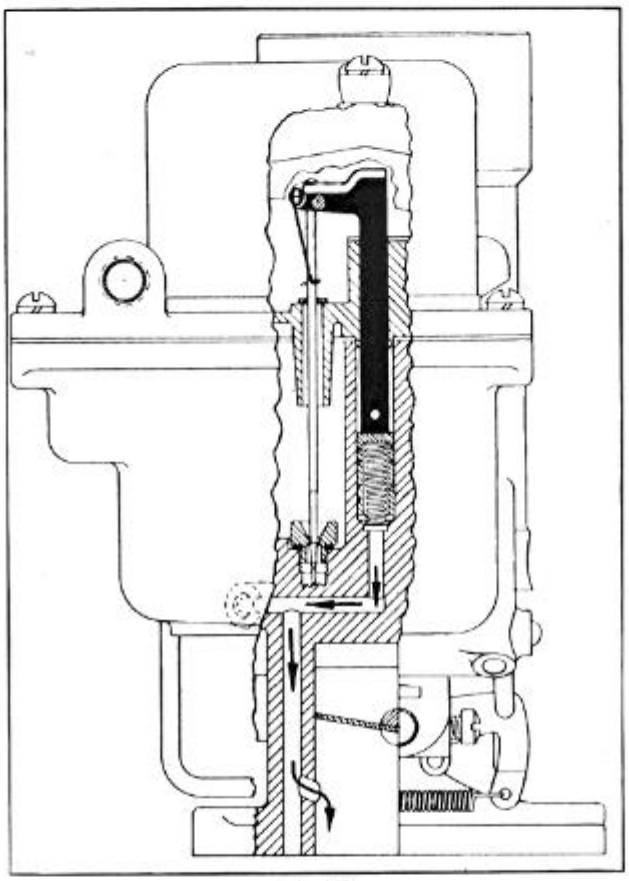

Fig. 2

The accelerating pump injects a spray of gasoline directly into the carburetor throat, providing instant response as the accelerator is depressed.

An anti-percolator valve arrangement serves as a vent to release any vapor pressure created by excessive heat in the float bowl which would otherwise force the gasoline into the carburetor throat and cause flooding. This valve is adjusted to open only when the throttle is closed.

The choke is operated manually by a knob located on the left side of the center section of the instrument panel and should be used when starting a cold motor.

As the choke is pulled out the throttle valve is opened slightly by the choker link, thereby increasing the idle speed to approximately fifteen miles per hour to prevent stalling during warm-up periods.

A "radial" low-velocity type intake manifold is used, in which large straight passages to the cylinders radiate from the riser. This permits better volumetric efficiency and uniform power impulses.

A manifold heat control is provided in the exhaust

manifold which can be adjusted for seasonal driving conditions to provide the necessary heat in the riser for proper fuel vaporization.

The air cleaner and air intake silencer is of the replaceable element type, employing a filter element of copper gauze saturated with oil. An oil bath type of air cleaner is also available which is recommended for use under extreme dust conditions.

An A. C. fuel pump with a glass sediment bowl located on the top of the pump is used. The pump operates on the spring loaded diaphragm principle and is actuated by an eccentric cam on the camshaft.

A flexible connection is provided between the gas line and the fuel pump. All fuel lines are ¼" diameter tubing.

A 12½ gallon (10½ Imp. gal.—47¼ liter) gasoline tank is mounted under the rear of the body. It is constructed of heavy terne plate metal with continuous welded seams. A screen is used around the outlet pipe to prevent foreign matter from entering the gas lines. The float, or sending unit, of the electric gas gauge is mounted in the tank. The filler neck extends to a point outside the body on the left side of the car.

These parts of the fuel system can be serviced by following the procedure outlined in Section 4, Hudson-Terraplane Mechanical Procedure Manual.

ELECTRICAL

The Hudson 112 is equipped with a National battery and Auto-Lite electrical equipment of the following capacities and specifications.

Battery

The 17-plate National battery is placed in the engine compartment and located well forward along the left front fender side panel. This location places the battery in a position quite favorable from the standpoint of servicing and provides short battery cables as well as maximum protection from the standpoint of trouble-free performance.

The size of the battery was chosen in keeping with the Hudson policy of providing batteries of more than ample capacity.

Generator

The 4½" two-pole generator is located on the left front of the engine block and is driven by the "V" type fan belt. The generator is cooled internally by a fan which is constructed integral with the driving pulley. A three-point swing-out type mounting is used as a means of fan belt adjustment. The three mounting lugs are located on the two heavy cast-iron end plates and the points of support are reinforced with heavy ribbed sections. This results in a more rigid alignment of the end plates and quieter brush operation.

A ball bearing is used on the drive end of the armature and a plain absorbent bronze-type bearing is used on the commutator end. A few drops of light engine oil in each of the two hinge-top oilers provides sufficient lubrication.

The output of this generator is controlled by third-brush regulation and provides a peak range of 19 to 21 amperes cold and 17 to 19 amperes hot. The third brush moves in direction of rotation to increase output.

Cars with radio are equipped with a high output generator of the same general construction, but capable of an output of 29 to 32 amperes cold and 27 to 29 amperes hot. The output is controlled by an internal or third-brush current control and an external voltage control of the vibrating type, operating between 7.1 and 7.8 volt limits. This range will provide the battery with an ample charge and also protect it against overcharge or high voltage conditions. The distributor ballast resistor is omitted when this generator is used.

This generator with regulator control is also furnished as an extra cost option.

Starting Motor

The starting motor is a 4½" four-pole unit, capable of producing a 12 foot pound torque at three volts and 550 amperes while under lock test.

The drive from the starting motor is of the Bendix over-running type, driving a nine-tooth pinion against a 134-tooth high-carbon steel flywheel ring. This gives a cranking ratio of 15 to 1. The lead screw of the drive is lubricated with a light film of special graphite lubricant.

The armature of the starting motor runs in two plain absorbent bronze-type bearings. These are lubricated with a few drops of light engine oil in the two oil fittings.

The starting motor is controlled by a foot-operated switch mounted on the side of the steering gear housing with the control shaft extending through the floor just below the steering gear column.

Ignition

The ignition coil is of the cylindrical open core type and is capable of maintaining high voltages in the output during extremely low cranking voltages.

The coil is mounted on the dash just above the distributor in order to take advantage of a short secondary ignition cable.

The ignition is controlled by a locking switch on the instrument panel and protected by an armored conduit cable between the switch and the ignition coil.

Distributor

The distributor is mounted on the right rear of the engine and drives direct from the camshaft in a right hand rotation. The breaker points are adjusted to 0.020" and the complete assembly is timed to fire ¼" before top dead center in the order of 1, 5, 3, 6, 2, and 4. The timing is adjustable through a range of 360° by loosening the hold-down arm clamp screw. A low value ballast resistor on the distributor protects the breaker points from high voltage fluctuation.

Fibre shields between the dash brace and the fender side panel and over the steering gear hole in the frame provide protection for the distributor against water and mud splash.

The necessary spark advance for proper operation of the engine is automatically controlled by a governor mechanism.

The ignition condenser is located on the outside of the distributor housing.

Spark Plugs

The spark plugs used in the Hudson 112 are Champion J8, 14 mm. plugs with a gap setting of .032".

Headlamps

The headlamps are of the two-beam type and are equipped with 32-32 c.p. bulbs. A miniature base 1.5 c.p. parking bulb is also incorporated in the headlamp housing. The lens is mounted in a rimless type housing which has a ball and socket mounting on the radiator shell. The lens is held forward in the housing by three springs behind the reflector and a spring steel clamp under the screw in the bottom of the lamp. The lens can be removed by loosening the clamp screw in the bottom of the lamp, applying tool No. HMO-205 to the lens and pushing inward and downward.

The bulbs are of the pre-focused base type and have offset filaments to provide a driving beam and a passing beam. The driving beam illuminates the road straight ahead while the passing beam throws a concentrated light on the right curb immediately in front of the car.

These beams are controlled by a foot-operated switch mounted in the toe board riser.

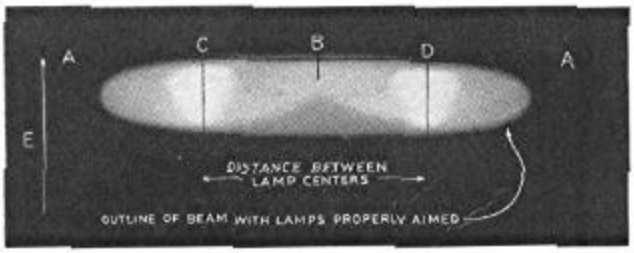

Fig. 3

Beam Adjustment

1—Place the car (without passengers) on a level floor or driveway squarely in front of a white wall (or screen) with the headlamps 25 feet distant from the wall.

2—Draw a horizontal line (AA), Figure 3, on the wall at a height of $38\frac{13}{16}$ inches above the floor level.

3—Sight through the center of rear window and over radiator ornament to the wall to establish line (B), Figure 3, as center line of car projected to wall.

4—Measure a distance of $15\frac{1}{4}$" on each side of line (B) and draw vertical lines (C) and (D) through these points. These lines represent the vertical center lines of the headlamps.

5—Place beam control foot switch in "high" or driving position and cover headlamp not being adjusted.

6—To adjust headlamp, loosen large headlamp mounting stud on inside of radiator shell by reaching through large opening in top radiator tank shield. Shift headlamp until the pattern on the screen approximates that shown in Figure 3 and re-tighten mounting stud.

7—*Repeat for other headlamp.*

Tail Lamp

A moulded glass tail lamp is mounted on the rear slope of the left rear fender and is connected to a junction block on the back of the rear license plate lamp. The lamp body is secured to the base by a snap-in retaining ring. The license plate lamp is mounted on the rear splash apron to illuminate the rear license plate.

Dome Lamp

The dome lamp is placed above the rear window and is controlled by a switch on the right lock pillar. The 15 c.p. dome lamp bulb can be replaced by pulling the lens and bezel assembly out of the lamp body.

Instruments and Gauges

The instrument cluster, which centers about the speedometer, is lighted by a 1.5 c.p. miniature base bulb placed in the center of the unit.

The Hudson developed Teleflash signals for generator indication and oil pressure are used in this model. They are lighted by a 1 c.p. miniature base bulb in each.

Electric Bi-thermal gas and temperature gauges are used with the two gauge receivers incorporated in the speedometer housing. This type gauge gives a steady reading and is free from erratic pointer fluctuations. All gauges are controlled from the ignition switch and are inoperative when the engine is not running.

Horn

A single vibrator type horn is standard equipment. It is mounted on the dash above the engine by means of a flexible steel bracket.

Wiring

Color coded wires are grouped together in a harness to inter-connect the instruments in the instrument panel to their corresponding units on or near the dash. Distant electrical units are connected to the wiring harness through the medium of wires that are protected from abrasion, and sleeve type slip connectors. Figure 4 shows all basic wiring circuits of the standard equipped car and all principal electrical items, both service and optional.

MUFFLER

A modified "straight through" type muffler has been adopted for the Hudson 112 model. This design creates very little exhaust back pressure, making for increased power and fuel economy.

The muffler is 5 inches in diameter and $26\frac{1}{2}$ inches long and is mounted inside the frame channel on the right side between the legs or branches of the frame "X" member. It is supported at the front end by a flexible rubberized fabric mounting and at the rear end by the tail pipe.

The toning chamber design used results in a quiet exhaust and reduces to a minimum any tendency to produce vibration or drumming noises within the body.

The horizontal part of the exhaust pipe passes underneath the engine pan instead of through it and the vertical portion is shielded with an asbestos cover. This arrangement produces less heat in the engine compartment.

A full-length tail pipe is used which carries the exhaust gases from the muffler to a point well beyond the rear of the body. It is arched to provide ample rear axle clearance and is located well away from the gasoline tank. A flexible rubberized fabric mounting supports the tail pipe at the frame rear cross member and another holds it in place where it passes through the opening in the rear branch of the "X" member, just behind the muffler.

