SECTION XVIII
WHEELS AND TIRES

Description

The 55th series cars are equipped with tubeless tires. Tubeless tires have several advantages over the tire and tube assembly. In the tire and tube assembly (see Fig. 1)

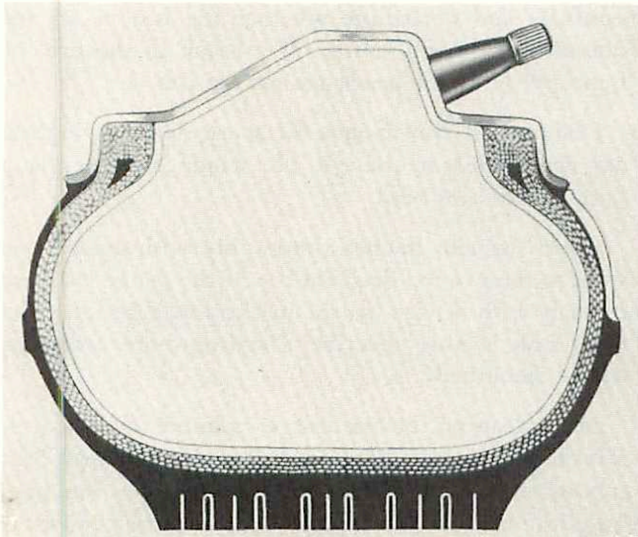

Figure 1—Tire and Tube Assembly

there are two units to balance; while in a tubeless tire the liner is an integral part of the tire (see Fig. 2). With

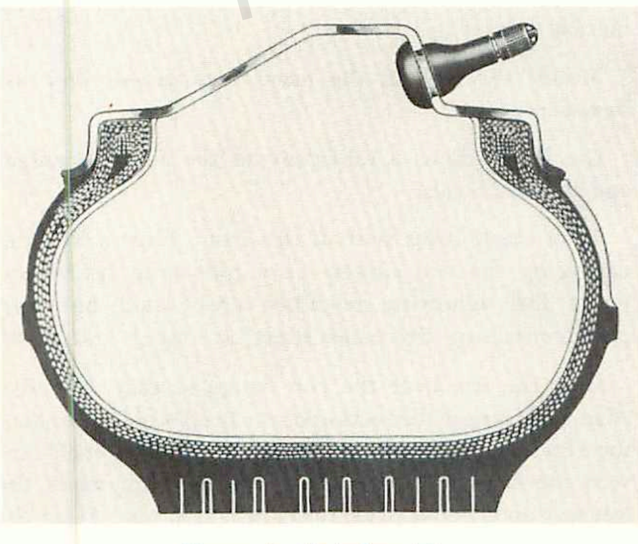

Figure 2—Tubeless Tire

the liner welded into position in the tubeless tire and being the same size as the rest of the tire, it cannot stretch out of position, tear, or explode. Troubles such as tube pinching, chafing, buckling, shifting, or valve shearing are eliminated in the tubeless tire.

In the tire and tube assembly, when the tube is inflated it is stretched approximately 20 per cent. When a nail penetrates the tube, it actually creates an opening which tends to pull away from the nail and causes an immediate air loss (see Fig. 3). The liner of a tubeless

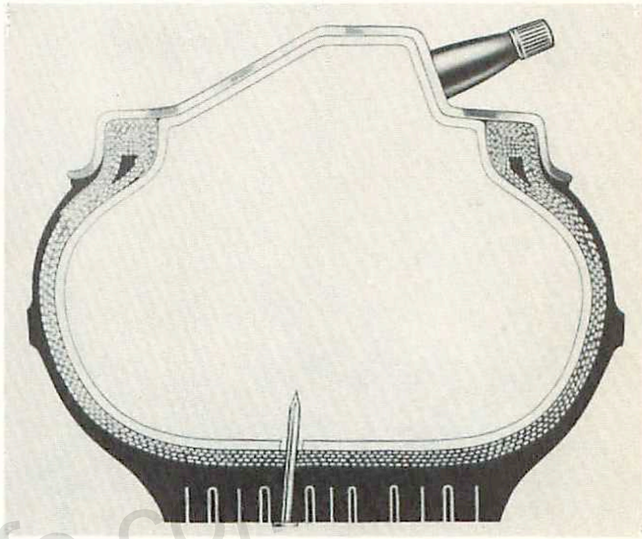

Figure 3—The Tube Stretches in a Tire and Tube Assembly

tire, being an integral part of the tire, is relaxed and not under tension. When a nail enters, the liner material clings to the penetrating object, forming an effective seal until removed (see Fig. 4).

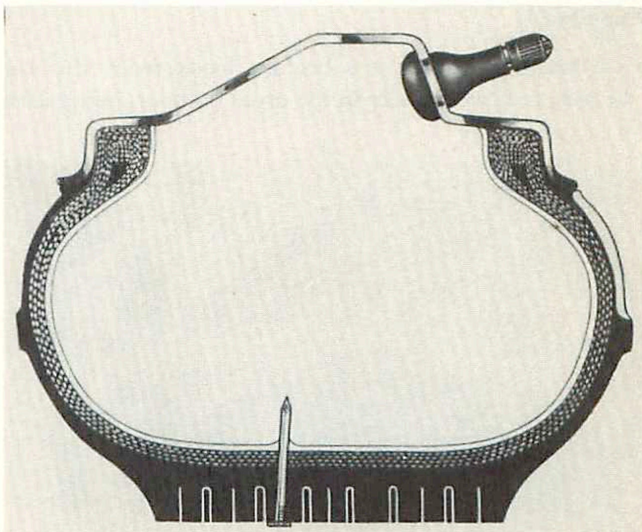

Figure 4—The Liner Material Clings to the Object

When an impact ruptures the cord body of the tubeless tire, the inner liner contains the average injury and prevents a dangerous blowout. Unlike a tube which bursts when the cords pinch through, the inner liner will only develop slow air leakage, giving the operator advance warning. The tubeless tire, having its built-in inner liner, forms a single unit which flexes as a unit and is actually stronger than the tire and tube assembly (see Fig. 5).

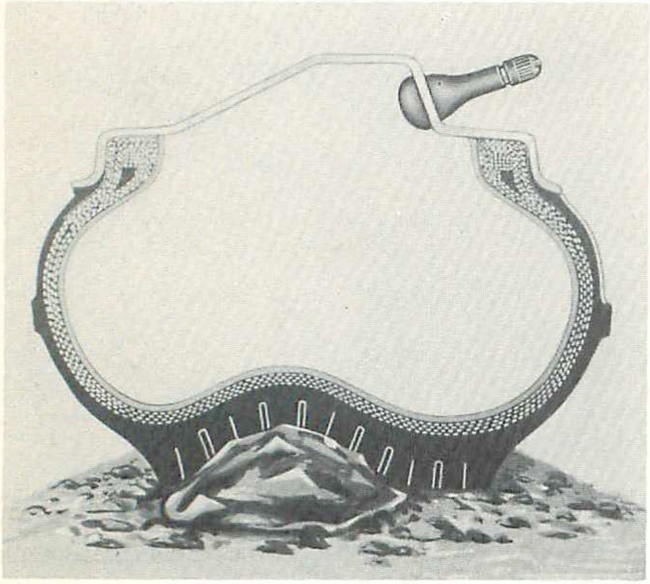

Figure 5—The Liner Provides Resistance to Impact Breaks

Demounting

Do not use tire irons to force the beads away from the rim flanges. To do so might damage the rim seal ridges on the beads and cause a leak when remounted.

A "bead breaker" such as shown in Fig. 6 is recommended.

After both beads are broken loose from the rim flanges, remove the tire in the usual manner, being careful not to damage the rim seal ridges. Start the removal of the bead at the valve to eliminate the possibility of the bead catching at the valve base. To prevent damaging the seal ridges or the beads, apply RuGlyde around the seal ridges and base of the beads.