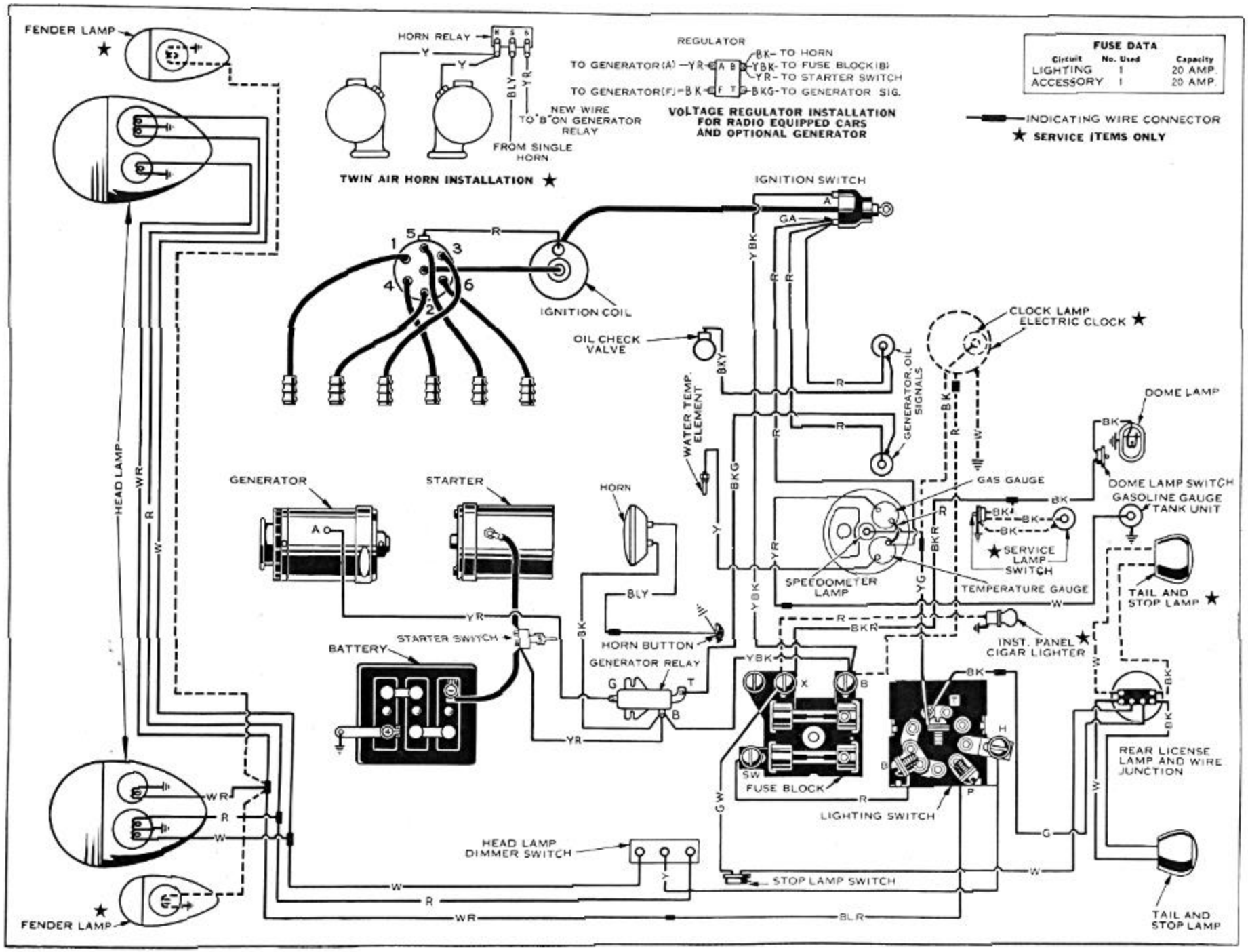
FENDER LAMP
HORN RELAY
TWIN AIR HORN INSTALLATION ★
NEW WIRE TO "B" ON GENERATOR RELAY
FROM SINGLE HORN
REGULATOR
TO GENERATOR (A)
TO GENERATOR (F)
BK- TO HORN
YBK- TO FUSE BLOCK (B)
YR- TO STARTER SWITCH
BKG- TO GENERATOR SIG.
VOLTAGE REGULATOR INSTALLATION FOR RADIO EQUIPPED CARS AND OPTIONAL GENERATOR
FUSE DATA
Circuit | No. Used | Capacity
LIGHTING | 1 | 20 AMP.
ACCESSORY | 1 | 20 AMP.
INDICATING WIRE CONNECTOR
★ SERVICE ITEMS ONLY
IGNITION SWITCH
IGNITION COIL
OIL CHECK VALVE
WATER TEMP. ELEMENT
GENERATOR, OIL SIGNALS
CLOCK LAMP ELECTRIC CLOCK ★
DOME LAMP
DOME LAMP SWITCH
GAS GAUGE
GASOLINE GAUGE TANK UNIT
SERVICE LAMP SWITCH
SPEEDOMETER LAMP
TEMPERATURE GAUGE
TAIL AND STOP LAMP ★
INST. PANEL CIGAR LIGHTER ★
GENERATOR
STARTER
HORN
HORN BUTTON
GENERATOR RELAY
STARTER SWITCH
BATTERY
FUSE BLOCK
LIGHTING SWITCH
HEAD LAMP DIMMER SWITCH
STOP LAMP SWITCH
REAR LICENSE LAMP AND WIRE JUNCTION
TAIL AND STOP LAMP
FENDER LAMP
HEAD LAMP

Fig. 4

The rubberized fabric mountings used to support the muffler and tail pipe allow the exhaust system to flex with the engine movement and prevent vibration and exhaust noises from being amplified in the body.

COOLING SYSTEM

The cooling system is of the pressure circulation type, using a packingless centrifugal pump mounted on the front of the engine and driven by a "V" belt from the crankshaft. The fan blades are carried on the front of the pump shaft. The inlet of the pump is connected to the lower radiator inlet and the outlet is connected to the water manifold. The pump forces the water into the cylinder water jacket. This keeps the water in the cylinder block under a slight pressure, reducing the tendency to boil and form steam pockets. This maintains a more uniform temperature of the engine parts and is particularly advantageous in preserving the coolant, especially when a volatile anti-freeze such as alcohol is used.

A flanged type thermostat is used in the cylinder water outlet to prevent circulation of the water until a normal operating temperature is reached, thus providing a quicker warm-up and more efficient operation.

The water pump shaft rotates in two large bronze bushings with an oil reservoir between them. The seal against the rear bushing is formed by spring loaded, ground, stainless-steel washers. A new type synthetic rubber and cork seal is used to seal against the shaft. This seal is of the permanent type and requires no adjustments. The steel washers also take the end thrust of the fan

Lubrication is through a special fitting that automatically shuts off the flow of lubricant as soon as the reservoir is filled.

Only Aluminum Base Soap Grease should be used in the pump.

A 2⅛" thick cellular type radiator core provides 412 square inches of cooling area for the system. The large horizontal louvres in the radiator shell allow a free passage of air for ample cooling.

The complete system has a capacity of 12 quarts (10 Imperial quarts—11⅓ liters).

The complete cooling system can be serviced as outlined in Section 5 of the Hudson-Terraplane Mechanical Procedure Manual.

CLUTCH

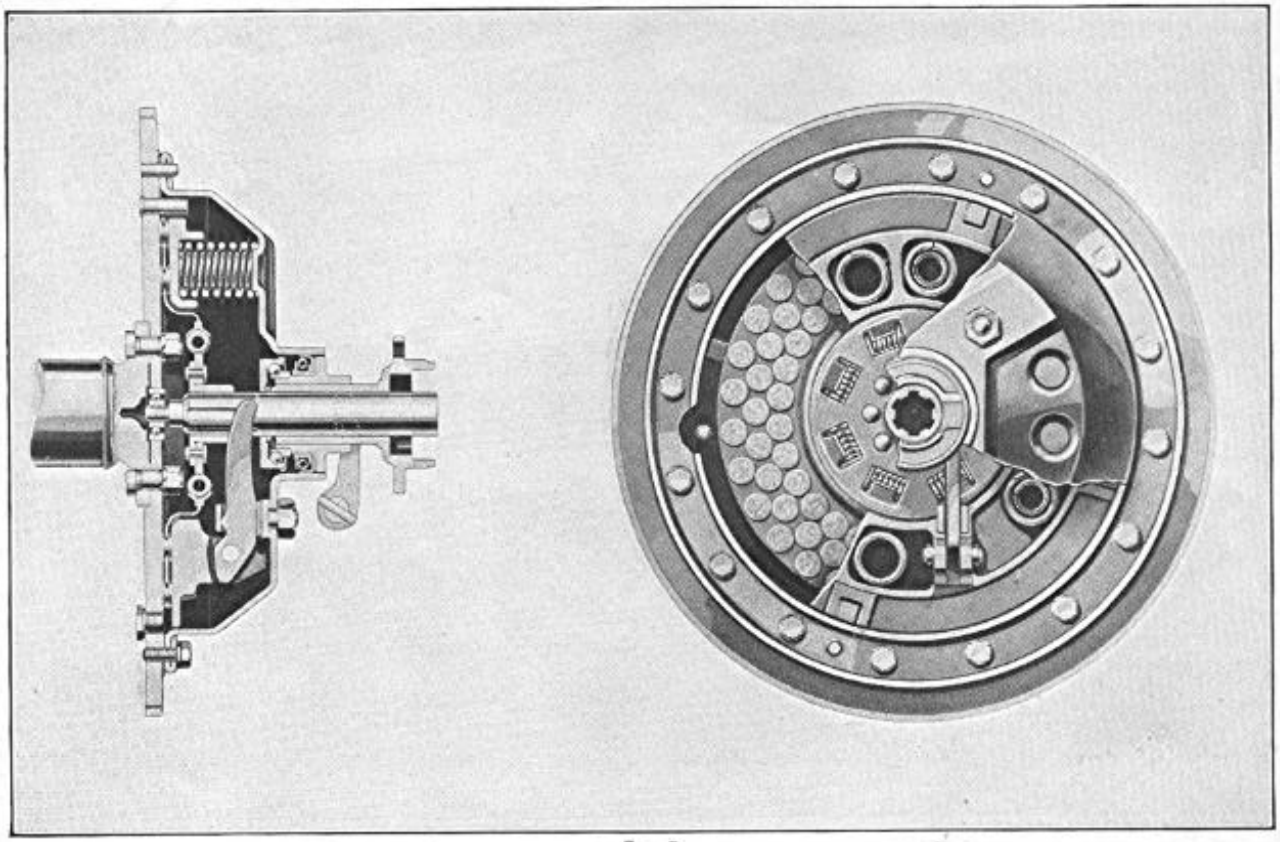

Fig. 5

The clutch is a 9" single plate, cork insert, oil cushioned triple sealed type. This design provides the smoothest possible engagement and is unusually long-lived.

The clutch operates in a bath of oil which further contributes to its long life and smooth engaging features. The lubricant is a special compound developed by Hudson engineers, called Hudsonite, and is available through Hudson dealers.

Ninety oil-treated cork inserts in the driving disc as

shown in Figure 5, provide the frictional surface. The cork inserts are spread and fixed in oil under pressure, and heat treated to provide long life. After this operation the plate is cooled in oil and the corks are accurately trimmed. Eight torsional vibration springs are incorporated in the driving plate to absorb or dampen out any vibration periods.

The driving plate is driven by friction from the rear face of the smooth steel flywheel and front face of the pressure plate. The pressure plate is of forged steel to provide maximum strength and smoothness of finish. Adequate pressure for engagement is obtained by nine main engaging springs, three of them containing inner springs. The springs are "pre-set" by special treatment to assure retention of the clutch's operating characteristics throughout its life.

The clutch cover is heavily ribbed to prevent distortion under all operating conditions. Ample ventilation is provided through large holes in the clutch housing.

The large annular ball thrust throwout bearing insures quiet and trouble-free clutch operation.

Adequate sealing against oil leakage by means of hydraulic oil seals and gaskets insures against the loss of clutch fluid so that after many thousands of miles of driving no material change in the smooth, velvety characteristics of the clutch will be noticed.