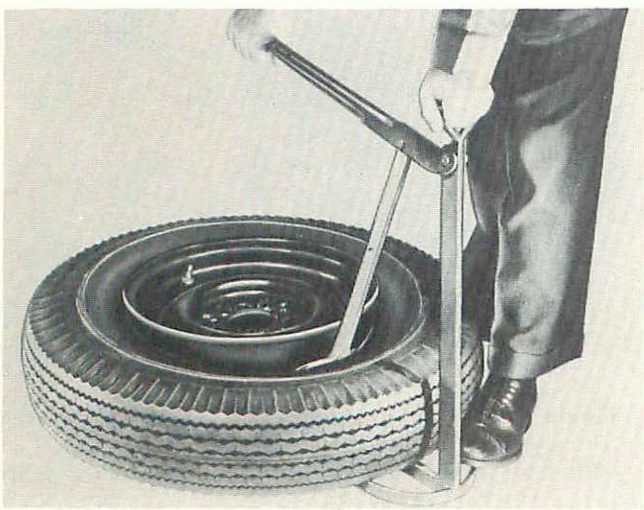

Figure 6—Breaking the Bead on a Tubeless Tire

Inspection

When the tire is removed from the rim, inspect it carefully and determine whether the loss of air was caused by (1) a puncture, (2) a break in the tire, (3) improper fit of the beads against the rim.

Examine all rim flanges for sharp dents. Straighten any dent visible to the eye. The flange is the only support for the tire bead.

Clean the rim flanges thoroughly with coarse steel wool to remove oxidized rubber. If the flange is rusted, clean it with a wire brush; in extreme cases of pitted rims, a file is more effective. The drop center well need not be smoothed.

After cleaning the rim flange, examine the butt weld joint to be sure that no groove or high spot exists. Such condition may cause a leak when the tire is mounted. To eliminate any possibility of air loss, file grooves or high spots flat and smooth.

Mounting

Clean the rim seal ridges with RuGlyde rubber lubricant to remove any dirt, rust, or any other foreign matter.

Mount the tire in the usual manner—*do not use hammers.*

Use RuGlyde as a lubricant on the rim seal ridges and the tire beads.

Take small bites with a tire iron. This will avoid damaging the seal ridges. Tire irons must be free of burrs. Tire mounting machines can be used; however, parts contacting tire beads must be smooth and clean.

Start the tire over the rim flange so that the valve stem will be near the section of the bead which goes over the rim last. Otherwise the base of the valve may prevent the bead from dropping into the well when the last section is being pried over the rim flange. Align the balance mark on the tire with the valve.

Be sure the valve core is removed to permit an increased flow of air during inflation. Hold the tire and wheel assembly in a vertical position and bounce it on the floor at various points around the circumference to snap the beads out against the rim flanges. If a seal cannot be effected in the foregoing manner with a rush of air, it can be accomplished by applying a tourniquet of heavy sash cord to the circumference of the tire and tightening with the use of a tire iron. Where available, tubeless tire mounting bands should be used instead of the sash cord. When inflating, hold the wheel vertically and inflate until the beads are forced completely against the rim flanges.

Then remove the air chuck, insert the valve core, and temporarily reinflate to 50 pounds pressure. Test the complete wheel assembly in a water tank. This will disclose any leaks in the area of beads, valve, or rim.

Be sure to deflate the tire to the recommended operating pressure.

Tire Repair

Proper repair of tubeless tires requires certain special equipment in some cases. These materials are furnished in a kit by the makers of the tires. Kits usually contain rubber plugs, plug inserting needle or finger, knife, cement, semi-fluid tire compound, compound gun, and puncture rasp. For hot patch applications, a special clamp (available through auto stores and jobbers) must be used to hold the patch in place (see Fig. 7). Cold patch repairs are made with standard cold patches used in conventional tire repairing, but the cold patch method should be used only as a temporary method until a hot patch or other permanent repair can be made.

Nail punctures in tubeless tires tend to produce slow leaks rather than fast leaks that result in a flat soon after the puncture. It is even possible that a nail puncture will result in no discernible loss of air.