The clutch is controlled by means of a linkage, part of which is assembled to the frame and part in the clutch housing. The two are connected by means of a flexible coupling to allow for engine movement. The pilot and arms of the coupling are insulated in rubber to prevent the transmission of vibration and noise.

The clutch throwout bearing is lubricated by a fitting on the side of the clutch housing and drilled passages through the clutch housing and the transmission drive gear bearing cap.

This clutch has a capacity of ⅓ pint of Hudsonite Clutch Compound and is serviced as outlined in Section 8 of the Hudson-Terraplane Mechanical Procedure Manual.

TRANSMISSION

The transmission is of the selective three-speed type. It is unusually compact, allowing the use of short main and countershafts. This can be readily seen by studying Figure 6

The transmission case has been designed to furnish ample support for the bearings and shafts. It is also provided with a sediment chamber at the bottom to collect sediment and foreign matter to prevent its movement through the unit.

The mainshaft which is of involute spline design is supported at the rear end by an annular ball bearing and at the front end by needle roller bearings located in the mainshaft drive gear. Shims are used at the rear end to provide for proper end play. End thrust is taken by ball bearings located at the front end, instead of a bronze washer which is conventional practice.

The mainshaft drive gear is supported at the front end by a pilot ball bearing located in the rear end of the crankshaft, in addition to an annular ball bearing at the rear end.

The second speed gear is of helical cut, cup design fitted with a babbitt bushing and a two-piece steel-backed copper-lead thrust washer locked in place by means of a heavy steel retaining ring placed in the groove in the second speed gear.

The main and countershaft drive and second speed gears are of helical cut design for quiet operation. All gears are of nickel molybdenum electric furnace alloy steel which provides unusual strength and wear-resisting qualities, making unnecessary the use of heavy parts, thereby contributing to ease of shifting.

The countershaft is also of involute spline construction

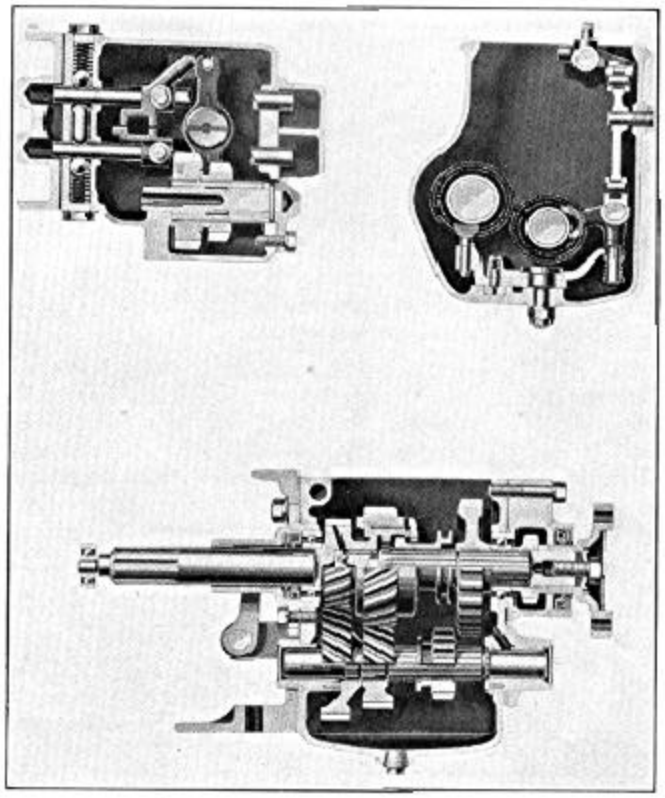

Fig. 6

and is amply supported by means of two steel-backed babbitt bushings. End thrust is absorbed by large bronze washers. Shims are used to obtain proper end play.

Low and reverse gears are automatically demeshed when second and high gears are engaged by means of a special linkage within the transmission. This feature provides for quieter operation and prolongs the life of the transmission.

Hydraulic leather oil seals are used on the mainshaft drive gear and mainshaft to guard against oil leakage.

The universal joint front flange is splined on the mainshaft and is fastened in place by a cap screw.

A vent is located at the top of the speedometer housing on the rear end of the transmission to equalize the atmospheric pressure within the transmission.

The transmission gear ratios are as follows:

Low	2.42—1	High	1 —1
Second	1.61—1	Reverse	2.99—1

The entire transmission assembly can be serviced by following the procedure given in the Hudson-Terraplane Mechanical Procedure Manual, Section 10.

UNIVERSAL JOINT

The Hotchkiss drive employed on the Hudson 112 model permits the use of an "open" type propeller shaft of large diameter, fitted with universal joints at each end.

The propeller shaft itself is made of steel tubing and is of tapered construction, being larger at the center than at the ends. The maximum diameter is 3 inches which, coupled with its comparatively light weight, results in a very rigid assembly and freedom from whip and vibration even at the highest speeds. The entire shaft assembly is carefully balanced, both statically and dynamically, in the process of manufacture.

The front universal joint is of needle roller bearing design and is fitted with a sleeve end which is splined to fit the splines on the front of the propeller shaft. This provides a slip joint to compensate for the change in shaft length due to the action of the car springs. This joint and the front universal are shown in Figure 7. Grease introduced through a pipe plug opening at *the front* provides separate lubrication for the splines, while a cap and felt washer are fitted at the rear end to retain the lubricant.

The cross or journal of the universal joint operates in four sets of needle type rollers fitted within hardened and ground cup-shaped retainers which greatly minimizes friction and wear. The need for lubrication attention is likewise reduced since the roller bearings *are packed with lubricant at the time* of assembly and need be replenished only after long intervals of service.

The closed end bearing cups are held in place by snap rings and "U" bolts and the cork oil seals and retainers used at the inner ends of the bearings, insure against loss of lubricant in operation.

The same constructional features apply to the rear

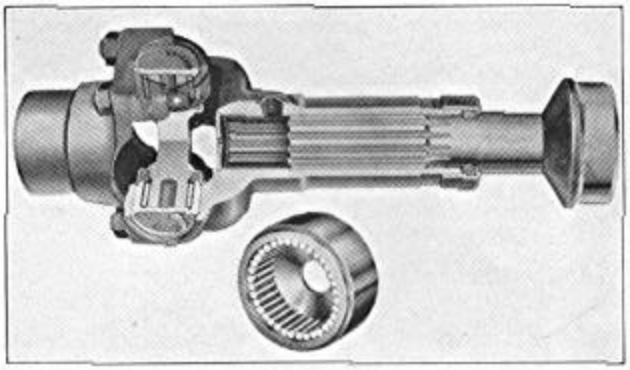

Fig. 7

universal joint, the front yoke of which is welded to the rear end of the propeller shaft. "U" bolts or clamps are used to secure the bearing cups to the pinion shaft companion flange, which is counterbored to receive them.

The journals, rollers and bearing cups are replaceable by following the procedure given in Section 12 of the Hudson-Terraplane Mechanical Procedure Manual.

FRAME

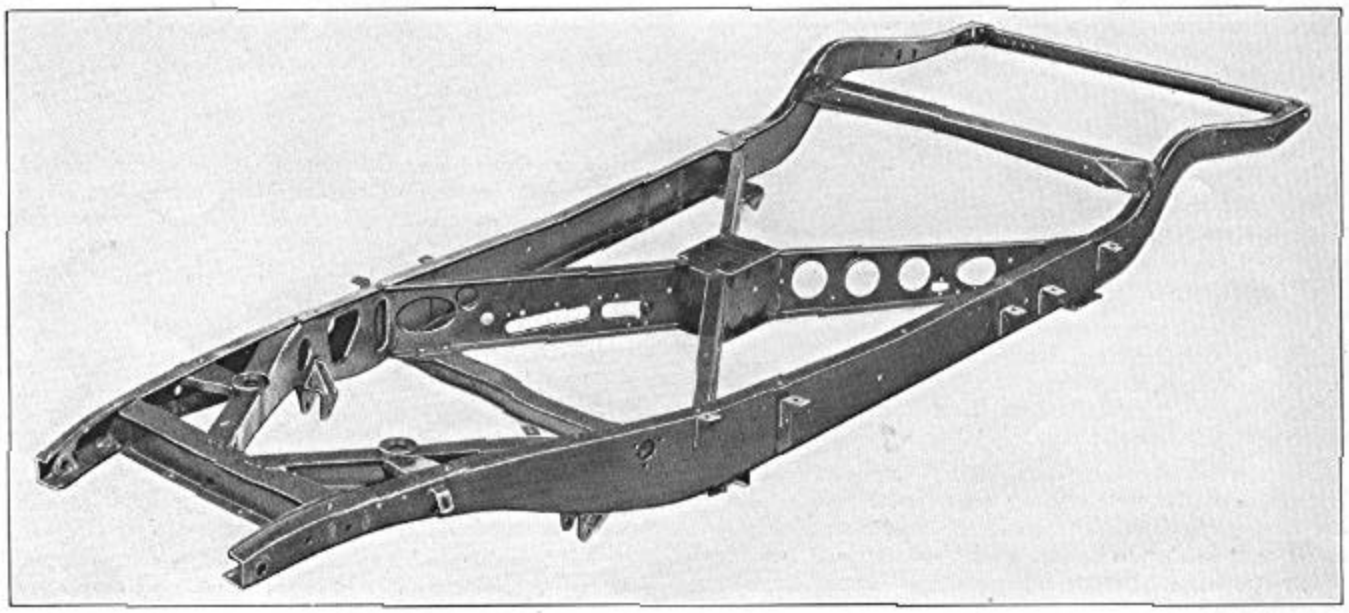

Fig. 8

The frame employed on the Hudson 112 model is of the double-drop pressed-steel design with deep channel and box section side rails and incorporates the "X" type of construction which provides maximum torsional stiffness. Its various members and bracings are shown in Figure 8.

Diagonal members extending from the front cross member to the side rails and to the front ends of the

"X" members are of box section which stiffen the entire front end of the frame and act as supports for the front end of the engine. The heavy malleable brackets in which the rear ends of the front springs are mounted, are attached to these members as well as to the side rail lower flanges, providing exceptional ruggedness at this point. Another heavy channel cross member extends across the frame and is attached to the side members and front ends of the "X" members. This forms a support for the rear end of the power plant. Brackets to accommodate the front spring shackle threaded bushings are fastened to the front ends of the side members by welding.

Deep channel section members diagonally placed within the center of the frame form an "X" which joins the side members just behind the rear ends of the front springs and at the points of rear spring front bracket attachment. At the center of the frame where the two members intersect, a heavy box is formed having an opening through which the propeller shaft passes.

The rear ends of the side rails, from the point where the "X" members join to well beyond the rear spring rear supports, are closed by separate plates welded in place to form box members. A wide, channel shaped cross member located above the rear axle, effectively ties the side rails together at this point and serves to support the upper ends of the rear shock absorbers. At the rear end a channel type cross member is used to join the ends of the side members.

The combination of scientific bracing with the use of box sections coupled with generous welding and riveting results in a frame which has exceptional strength and rigidity with a minimum weight.

The wheelbase is 112 inches and the car overall length is 187½ inches.

FRONT AXLE

The front axle of the Hudson 112 model is of the Elliott type and employs a solid drop-forged center with integral spring seats and is off-set towards the front of the car to provide clearance for the crankshaft vibration dampener. The large diameter spindle pivot pins are secured to the front axle spindles and rotate in hardened and ground steel bushings located in the upper and lower yoke ends. Ease of steering is assured by carrying the car weight on steel balls located at the top of the spindle pivot pins where they are housed and protected from dirt and water by the upper bushings.

The front wheels operate on tapered roller bearings adjustable for wear. A one-piece tie rod having a diameter of ⅞" is used. The tie rod ends are of the self-aligning plain bearing type in which the hardened and ground steel pivot pins operate directly in hardened steel seats provided with automatic spring take-ups. The tie rod ends screw directly into the tie rod and are fitted with right and left hand threads so that an adjustment for toe-in can be made by loosening the tie rod end clamps and rotating the tie-rod to the right or left as necessary.

Specifications for the new axle call for a spindle pivot pin transverse angle of 7°, a caster angle ranging from 2° to 2½° and from 1° to 1½° of camber. The front wheel toe-in should be from Zero to a maximum of ⅛".

Lubrication of the spindle pivot pins and bushings is accomplished by the use of the conventional pressure grease fitting, supplying lubricant through the hollow drilled spindle pivot pins. The tie rod ends are also supplied with Zerk pressure fittings for lubrication.

The front wheel tread is 56 inches.

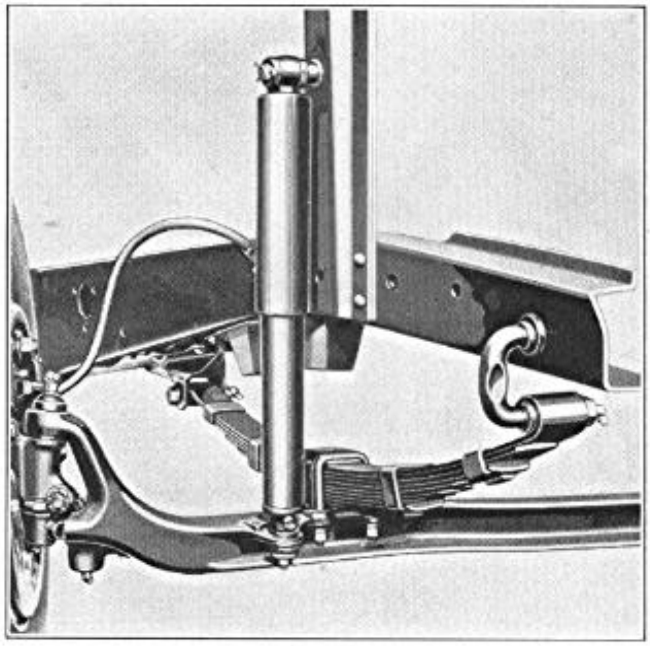

Fig. 9

Wheels and Tires

The Hudson 112 is equipped with 5 convex steel disc wheels. They are 16 inches in diameter with 3.50 inch rims. The wheels are secured to the wheel hubs by five ½ inch bolts. A pilot stud is provided to assist in wheel mounting.

The tire equipment consists of 5—16 x 5.50—4 ply tires having a 6-rib tread design. 6 ply tires are furnished as an extra cost option.

Correct inflation pressures are 24 lbs. for the front tires and 32 lbs. for the rear.

The spare wheel and tire assembly is carried in the rear compartment under the luggage floor.

Spring Suspension

The splayed type of spring suspension, wherein the springs are placed at an angle with respect to the center line of the car, being farther apart at the rear ends than at the front, has long been a feature of Hudson construction and is employed in the new Hudson 112 model. See Figure 9.

Front Springs

The front springs are of the conventional semi-elliptic design having a length of 32½" and a leaf width of 1¾" —the number of leaves being 9, exclusive of the rebound leaf. The springs are securely anchored to the front axle I-beam through the medium of alloy steel clips passing through the spring seats which are forged integral with the axle. The main and secondary leaves are of the wrapper type, being wound around the spring bushings, providing a safety factor in the case of leaf breakage. The rear ends of the front springs are securely anchored to substantial brackets attached to the frame while the front ends are supported by self-adjusting threaded

U-shackles. See Figure 10. The front springs have a deflection rate of 175 lbs. per inch, low enough to provide

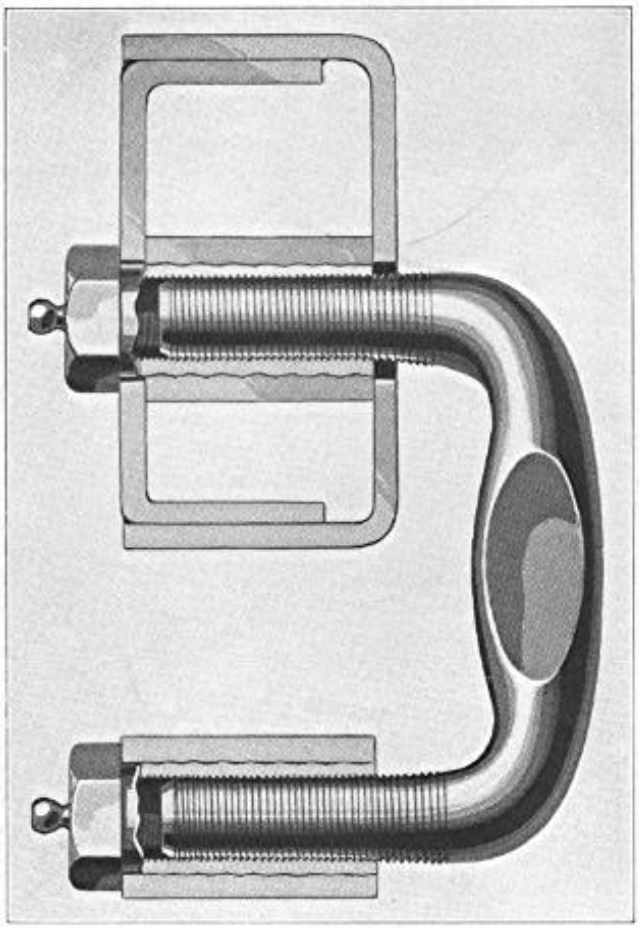

Fig. 10

a soft, cushioned ride and sufficiently high to insure good road stability without the necessity of using a stabilizing bar. High limit front springs are used on the left side of the car and low limit springs on the right. Although identical in appearance and manufacture, these springs carry two different part numbers and are marked with two prick-punch marks on a clip of the high limit spring and one prick-punch mark on a clip of the low limit. In addition to the rubber axle to frame bumper, located directly above the front spring clips, another bumper of the same design is attached to the frame at a point approximately midway between the rear end of the front spring and the center. The installation of this extra rubber bumper tends to maintain front axle and spring alignment and prevent spring distortion under conditions of severe brake application. This reaction is also absorbed by the rebound leaf fitted on top of the main leaf and extending from the front to the rear leaf clips.

Rear Springs

The Hudson 112 model employs the Hotchkiss type of drive by means of which the rear springs absorb the driving and brake torque reaction. This provides a smooth, cushioned starting engagement making for increased passenger comfort and protecting the mechanism from the harmful effects of shock following sudden clutch engagement or brake application.

The rear springs are of the semi-elliptic design, 48 inches long by 1¾ inches in width and have 8 leaves, exclusive of the rebound leaf fitted on top of the main leaf to minimize spring distortion. The front ends are mounted in substantial pressed steel brackets riveted and welded to the lower flanges of the frame side and "X" members. Self-adjusting, "U" type threaded shackles, operating in hardened steel bushings in the spring eyes and frame, are used at the rear ends.

The springs are clamped to rubber cushions and retainers on the rear axle spring seats through the medium of heavy alloy steel spring clips or "U" bolts which also hold the rear shock absorber lower brackets in position. Substantial rubber bumpers located on the lower frame flanges above the axle housing and on the rear axle frame cross member above the rear axle pinion housing, prevent bottoming on extreme spring compression. The adoption of the low deflection rate of 110 lbs. per inch assures a soft, cushioned rear seat ride, while the rubber cushions prevent the travel of tire and axle noises.

Lubrication provisions include pressure fittings for the front pivot bolts and the rear end shackles.

STEERING GEAR

The steering gear used in the Hudson 112 is of the worm and roller tooth type, having a ratio of 16.4 to 1. Its various parts are shown in Figure 11. The gear is controlled by a 17" hard rubber wheel with a steel core insert.

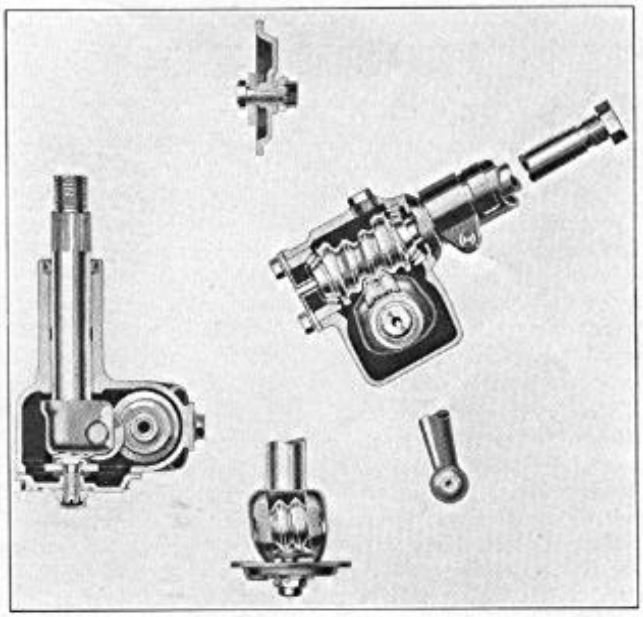

Fig. 11

The 1½" column jacket and tube are adjustable for height by means of slotted mounting holes in the frame and a shimmed bracket at the instrument panel. The wheel hub is secured to the column tube by numerous small serrations placed on a taper so as to provide small increments of wheel adjustment.

A variation in ratio for easier parking is provided by the varying pitch line or line of contact between the worm and roller. The roller tooth is mounted on the roller shaft by means of needle roller bearings to eliminate friction and increase the life of the roller. Minimum clearances are arranged in the straight-ahead position so that wear will not cause binding as the gear is taken up in adjustment.

All play and lost motion in the gear can be adjusted out to provide smooth, easy operation. The worm is mounted in adjustable tapered roller bearings. The clearance between the worm and roller is adjustable by means of a screw and lock nut extending through the case at the inner end of the roller shaft. The roller shaft rotates in removable bushings.

The drag link is fitted with adjustable ends so that the gear can be centered as the column is raised or lowered. This is done by changing shims from one side of the steering gear ball arm to the other. The 6" gear ball arm is secured to the roller shaft by tapered serrations or small "V" splines and a nut. Four double splines insure its proper alignment.

A hydraulic type oil seal on the roller shaft prevents oil leakage.

All service procedure and adjustments are given in Section 16 of the Hudson-Terraplane Mechanical Procedure Manual.

REAR AXLE

The rear axle is of the semi-floating design, incorporating a sturdy pressed steel banjo type housing and a differential carrier and gear set assembly in which the gears and driving mechanism are mounted in a self-contained unit. The relationship of the gears and bearings is shown in Figure 12. Maximum rigidity and freedom from oil leaks are obtained by the use of through bolts instead of cap screws to hold the carrier assembly to the housing and also by welding the cover in place instead of attaching it with cap screws.