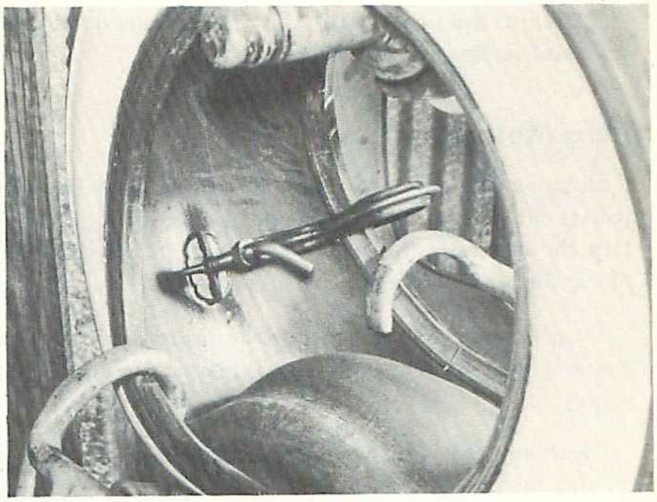

Figure 7—A Special Clamp Must Be Used to Hold the Patch

It is therefore advisable to inspect the tires from time to time for the presence in the casing of nails or other foreign objects. When any are found, remove the objects only when the tire can be properly repaired immediately thereafter. A fast leak will occur as soon as the nail or similar puncturing object is removed.

INJURIES UP TO ¼" DIAMETER

Hot Patch Method

Remove the tire and wheel assembly from the car.

Inflate the tire to the recommended operating pressure. Dip the assembly in a water tank and locate the leak. Mark the spot of the leak with a crayon.

Demount the tire. Clean the injury with a rasp.

Fill the injury with tire compound, using the gun, from the outside of the tire. Be sure to replace the nail in the gun nozzle after using. Then thoroughly clean the inside of the tire around the injury with solvent and allow to dry. Roughen the area around the injury with a hand buffer or wire brush.

Carefully center the hot patch over the injury and hold it in place. Apply the hot patch clamp and tighten maximum finger tight. Ignite the patch.

Allow the patch to cool for at least 15 minutes or until cool to the touch. Carefully remove the metal cup and blow out any ashes remaining in the tire.

Remount the tire. Inflate it to operating pressure. Then re-check it in the water tank.

Cold Patch Method

Remove the tire and wheel assembly, check the spot of the leak, demount and prepare the tire in the same manner as outlined for the Hot Patch Method.

Cement the area around the injury. Allow the cement to dry. Apply the cold patch and stitch it down (see Fig. 8).

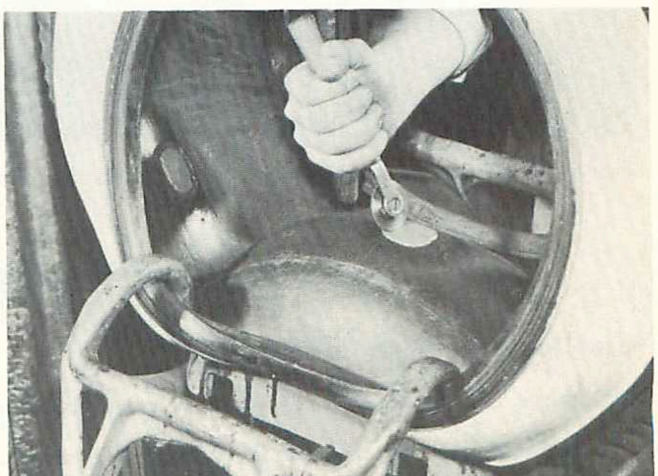

Figure 8—Stitching the Cold Patch Down

Remount the tire. Inflate it to the recommended pressure and re-check it in the water tank.

Plug Method

Remove the tire and wheel assembly from the car. Inflate the tire to the recommended operating pressure. Dip the assembly in a water tank and locate the leak. Mark the spot of the leak with a crayon.

Demount the tire. Clean out the injury with a rasp. Remove the loose or damaged material around the injury.

Clean an area 3 inches in diameter around the injury on the inside of the tire by light rasping or buffing. Make sure that the plug will seat on a smooth, solid surface. Wash the surface, using solvent sparingly, and apply rubber cement. Allow the cement to dry.

Prepare the plug by wire brushing or rasping the flat side of the plug. Apply cement to the flat side of the plug and allow it to dry.