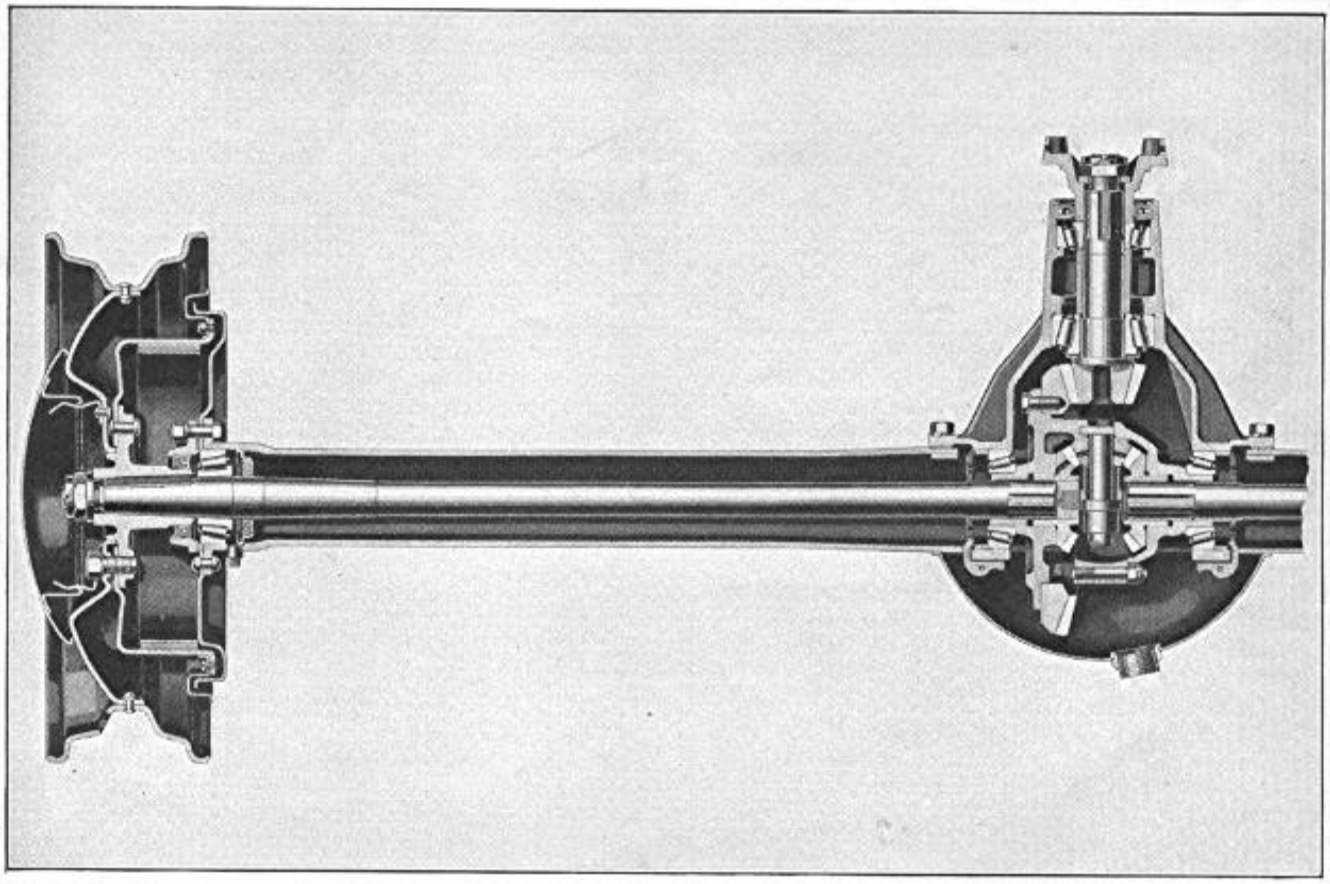

Fig. 12

The differential is of the two-pinion type and the housing is made in two sections held together with six studs and nuts. The differential pinions are bronze bushed and operate on a large diameter journal on which is also mounted the hardened steel spacer block fitted to absorb the axle drive shaft end thrust. The differential side gears are internally splined to receive the inner ends of the axle shafts and have large thrust surfaces. Bakelite thrust washers are inserted between the differential pinions and gears and the case to minimize thrust wear. The nickel molybdenum drive gear is securely fastened to the differential case flange by special alloy steel bolts and the entire differential assembly is mounted on two large tapered roller bearings. Adjusting cages threaded into the carrier housing are used to provide means of adjusting the bearings as well as the side mesh of the gear teeth with the pinion.

The drive pinion is forged integral with the pinion shaft and is supported on two adjustable tapered roller bearings. A sleeve or spacer between the two bearings

serves to hold them in their correct positions. Full adjustment facilities are provided by a shim pack between the sleeve and the front bearing in order to compensate for bearing wear, and by a second shim pack between the front face of the pinion and the rear bearing, to adjust the fore and aft meshing of the pinion with the drive gear.

The pinion shaft universal joint flange is secured to the shaft through the medium of splines and a large castle nut. An oil seal of the hydraulic leather type

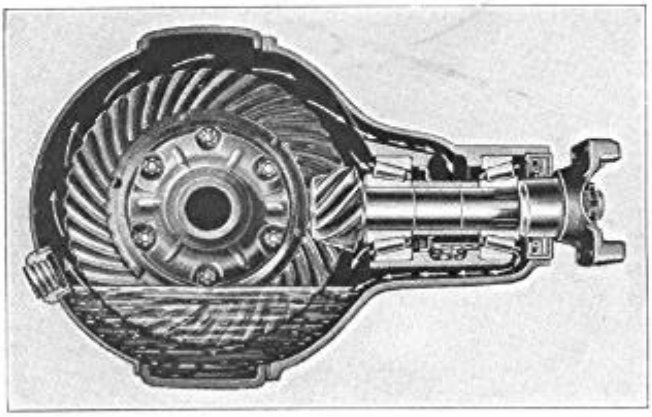

Fig. 13

riding on the flange insures freedom from pinion shaft oil leaks.

Adequate lubrication for the pinion shaft bearings is provided by oil thrown up by the drive gear which is forced through a large passage cast in the housing to the bearings. A similar passage at the bottom returns the oil to the main supply. This lubricating action is shown in Figure 13. The rear axle oil capacity is 2¾ pints and filling and draining are accomplished through a ¾" pipe opening in the housing cover. Only mild extreme pressure lubricants having an S. A. E. 90 viscosity should be used.

The axle drive shafts which are made of alloy steel have their largest diameter near the outer ends where they are taper ground to fit into the wheel bearings. The rear wheel hubs are taper machined and are secured to the tapered axle shafts by keys and castellated nuts. Axle shaft end thrust is taken on hardened steel thrust buttons at the inner ends of the shafts, contacting the differential spacer.

The rear wheel bearings are of the adjustable tapered roller type with the outer cups seating directly in the outer ends of the axle housing. Adjustment for wear and end play is provided by shims inserted between the bearing retaining caps and the housing flanges. Spring pressed, hydraulic leather oil seals fitted between the caps and the rear wheel hubs prevent leakage of oil onto the brake parts.

The standard drive gear and pinion ratio is 4 1/9 to 1 with a 4 5/9 ratio available as an option. The rear tread is 59½ inches.

Complete service procedure for this axle is given in Section 13 of the Hudson-Terraplane Mechanical Procedure Manual.

BRAKES

The brake equipment of the Hudson 112 is a newly developed system incorporating the Duo-Automatic Hydraulic principle for complete safety, Duo-Servo features for efficiency and long life and Double Anchor Floating Type Shoes for positive control and smooth operation.

Duo-Automatic

Two complete braking systems are actuated by the same pedal, the primary or hydraulic portion being controlled by the first part of the pedal travel and the secondary or mechanical portion being controlled by the remaining travel. The relationship of the two systems is shown in Figure 14.

The primary system utilizes a standard hydraulic brake actuating system, having a compensating type master cylinder and a brake actuating cylinder at each wheel. This system is used for all normal braking requirements.

The secondary system is Hudson's Rotary Equalized Mechanical Brake operating on the rear wheels. Besides serving as a parking brake, this secondary system provides a reserve brake if for any reason the hydraulic system should become disconnected or inoperative.

Its application is entirely automatic inasmuch as it is applied by a continued pressure on the brake pedal and requires no conscious effort on the part of the driver.

Servo-Action

The Servo-action in the brake is the utilizing of wheel energy to apply both brake shoes against the drum. The revolving brake drum actually pushes the shoe harder against the braking surface of the drum. The brake application is controlled from the brake pedal.

In the Hudson type brake the primary shoe is hinged to the secondary shoe by means of an adjusting screw or star wheel link (A), Figure 15. This arrangement allows the reaction of the primary shoe to move the secondary shoe against the drum. Servo-action is equally effective in both forward and reverse directions of drum rotation.

This arrangement allows for more even lining wear, more efficient brakes and longer lining life.

Floating Type Shoes

The brake shoes in this type of brake are direct acting in that the upper ends of both primary and secondary shoes rest against the wheel cylinder pistons without any links in between them (Point "B" Figure 15). This places the cylinder (C) higher up on the backing plate so that no portion of the shoe overhangs the point of application.

The floating anchors consist of short forged-steel links (D) and (E) near the top of each shoe. These are pivoted on the backing plates at one end (F) and operate in short slots (G) in the shoe webs at the other end. In forward operation, the wheel cylinder piston pushes the primary shoe out against the drum with anchor link (D) free to slide in its slot in the shoe. The primary shoe is forced against the adjusting screw (A) and the reaction load is carried over to the bottom of the secondary shoe. The reaction is then carried to its

anchor link (E) acting against the end of its slot (G) as an anchor.

Braking action in reverse rotation is exactly opposite in operation, link (D) becoming the anchor as link (E) swings free. Only one anchor acts in each direction of rotation.

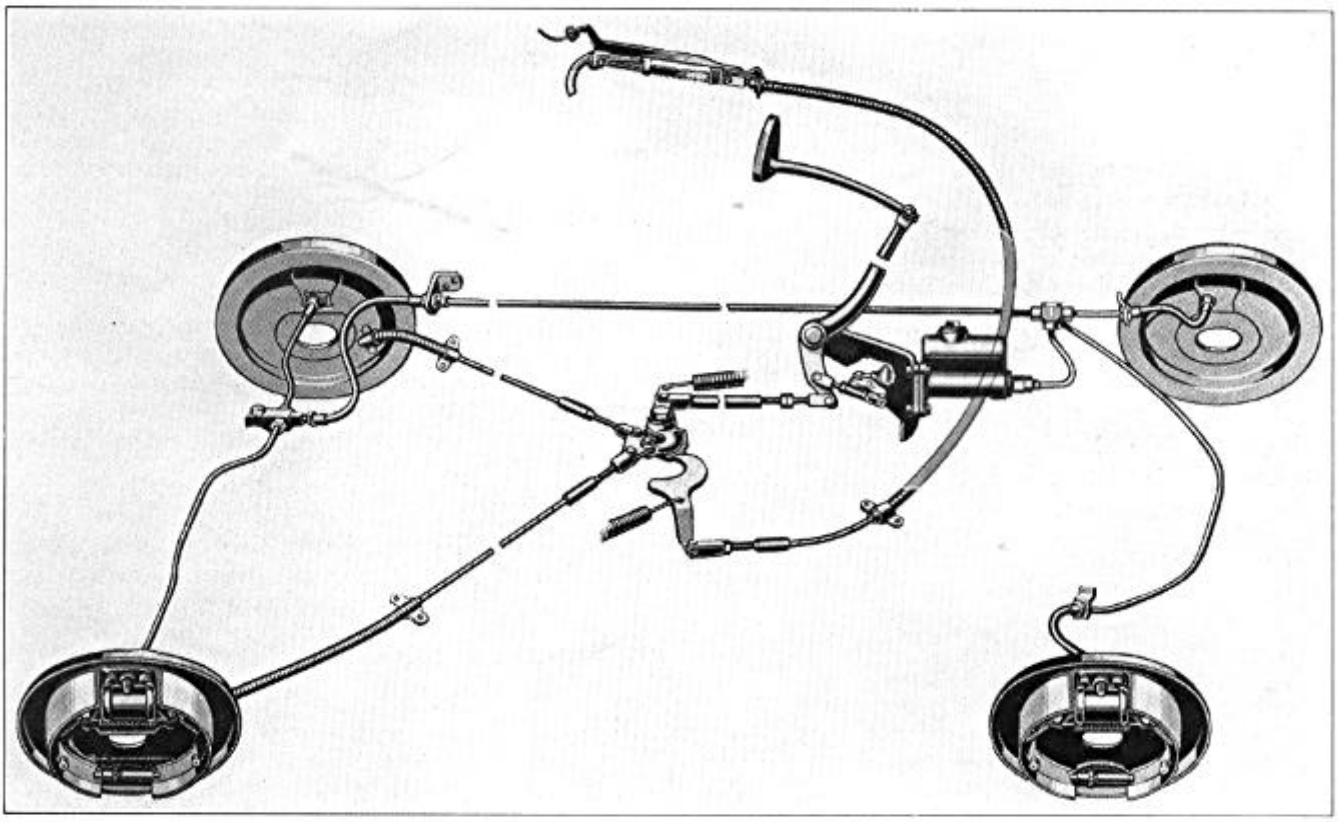

Fig. 14

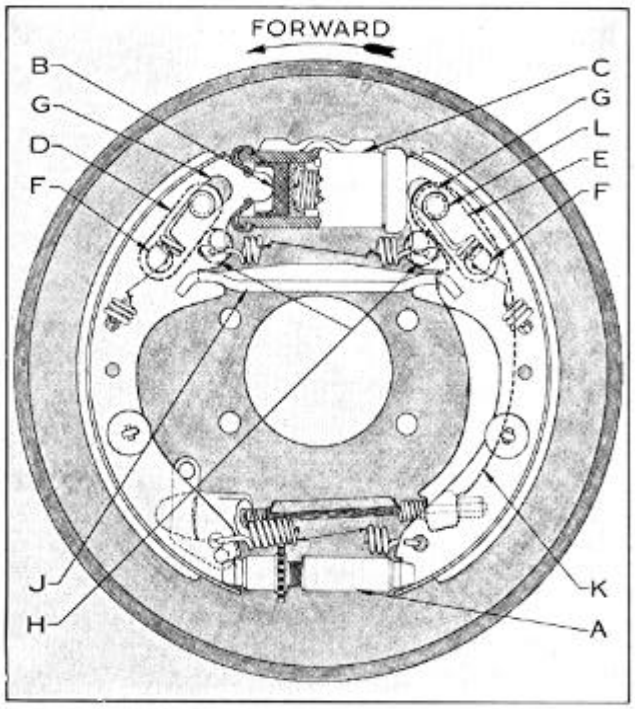

Fig. 15

The links are arranged so that the pull on them is approximately endwise. This leaves the shoes and anchors free to swing within the limits of the lining to drum clearance maintained by the eccentric adjustments (H). This allows the complete shoe assembly to move with the drum, thus eliminating high spots due to irregular drums.