Dip the plug inserter (wire needle or finger) in cement to lubricate it, and start it through the hole from inside the tire. (See Fig. 9.) Apply cement to the stem of the plug for a lubricant and pull the plug through the hole with the needle or finger while the cement is still wet. Pull the plug with a steady movement—don't

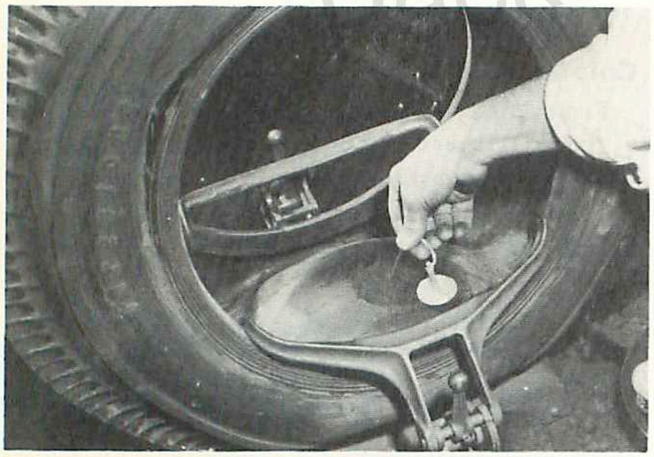

Figure 9—Start the Plug Through from Inside the Tire

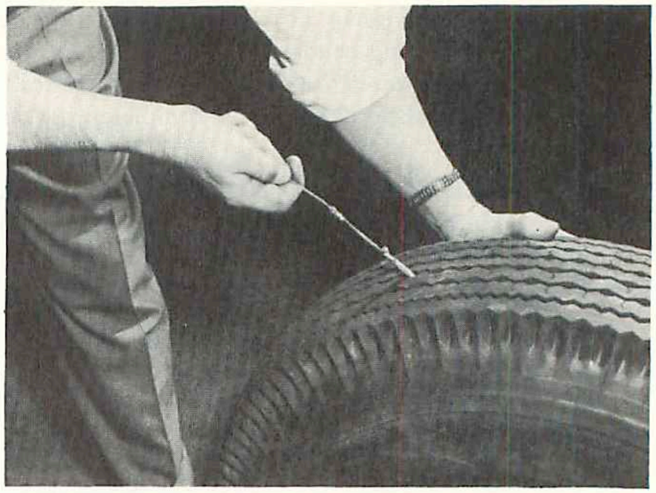

Figure 10—Pull the Plug with a Steady Movement

stop or jerk (see Fig. 10). When the plug is firmly seated against the inside of the tire, press down all around to remove air bubbles from between the flat surface of the plug and the inside of the tire.

Trim the plug slightly above flush of the tread surface (see Fig. 11).

Remount the tire. Inflate it to the recommended operating pressure and re-check it for leaks.

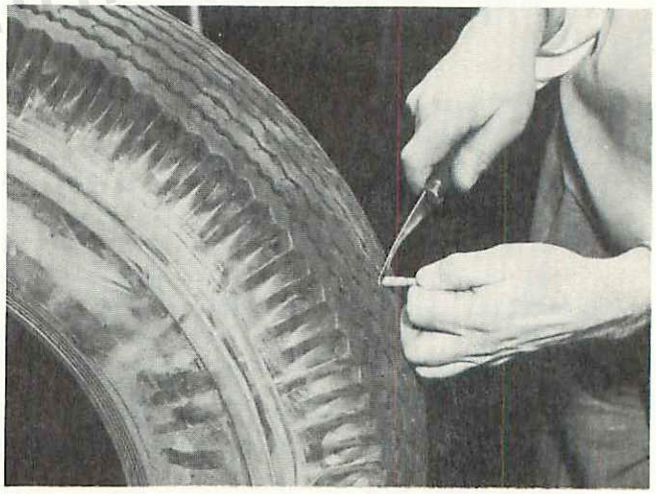

Figure 11—Trim the Plug Slightly Above the Tread Surface

INJURIES NOT EXCEEDING 1/16″ DIAMETER

Gun Method (Tire Compound)

Remove the tire and wheel assembly from the car.

Inflate the tire to recommended operating pressure.

Dip the assembly in a water tank and locate the leak. Mark the location of the leak with a crayon.