Master Cylinder

The compensating type master cylinder maintains a constant volume of fluid in the system at all times regardless of expansion or contraction, and it also permits additional fluid to enter the system to make up any loss due to seepage. This keeps the cylinder full of fluid for the next brake application.

Mechanical System

An expanding bar (J, Figure 15) is placed between the rear shoes just under the cylinder and acting parallel with the cylinder. This bar is actuated by a lever (K) which is pivoted on the secondary shoe anchor link at (L). The parking brake and secondary brake mechanisms are connected to these levers in the rear wheels only, by cables operating through an equalizer arrangement. The rotary action of the equalizer, when the brake pedal or hand brake is applied, actuates the cables in an absolutely equal movement at equal pres-

sures. The rotary equalizer requires no adjustments.

It, in turn, is connected to the foot pedal through a play link arrangement to complete the mechanical section of the system.

Parking Brake

The parking brake or hand brake is applied through a pull type, self-locking, pistol grip, hand control located under the cowl to the left of the steering column. The brake is released by a slight rotation of the control handle.

Linings and Drums

A molded lining is used on the primary shoe and a woven lining on the secondary shoe. The lining materials were chosen to provide long life and a smooth, uniform braking action, requiring a minimum of attention.

The brake drums are of alloy steel, machined and polished to provide a smooth concentric braking surface.

The drums are $9\frac{1}{16}$" in diameter and have a $1\frac{3}{4}$" braking surface.

All springs are coded by painting and all actuating parts are heavily plated to prevent rust.

Centrifugal shields and baffle plates protect the brake parts from mud and splash.

Brake Adjustment

Three adjustments are necessary at the wheel for proper brake adjustment.

These are:

A. *Primary Shoe Eccentric Adjustment*, which positions the anchor end of the primary shoe.

B. *Secondary Shoe Eccentric Adjustment*, which positions the anchor end of the secondary shoe.

C. *Star Wheel Adjustment*, which establishes the correct clearances between the brake linings and the brake drum after the eccentric adjustments have been made.

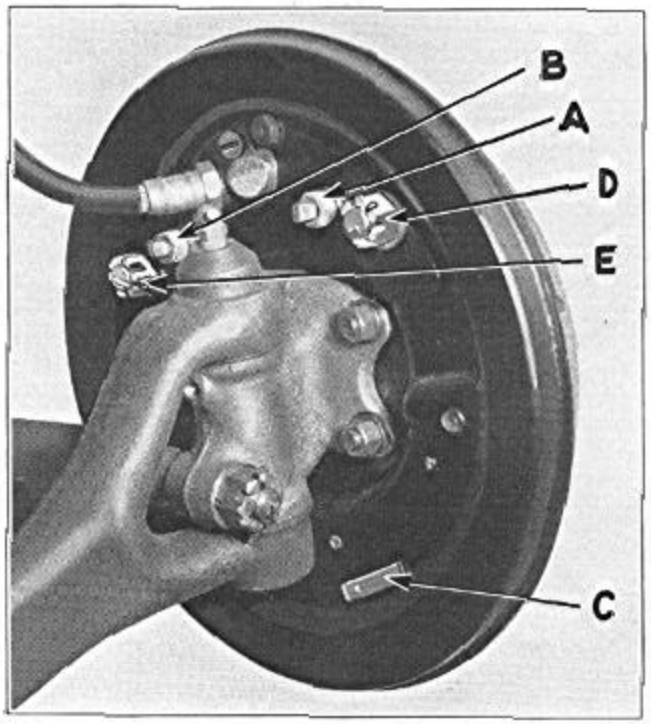

Fig. 16

Procedure for Simple Adjustment

For Taking Up Wear.

1—Block up car so that all wheels are clear of floor.

2—Loosen lock nut on primary shoe eccentric adjustment (A, Figure 16) and turn eccentric in direction of forward wheel rotation until wheel can just be turned by hand. Then turn the eccentric very slowly in the opposite direction until the drum is just free of lining drag. Hold eccentric in this position and tighten lock nut.

3—Loosen lock nut on secondary shoe eccentric adjustment (B, Figure 16) and turn eccentric in direction of forward wheel rotation until wheel can just be turned by hand. Then turn eccentric very slowly in the opposite direction until the drum is just free of lining drag. Hold eccentric in this position and tighten lock nut.

4—Remove the adjusting hole cover (C, Figure 16) and by means of Tool HM-13985, expand brake shoes tightly against drum by turning star wheel. NOTE: Moving the outer end of tool toward the axle expands the shoes and in the opposite direction releases the brake shoes.

5—Back off on star wheel 12 notches and replace adjusting hole cover.

6—Repeat operations 2, 3, 4, and 5 at each wheel. NOTE: Be sure to back off the same number of notches at both rear brakes for parking brake balance.

7—Check to see that all brake drums are free of lining drag before removing jacks.

Procedure for a More Accurate Adjustment for Wear

8—With car blocked up, disconnect parking brake cable to each rear wheel at the equalizer bar. (If cables have been adjusted too short the anchor ends of the rear brake shoes will be forced away from the eccentrics in the released position, making correct eccentric adjustment impossible.)

9—Remove inspection hole cover from brake drum and insert .010" feeler gauge between lining and drum near the anchor end of the primary or front shoe. Loosen lock nut on primary shoe eccentric adjustment (A) and turn adjustment in direction of forward wheel rotation until .010" feeler gauge is just snug. Hold eccentric in this position and tighten lock nut.

10—Insert .010" feeler gauge between lining and drum near the anchor end of the secondary or rear shoe. Loosen lock nut of secondary shoe eccentric adjustment (B) and turn adjustment in direction of forward wheel rotation until .010" feeler gauge is just snug. Hold eccentric in this position and tighten lock nut.

11—Expand brake shoes tightly against the brake drum by means of the star wheel.

12—Repeat operations 9, 10, and 11 at each wheel.

13—Set parking brake hand lever two notches from full release position and check cable to each rear brake for correct length adjustment. Pull cable hard toward equalizer bar to remove all slack. The holes in the adjustable yokes at the ends of the cables and the holes in the bar should line up so that the clevis pins can just be inserted when the cables are pulled tight. Adjust yoke at each cable end to secure correct cable length.

Insert cotter pins and tighten adjustable yoke lock nuts.

14—Release hand lever and back off on star wheel until brake drum is just free of lining drag. Be sure to back off the same number of notches at both rear brakes. Replace adjusting screw hole and feeler gauge inspection hole covers.

Repeat operation at each wheel. Lower car and test brakes for brake balance.

Complete Brake Adjustment And Lubrication Procedure

The following complete brake adjustment procedure is to be followed in cases where an adjustment for wear does not give satisfactory results or when relining or new shoes are found necessary.

15—Remove, clean and inspect all drums and shoes. Remove anchor links (D) and (E), Figure 15, from backing plates. After all brake parts are thoroughly cleaned, apply a thin film of Bendix Lubri-plate (Grease) to parking brake cable ramps, shoe support ledges on backing plates, eccentrics, and to the side of the anchor link which rests against the backing plate reinforcement; and all other moving or frictional contact points. Replace anchor links and adjust nuts (D) and (E), Figure 16, so that links are free to turn with all side play removed. Secure nuts with cotter pins.

16—During inspection or disassembly of brakes the hydraulic actuating system should be left intact so that bleeding of the system will not be required. Place wheel cylinder clamps HMO-145 over the wheel cylinders before removing the brake shoes. THE BRAKE PEDAL MUST NOT BE DEPRESSED AT ANY TIME WHEN THE BRAKE DRUMS ARE NOT IN PLACE.

17—Disconnect parking brake cables at equalizer bar.

18—Clean the exposed portion of the cable and then pull cable through conduit from wheel end to expose that part of cable sheathed by conduit. Clean this portion of cable and lubricate freely with Bendix Cable Lubricant.

19—Push cable into conduit and after shoes have been reinstalled, connect cable to shoe-operating lever (K), Figure 15, leaving adjustable yoke end of cable disconnected. To connect brake cable to shoe operating lever, move cable return spring away from cable end and place cable end into groove at end of operating lever.
After cable is in place allow cable return spring to return against the lever to hold cable in place.

20—Before installing new shoes, turn the primary and secondary shoe eccentrics so that the high side of the eccentric is away from the anchor link.

21—After reinstalling shoes and shoe parts, remove adjusting hole cover (C), Figure 16, from backing plate at each wheel and back off on star wheel.

22—Install brake drums, being sure that front wheel bearings are properly adjusted and lubricated and that rear hub nuts are securely tightened with all cotter pins in place.

23—Adjust as in operations 9, 10, 11, 12, 13, and 14. For all other service procedures relating to master cylinder, bleeding, wheel cylinders, linkage, etc., see the Hudson-Terraplane Mechanical Procedure Manual (Section 14).

SHOCK ABSORBERS

The ride of the Hudson 112 is controlled by direct acting two-way shock absorbers. See Figure 17. This type of shock absorber was first used by Hudson, but has now been adopted generally by the industry. Its counterpart can be found in the landing gear of aeroplanes and the recoil mechanism of cannons.

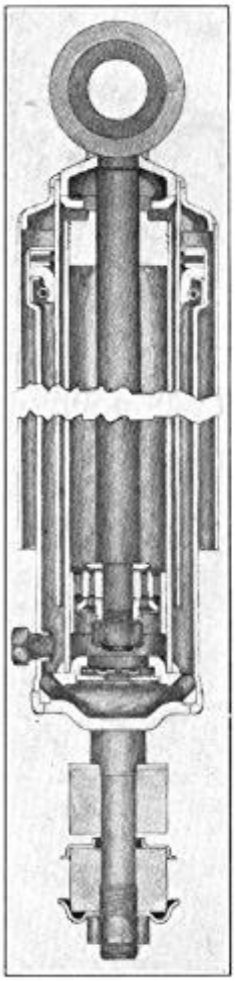

Fig. 17

This type shock has a direct 1 to 1 ratio of control over the spring action. The design is exceptionally simple and requires a minimum of working parts. They require the least attention and provide the most trouble-free service of any type shock absorber.

The direct acting shock absorber, because of its long piston movement, the movement being equal to the axle movement, gives from 4 to 7 times the oil displacement of an arm and link type shock absorber with a piston of equal size and naturally, ¼ to 1/7 the oil pressure for a given amount of control. In addition to this, the direct acting type shock absorber requires no seal against the pressures developed in the working cylinder, the only seal necessary acts under a maximum pressure of about 35 pounds and is located well above the actual oil level in the shock absorber. The seal in the arm and link type is submerged and subjected to pressures of 4000 to 6000 lbs. In the direct acting shock absorber the only oil coming in contact with the seal is the splash. Consequently, the seal has to function as a wiper only.

Because of the large displacement in this type shock, larger apertures can be used in the valves, thus rendering the shock absorbers less sensitive to oil viscosity changes. No appreciable change will be experienced in the ride because of temperature changes.

The rear units are provided with stone guards on the forward sides of the lower shield tubes. The use of live rubber in the shock absorber mountings provides greater freedom of operation and lessens vibration and noise.

These shock absorbers have valving characteristics which have been balanced with the vibration periods of the springs of the car for the proper control of normal loading and driving conditions. The valves can be changed to meet the requirements of control necessitated by unusual operating conditions. Either half of the units are replaceable.

The refill capacity is 5 oz. for front shocks and 5½ oz. for rears. Use Genuine Hudson Shock Absorber Fluid. Refer to the Hudson-Terraplane Mechanical Procedure Manual, Section 19, for service procedure.

BONNET

The new bonnet-raising arrangement incorporated in this model contains some unusual features in regard to safety. See Figure 18. Unlike numerous other types of bonnet design, the one on the Hudson 112 is hinged at the front end rather than at the center or rear which precludes the possibility of raising up at the front end and obstructing the driver's view if it is not properly locked in place.

Fig. 18

An unusually strong support is used to hold the bonnet in the raised position when checking the radiator water level, oil level or making minor adjustments to the engine. The support is hinged at the center and is self-locking, due to the weight of the bonnet top panel.

The bonnet is locked in a closed position by means of two catches located near the cowl, as shown in the illustration, which are engaged in the rear transverse support. The catches are operated by two handles, one located on each of the side panels and are joined by a tie rod so that the bonnet may be locked in place from either side.

To raise the bonnet turn the handle toward the front of the car and raise the top panel at the rear end to its fullest extent; at the same time push the lower section of the bonnet support forward to be sure that the hinge is fully closed.

To lower the bonnet, support the top panel with one hand and with the free hand push the lower section of the support rearward to open the hinge and permit the bonnet to return to its normal position. Lock the bonnet in place by turning the handle toward the rear of the car.

In the lowered position, the bonnet top panel rests on rubber bumpers inserted in the flange and a woven lacing on the cowl.

Removing Bonnet Side Panels

The single hinge at the front end of the bonnet is slotted for adjustment to obtain the proper alignment.

When doing major motor adjustments or repairs and it is found desirable to remove the side panels, it is necessary to first separate the bonnet latch handle from the handle tie rod.

These are held together with a small clamp arrangement at each end. Loosen one clamp bolt and the latch handle on that side can be removed with the panel, while the handle, rod and panel on the other side can be removed as a unit.

Hudson 112 Service Information and Adjustments

Starting Serial and Engine No. 8928566

FRONT AXLE	
Type	Elliot
Caster (Actual on Car)	2° to 2½°
Max. Variation—Right and Left Ends	½°
Camber	1°-1½°
Toe-in—at Felloe	0-⅛"
Spindle Pin Inclination (Angle with Spring Pad) Transverse	7°
Steering Spindle Pin Diameter	15/16"
Steering Pin Thrust Bearing	Ball
Wheel Bearing—Type	Taper Roller
End Play	.001"-.003"
Tie Rod End—Type	Plain Bearing
Tie Rod Adjustment	Screw
To Adjust Tie Rod:	
Turn Clockwise—To (As seen from right)	Lengthen
Turn Counter-Clockwise—To	Shorten

REAR AXLE	
Type	Semi-Floating
Ratio—Standard	4 1/9
Optional	4 5/9
Pinion Bearings:	
Type	Taper Roller
Adjustment	Shim
End Play	.000"-.001"
Differential Bearings:	
Type	Taper Roller
Adjustment	Screw
End Play	.009" Tension
Wheel Bearings:	
Type	Taper Roller
Adjustment	Shim
End Play	.004"-.010"
Pinion and Gear:	
Adjustment	Shim
Lash in Gears	.0005"-.003"
Lubrication:	
Type—Summer and Winter	S.A.E. 90 E.P.
Quantity (Pints)	2¾ (1.24 Kgs.)

BRAKES

Location	4 Wheels
Operation	Hydraulic
Drum Diameter	$9\frac{1}{16}$"
Drum Material	Alloy Steel
Lining—Type	Moulded and Woven
Width	$1\frac{3}{4}$"
Thickness	$\frac{3}{16}$"
Length per Wheel	19"
Pieces per Wheel	2
Adjustments:	
Anchor Pin	Pivot
Rear Shoe	Eccentric and Screw
Front Shoe	Eccentric and Screw
Clearance:	
Anchor Pin End of Shoe	.010"
Adj. Screw End of Shoe	.010"
Max. Variation per Shoe	.003"

CLUTCH

Type	Single Disc in Oil
Facing	Cork
No. Inserts (Cork)	90
Pilot Bearing	Ball
Throwout Bearing	Ball
Lubrication:	
Unit	Hudsonite
Quantity	$\frac{1}{3}$ Pt. (180 c.c.)
Location of Filler	Front of Flywheel
Throwout Bearing	Visc. Chassis Lubricant
Quantity	1 oz.
Type of Fitting	Zerk
Location of Fitting	Right Bell Housing

ELECTRICAL EQUIPMENT

Distributor:	
Make	Auto-Lite
Drive	Camshaft
Advance	Automatic
Breaker Point Gap	.020"
Timing	$\frac{1}{4}$" B.D.C.
Firing Order	1-5-3-6-2-4
Lubrication	Lt. Motor Oil
Quantity	Fill Cup
Generator:	
Make	Auto-Lite
Drive	V-Belt
Belt Adjustment	Swing Mtng.
Regulation—Internal	Third Brush
External*	None

*Voltage Regulator used on cars with Radio and Optional Generator.

Charging Rate—Max. Cold	21 Amps.
Min. Cold	19 Amps.
Max. Hot	19 Amps.
Min. Hot	17 Amps.

*With high output Generator.

Max. Cold	32 Amps.
Min. Cold	29 Amps.

Electrical Equipment (Continued)

Max. Hot	29 Amps.
Min. Hot	26 Amps.
Lubrication	Lt. Motor Oil
Quantity—Each Bearing	2 Drops
Lamps:	
Bulb Voltage	6-8
Candle Power and Bases (Contact Single—S—Double—D)	
Head—Mazda No. 2331	32-32-D
Head—Export—Mazda No. 2520-D	21-50-D
Parking—Mazda No. 55	$1\frac{1}{2}$-S
Fender Lamp—Mazda No. 63	3-S
Dash Signals—Mazda No. 51	1-S
Instruments—Mazda No. 55	$1\frac{1}{2}$-S
Dome—Mazda No. 87	15-S
Stop and Tail—Mazda No. 1158	3-21-S
License Lamp—Mazda No. 63	3-S
Fuse—Light Switch Circuit	20-Ampere
Accessory Circuit	20-Ampere
Spark Plugs:	
Make	Champion
Type	J8
Size	14 mm.
Gap	.032"
Starting Motor:	
Make	Auto-Lite
Drive	Bendix
Control	Foot Switch
Lubrication	Lt. Motor Oil
Quantity—Each Bearing	2 Drops
Battery:	
Location	Eng. Comp. Left Side
Make	National
No. Plates	17
Dimensions—Length	$10\frac{9}{16}$"
Width	$7\frac{1}{4}$"
Height (Overall)	$7\frac{13}{16}$"
Terminal Grounded	Positive

ENGINE

Number of Cylinders	6
Arrangement	Vertical
Bore	3"
Stroke	$4\frac{1}{8}$"
Piston Displacement	175 cu. in.
Taxable Horse Power	21.6
Actual Horse Power	83 @ 4000
Compression Ratio	6.50
Firing Order	1-5-3-6-2-4
Engine Mounting	Rubber
Camshaft:	
Drive	Gear
Number of Teeth—	
Camshaft Gear	56
Crankshaft Gear	28
Timing Indicated by Marks on	Gears
Camshaft Bearings:	
Diameter and Length—	
No. 1	2" x $1\frac{3}{16}$"
No. 2	$1\frac{31}{32}$" x $1\frac{1}{16}$"
No. 3	$1\frac{1}{2}$" x $\frac{15}{16}$"
Radial Clearance	.0025"
End Play Controlled by	Spring

Engine (Continued)

Connecting Rods:

Material	D.F. Steel
Weight (Ounces)	30½
Length (C to C)	8⅝"
Lower End Bearing—	
Diameter	1 15/16"
Length	1⅜"
Clearance	.001"
End Play	.006"-.010"
Material	Spun Babbitt
Upper End Bearing—	
Diameter	¾"
Length	15/16"
Radial Clearance	.0003"
Material	Bronze

Cooling System:

Circulation by	Pressure Pump
Temperature Control	Thermostat
Capacity (Quarts)	12 (10 I.Q.—11⅓ Liters)
Upper Radiator Hose—Length	10"
Diameter	1½"
Lower Radiator Hose—Length	8½"
Diameter	1⅝"
Pump Hose Outlet—Length	3¼"
Diameter	1½"
Pump Drive	V-Belt
Fan Drive	Pump Shaft
Belt Adjustment	Gen. Mtng.
Pump Bearing Type	Bronze
Lubrication Fitting	Metered Zerk
Packing Gland Adjustment	Automatic

Crankshaft:

Type	Fully Compensated
Number of Bearings	3
Bearing Material	Bronze Backed Babbitt
Bearing Diameter and Length—	
No. 1	2 11/32" x 1⅝"
No. 2	2⅜" x 1¾"
No. 3	2 13/32" x 2⅜"
End Play Taken by Bearing No.	2
Bearing End Play	.006"-.012"
Bearing Clearance	.001"
Adjustment Type	Shim

Fuel System:

Carburetor—Make	Carter
Type	Down Draft Single
Size	1⅛"
Heat Control	Manual
Choke Control	Manual
Fuel Delivery	Pump
Pump Drive	Cam
Air Cleaner and Silencer	Oil Wetted Type
Air Cleaner and Silencer—Optional	Oil Bath Type
Gasoline Tank Capacity (Gal.)	12½ (10½ I.G.—47½ Liters)

Lubrication System:

Type	Hudson Duo-Flo Automatic
Pump Type	Oscillating Plunger
Pump Drive	Camshaft
Oil Cooling by	Baffles in Reservoir
Oil Filter	Screen
Screen Mesh	40
Capacity—Total (Quarts)	5½ (4½ I.Q.—5¼ Liters)
Reservoir Only (Quarts)	4½ (3¾ I.Q.—4¼ Liters)

Pistons:

Type	Cam Ground
Material	Lo Ex Aluminum Alloy
Weight (Ounces)	10.5
Length	3 3/16"
Pin Center to Top	1 11/16"
Clearance—	
Skirt	.002"
Top of Piston	.016"
Depth of Grooves	5/32"
Piston Pin Hole—Size	¾"
Finish	Diamond Bore

Piston Pin:

Type	Floating
Method of Locking	Snap Rings
Diameter	¾"
Length	2 7/16"
Fit in Piston (at 200° F.)	.0003"
Fit in Rod	.0003"

Piston Rings:

Material	Cast Iron
Joint—Type	Straight Cut
Compression Rings—No.	2
Width	3/32"
Gap	.005"
Oil Rings—No.	2
Width—	
Upper (above pin)	3/16"
Lower (below pin)	3/16"
Gap	.005"

Valves and Tappets:

Inlet Valve—Material	Silicon Steel
Head Outside Diameter	1⅜"
Opening	1¼"
Valve Lift	11/32"
Stem Length	5 11/32"
Stem Diameter	11/32"
Exhaust Valve—Material	Silchrome Steel
Head Outside—Diameter	1⅜"
Opening	1¼"
Valve Lift	11/32"
Stem Length	5 11/32"
Stem Diameter	11/32"
Valve Stem Guides	Removable
Valve Guide Length	2 9/16"
Top of Guide to Top of Block	1 1/16"
Valve Spring Pressure	44 lbs. @ 2" 102 lbs. @ 1 31/32"

SPRINGS

Front—Type	Semi-elliptic
Length	32½"
Width	1¾"
No. of Leaves	9
Shackle Location	Front
Shackle Type	Self-adjusting
Rear—Type	Semi-elliptic
Length	48"
Width	1¾"
No. of Leaves	8
Shackle Location	Rear
Lubricant—Leaves	Visc. Chassis Lubricant
Shackles	Visc. Chassis Lubricant

SHOCK ABSORBERS

Type	Hyd. Direct Acting
Make	Monroe
Capacity	
Front	5 oz.
Rear	5½ oz.