Wipe the injury dry. Reduce the air pressure to 5 pounds.

Probe the injury with a hand rasp and remove all foreign matter. Do not enlarge the hole. Then dip the rasp in solvent (gasoline) and thoroughly clean the injury.

Turn the screw in the heel of the compound gun until the sealing material appears and pinch off the excess compound. Hold the gun directly against the hole being repaired (see Fig. 12). Do not attempt to insert the nozzle in the hole. If the nozzle can be inserted in the hole, it indicates that the hole is too large for repair by the gun method, and hot patch or rubber plug method must be used. Replace the nail in the gun nozzle after using.

Allow the tire to stand at least 15 minutes before reinflating it to the recommended operating pressure. Re-check it in the water tank.

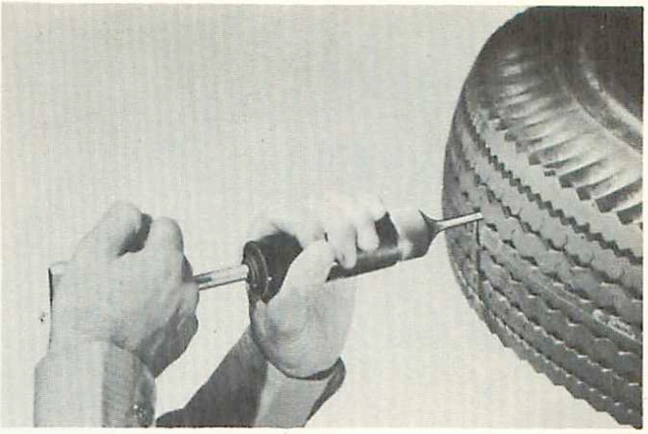

Figure 12—Hold the Gun Directly Against the Hole

VALVE STEM

Removal and Installation

Remove the tire from the wheel.

Cut or drive the old valve assembly out of the rim with a rubber hammer.

Clean the valve hole and the surrounding area with coarse steel wool. Coat the valve with RuGlyde rubber lubricant. Insert the end of the valve from inside the rim. Snap the valve assembly into position by either knocking it in with a rubber hammer or by using a pair of slip joint pliers with one jaw on the rim and the other jaw on the base of the valve assembly.

TIRE CARE

Maintaining proper tire pressure has a great effect on tire life and the riding of the car, as well as the action of the brakes and steering. Tires are subject to wear and, because of road conditions and driving habits, tend to wear unevenly. In order to maintain uniform and even tire wear, it is recommended to cross-switch the tires to reverse their rotation, at intervals of approximately 5000 miles.

Because of the normal wear of the tire itself, it is impossible to preserve proper wheel balance; therefore, it is advisable to balance wheels every 10,000 miles.

WHEEL BALANCE

Proper balance of the wheels, tires, and brake drums is important in providing safe steering, prolonging tire life, preventing wheel tramp, shake, and shimmy, and preventing excessive wear of the steering parts, which is caused by wheel vibrations. Although correct front suspension alignment is necessary for easy steering and long tire life, the cause of faulty steering and car vibrations can often be traced to improper wheel and tire assembly balance. In most cases, abnormal wheel vibrations can be corrected by balancing the tire and wheel as a unit, both *statically* (still balance) and *dynamically* (running balance).

Static balance in a wheel and tire assembly is the equal distribution of weight around the axis or center of rotation. A wheel that is out of balance statically has a tendency to bounce up and down. This condition is often called *"wheel tramp"* or *"high speed shimmy."*

Dynamic balance of a wheel is the equal distribution of weight on both sides of the vertical center line of the wheel. A wheel that is dynamically out of balance has a tendency to *"wobble"* and causes *"low speed shimmy."* Dynamic unbalance can easily result in early failure of wheel bearings, excessive wear of the knuckle pins and bushings, and excessive wheel fight or shaking of the steering wheel.

Balancing a Wheel Statically

Although the use of a wheel balancing machine greatly facilitates the operation, the wheels and tires may be statically balanced on the steering knuckle spindle of the car. To statically balance a wheel on the spindle, remove the wheel and hub and remove the oil seal and grease from the bearings. Lubricate the bearings with engine oil and install the wheel, hub, and bearings *but omit the oil seal.* Adjust the wheel bearings so there is no drag on the bearings. Be sure the brakes are fully released and not dragging.

Rotate the wheel and allow it to stop. It will come to rest with the heavy part of the wheel and tire assembly at the bottom. Install two external balance weights di-

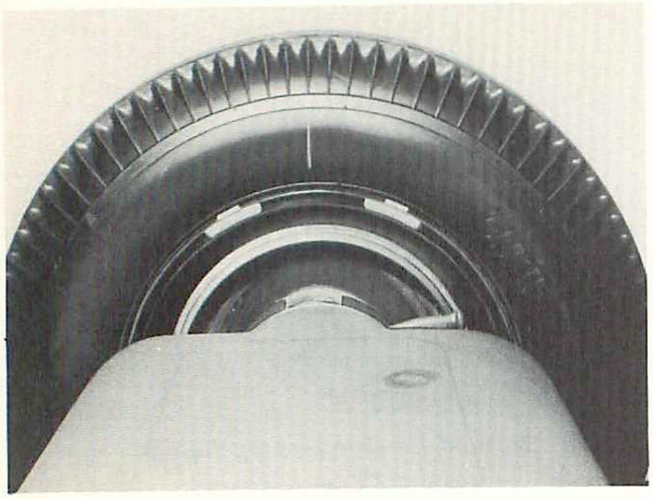

Figure 13—Balancing a Wheel Statically

rectly opposite the heavy part of the wheel (see Fig. 13). Rotate the wheel again and allow it to stop. Gradually move the two balance weights apart or add additional weights, until the wheel will stop in any position without any tendency of rotating of its own accord.

The same procedure is followed when balancing the tire, wheel, and hub assembly on a balancing machine or fixture. Follow the instructions furnished by the balancing machine manufacturer.

Balancing a Wheel Dynamically

After balancing a wheel statically, special balancing equipment or a wheel balancing machine is required to determine the amount of dynamic out-of-balance (see Fig. 14), and where the correct amount of weight is to be added to the rim flange to put the wheel in dynamic balance without disturbing the static balance. Do not attempt to balance a wheel dynamically until it is *known* that the wheel is *in balance statically.*

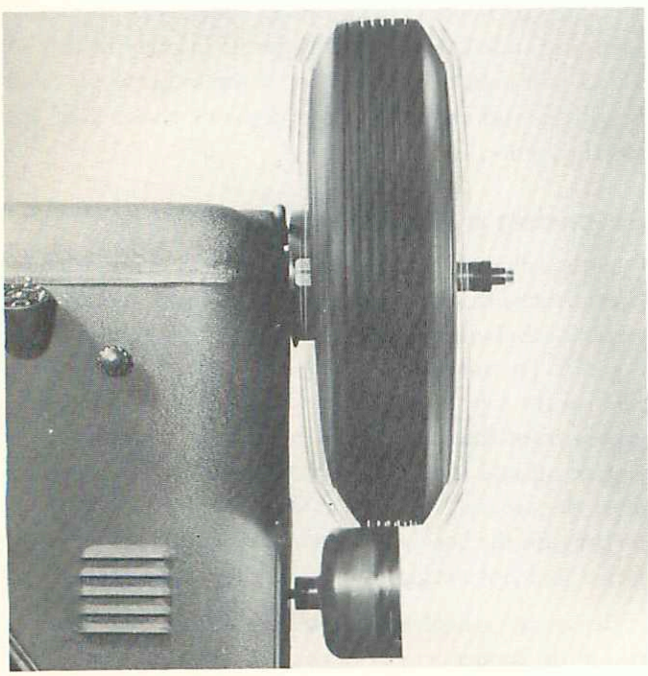

Figure 14—Balancing a Wheel Dynamically

Correct dynamic balance of a wheel and tire assembly is obtained by determining the heavy point on the wheel while the assembly is rotated rapidly. One-half of the required balancing weight is attached to the rim flange on the other side of the wheel, directly opposite the heavy point; and the remaining one-half of the required weight is attached diagonally across, *or 180° around the rim flange and on the opposite side of the rim,* from the first one-half dynamic balancing weight installed. By dividing and installing the required weight in this manner, it is possible to balance a wheel dynamically without disturbing the static balance of the wheel and tire assembly.