STEERING GEAR

Type	Worm and Roller Tooth
Ratio	16.4
Adjustments:	
Worm Shaft	Shims
Cross Shaft	Adjusting Screw
Gear Mesh	Adjusting Screw
Steering Wheel Height	Spacer
Lubricant—Summer and Winter	S.A.E. 90 E.P.

TIRES

Size—Standard—4 Ply	16" x 5.50"
Optional—6 Ply	16" x 5.50"
Air Pressure:	
Front	24
Rear	32

TRANSMISSION

Location	Unit
Speeds—Forward	3
Speeds—Reverse	1
Drive Gears	Helical
Second Speed Gears	Helical
Gear Ratios:	
Low	2.42
Second	1.61
High	1.0
Reverse	2.99
Lubricant—Summer	S.A.E. 90 E.P.
Winter	S.A.E. 80 E.P.
Capacity (Pts.)	3 (1.36 Kgs.)

Transmission (Continued)

Bearings:	
Mainshaft	Ball and Roller
Mainshaft Thrust Bearing	Ball
Countershaft Bearings	S.B. Babbitt
Size—Front	.812"
Rear	.812"
Clearance	.0005"
Second Speed M.S. Gear Bearing	S.B. Babbitt
Diameter	2.188"
Clearance	.0005"
End Play	.009"
Reverse Idler Bearings	S.B. Babbitt
Diameter	.683"
Clearance	.003"
Mainshaft End Play	.006"-.009"
Adjustment	Shims
Shim Location	Front Bearings Cap
Countershaft End Play	.005"-.008"
Adjustment	Shims
Location	Rear Bearing Cap

WHEELS

Type	Steel Disc
Rim Type	Drop Base
Rim Size	16" x 3.50"
Bolts—per Wheel	5
Hub Type	Demountable

CHASSIS AND GENERAL DIMENSIONS

Wheelbase	112"
Tread—Front	56"
Rear	59½"
Road Clearance:	
Front Axle—Center	$7\frac{15}{16}$"
Rear Axle—Center	$7\frac{11}{16}$"
Overall Length (Including Bumpers):	
Sedan	187½"
Coupe	187½"
Overall Height (No Load):	
5 Passenger Closed Cars	70"
Coupe	68½"
Brougham—Convertible	
Overall Width	72"
Turning Radius	20' 6"

Accessories for the Hudson 112

The following accessories are in our present accessory list and can also be installed on the Hudson 112

Part Number	Description	List Price
HA-122611	Assist Strap	$ 1.35
HA-121529	Cowl Ventilator Screen	.50
HA-155703	Defroster Kit	3.75
HA-129267	Door Kick Plates—Kit	3.25
HA-123566	Door Pull-to Cord (Coupe)	2.00
HA-123567	Door Pull-to Cord (Sed. and Conv.)	2.00
HA-118733	Door Pull-to Handle	.75
HA-124708	Draft Deflector—all weather	12.00
HA-128373	Fender Lamps Kit	7.50
HA-124799	Fog Lamp Kit—Twin—Chrome	14.00
HA-124800	Fog Lamp Kit—Twin—Prime	12.00
HA-128397	Fog Lamp—Single Installation Auxiliary Kit	
HA-155386	Heater—Hot Water—Standard	11.95
HA-155387	Heater—Hot Water—DeLuxe	15.95
HA-155388	Heater—Hot Water—Custom	19.95
HA-155805	Horns—Twin—Dash Mounted	9.50
HA-125990	Locker Box Door Lock—Cylinder and Keys	$ 0.75
HA-128394	Master Bumper Guard—Front	2.50
HA-122527	Mirror—Rear View—Outside	2.50
HA-129119	Mirror—Rear View—Oval	1.50
HA-155817	Radio Assembly—6 tube	49.95
HA-155818	Radio Assembly—7 tube	59.95
HA-155813	Radio Antenna Kit—Running Board	3.50
HA-155814	Radio Antenna Kit—Telescopic	5.95
HA-128398	Road Lamp	7.00
HA-128206	Spotlight—Chrome	15.95
HA-128380	Trunk—Std. Tires Rear Mount (Sedan)	25.00
HA-128374	Visor—Hinge Type	1.75
HA-128376	Visor—Swivel Type—R. H.	2.75
HA-128377	Visor—Swivel Type—L. H.	2.75

Accessories which apply to Hudson 112 only

Part Number	Description	List Price
HA-130595	Ash Tray	
HA-130591	Bumper Guards—Complete—Standard—Kit of 4	$ 5.00
HA-130584	Cigar Lighter—Automatic	2.50
HA-130519	Clock—Electric—L. H. D.	12.50
HA-157065	Radio Installation Kit (Included with Radio)	No List
HA-130592	Radiator Grille Cover	1.50
HA-130874	Robe Hanger (Sedan)	$ 1.85
HA-130593	Stone Guards—Front	2.30
HA-130594	Stone Guards—Rear	2.30
HA-130590	Tail Lamp—R. H. Lacquer Prime	3.00
HA-130586	Windshield Cleaner—R. H. Kit (Except Conv.)	3.90
HA-130588	Windshield Cleaner—R. H. Kit (Convertibles)	3.90

Seat Covers—Sedan—Front
Seat Covers—3 Pass. Coupe
Seat Covers—4 Pass. Coupe
Seat Covers—Sedan—Rear
} Part Nos. and Prices to Follow

Accessories which cannot be installed on Hudson 112

Electric Hand
Vacuum Clutch
Hill Hold

It is our suggestion and recommendation that in the main, charges for installation of accessories on the 112 should not be added to the list price. This in order that prices may be in keeping with the low price feature of this model. Possibly in a few instances there might be exceptions, but in the overall picture the profit should come from the accessories themselves. It will be decidedly to your advantage, we believe, to adopt this policy.

Answers to Questions

These Questions on Mechanical Procedure Appeared in the January, 1938, Issue

(1) *Q. What is the action of Hudson Rust and Corrosion Inhibitor in the cooling system?*

A. The inhibitor, when mixed with the coolant, will spread to every part of the cooling system and form a protective coating over the metal. This thin protective film keeps oxygen away from the surface and oxidation of the metals can not take place.

(2) *Q. Why are cooling system thermostats and grill covers desirable during extreme cold weather?*

A. These items lessen a condition of over-cooling. Over-cooling will cause excessive crankcase condensation and emulsified oil, and sludge deposits will form. Too cold a motor also allows raw fuel to pass through the engine where a warmer operating temperature will give complete vaporization.

(3) *Q. Why is it recommended that thermostats be checked in a complete cooling system inspection?*

A. A faulty or sticking thermostat requires a higher temperature to expand the bellows in overcoming drag or leakage. Thermostats which require more than 150° to 155° to start them opening will cause alcohol and non-permanent anti-freezes to boil off, and engine damage might result.

(4) *Q. What is the first precautionary step to take in the servicing of shock absorbers?*

A. See that all dirt, scale, and foreign matter are cleaned away from the filler plug before it is removed. This can be done with a wire brush. Precaution should also be taken to see that the filler cup and containers used for handling the shock absorber fluid are equally clean.

(5) *Q. What adjustment to the Hydraulic Hill Hold is necessary if the brakes are delayed in disengaging as the clutch is engaged?*

A. The valve control rod should be lengthened.

(6) *Q. What is the recommended back lash between the rear axle drive gear and pinion, and how is it adjusted?*

A. Mount a dial indicator (J-390-X) on the differential carrier flange and rest its operating stem perpendicular against the thrust face of a drive gear tooth. Starting with no backlash use wrench HM 576 and turn left hand adjusting nut to left or anti-clockwise one-half notch and turn right hand adjusting nut to right or clockwise a similar amount. Repeat until a backlash of .0005" to .003" is established.

(7) *Q. What is the Lubrication procedure for universal joints?*

A. The universal joint spline should be lubricated at 1000 mile intervals with a viscous grease. At 10,000 mile intervals the needle roller bearings should be disassembled, cleaned, and repacked with a viscous grease.

(8) *Q. What is the effect of changing the exhaust manifold heat valve from summer (S) position to winter (W) position?*

A. This change in valve setting increases the flow of hot exhaust gases around the intake manifold and provides increased fuel vaporization and reduces cranking dilution.

(9) *Q. What all-important adjustment should be made to the car on which a trailer is going to be used?*

A. The use of a trailer on car necessitates a readjustment of the headlamp beams because of the abnormal load lowering the rear of the car several degrees and thus causing the headlamp beams to raise to some angle well above the normal horizontal setting.

(10) *Q. What are some important points to check in servicing the lighting system relative to producing better light?*

A. The following points should be checked.

(1) Lenses should be clean and should form a good protection for the reflectors by excluding dirt and moisture.

(2) Reflectors should be bright and free from dust and oxide film.

(3) Bulbs should be equal to standard rating and free from age blackening.

(4) Electrical connections in terminals, wires, and grounds should be clean.

(5) Batteries should be well charged and generator output equal to a normal night load on the system.

(6) Headlamps should be properly aimed.

Take a Tip From the Super Service Station

Greater efforts, than ever before, are now being used by Super Service Stations to obtain more of the related maintenance business other than lubrication. These other services which are most commonly stressed are washing, polishing, headlamp adjusting, spark plug cleaning, air cleaner service and brake adjusting. Also with the realization of the profit possibilities offered through automobile accessories, many of these stations are stocking a complete line of accessories, and in such cases the accessories are usually effectively displayed to the public.

A program for going after related maintenance business has been sponsored and publicized by the Petroleum Marketers and is called "Balanced Selling." According to this plan these stations set up a departmental quota of how much additional they should sell in related merchandise and labor, thus setting a definite goal to achieve. Also in using this plan conscientiously these stations have a better picture of their activities from day to day.

No one whose business depends on the trade of the motoring public can afford to overlook the aggressive methods being adopted and used by many super service stations today. No one can deny that such methods are not sound business because behind these stations are the makers of the products they sell, namely the oil industry, which spends millions of dollars annually in making surveys of potential business and developing highly effective and highly efficient business methods.

So take a tip from the Super Service Stations. Don't overlook any opportunity, sell owners needed services other than those which they request. Most customers are really interested in protecting the investment they have made in a car. They are looking for the most in efficiency, comfort and safety and will gladly pay for needed services if they are called to their attention.

Important to Successful Operations

At this time let's review a few important factors which are responsible for making Super Service Stations successful. First and foremost objective is to keep the customer coming back; not to high pressure or over sell; always being friendly and cordial; being neat personally and keeping the place of business neat and attractive at all times, keeping rest rooms clean and fully equipped, keeping an active owner follow-up file and contacting owners regularly, selling merchandise at a fair profit, giving necessary courtesy services, being prompt on delivery of car when promised, keeping equipment clean and up-to-date and setting up a future business quota as a working goal to achieve in carrying on present activities.

Check and Double Check Your Place of Business Now

With the introduction of the Hudson 112 there are going to be more people visiting your places of business. It is natural that you will want every prospect favorably impressed. Also it is not too early to start preparing for spring business, which will be here soon. Take a good squint around right now and see if things are as ship-shape as they could be. Check your follow-up file, maybe you have overlooked some good chances to get extra business. Keep your business up on its toes at all times and give your customers the best service in town.

Hudson 112 Opens Way for Greater Volume of Heater Business

With the introduction of the Hudson 112, prominently placing Hudson Distributors and Dealers in a position to go after the volume business of the low priced field, one must not overlook the profitable related business which can be obtained through increased car sales.

Most popular of all motoring accessories is the car heater, and naturally buyers of the Hudson 112 will want one.

At this time there should be no let down in the merchandising of heaters. A heater should be sold with every car. A check should be made of the owners in your territory and a conscious effort should be made to sell a heater to any owner who is driving a car not equipped with one now.

SERVICE MEETING PROGRAM

for

February 1938

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Subject for Discussion

HUDSON 112 MECHANICAL FEATURES AND SERVICE INFORMATION—Pages 67-85

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Material

FEBRUARY SERVICE MAGAZINE