Remove the tire, wheel, and hub assembly from the balancing machine. Lubricate the wheel bearings, and pack the wheel hub with proper lubricant. Install the oil seal. Install the wheel and hub, and adjust the wheel bearings correctly. Install the spindle nut cotter pin, hub dust cap, and wheel hub shell cover.

Balancing the Rear Wheels

Rear wheels that are out of balance statically may cause a tramp, shake, or vibration of the car when driving at high road speeds. Although dynamic balance affects the rear wheels less (since they rotate around a fixed axis), it is recommended that when rear wheels are balanced they be balanced dynamically as well as statically. The procedure for balancing rear wheels is the same as for the front wheels, using a balancing machine.

Checking Wheel and Tire Runout

Wheels and tires that have an excessive runout or eccentricity will cause excessive tire wear. The wheel and tire runout may be checked on the car or wheel straightening fixture using a pointer. Raise the car and rotate the wheel slowly. Move the pointer to the side of the rim and measure the amount of runout. The runout should not exceed ⅛ inch. Excessive runout may be corrected by straightening the wheel on a straightening machine.

Measure the eccentricity of the tire at the center of the tread. Measure the runout at the center of the tire tread. The eccentricity should not exceed 1/16 inch, and runout should not exceed ⅛ inch. If the wheel and rim are known to be true, tire runout and eccentricity can often be corrected by deflating the tire and working it to another position on the rim. A tire that has excessive runout or eccentricity which cannot be corrected by shifting its position should be replaced with a new tire.

TROUBLE SHOOTING

FRONT TIRES WORN ABNORMALLY

Causes

1. Tires underinflated.
2. Incorrect front wheel toe.
3. Lateral tire runout or wobble because of:
   a) Tires improperly mounted.
   b) Wheel stud nuts drawn up unevenly.
   c) Sprung wheel.
4. Excessive wheel camber.
5. Harsh or unnecessary use of brakes.
6. Improperly adjusted brakes (dragging).
7. Eccentric brake drums.
8. Eccentric tires.
9. Wheel, hub, drum, and tire assembly out of balance.

FRONT WHEEL NOISE

Causes

1. Wheel rattles resulting from:
   a) Loose wheel bearings.
   b) Broken or pitted bearings.
   c) Brake drum loose on hub.
   d) Brake shoes or backing plate loose.
   e) Hub cap loose.
   f) Hub cover loose on wheel hub.
2. Wheel squeaks resulting from:
   a) Wheel stud nuts loose or unevenly drawn up.
   b) Movement of brake drums on hubs.
   c) Lack of lubrication of wheel bearings.
   d) Wheel bearings adjusted too tightly.
   e) Wheel bearings broken or pitted.
3. Variation in tire tread surface.
4. Type or condition of tire tread.
5. Underinflated tires.
6. Foreign object imbedded in tire tread.

ABNORMAL HEATING OF FRONT WHEEL BEARINGS

DESCRIPTION

Front wheel bearings, even when correctly adjusted and lubricated, will give off considerable heat after the car has been in operation for some time. Nevertheless, a check should be made to determine if heating is normal.

Causes

1. Insufficient lubricant.
2. Use of incorrect type of lubricant.
3. Bearings adjusted too tightly.
4. Bearings pitted or broken.
5. Heat transfer from brake drums due to dragging brakes.
6. Dirt or grit in bearings.
7. Abnormal use of brakes.
8. Steering knuckle spindle bent.
9. Eccentric wheel hub.
10. Very tight lubricant seal.

REAR TIRES ABNORMALLY WORN

Causes

1. Tires underinflated.
2. Rear wheels out of alignment due to:
   a) Rear axle housing sprung.
   b) Rear axle housing shifted on spring.
   c) Broken spring leaf.
   d) Use of incorrect spring.
   e) Frame bent or broken in rear.
3. Rear wheel runout or wobble due to:
   a) Wheel stud nuts loose or drawn up unevenly.
   b) Wheel or rim distorted.
   c) Axle shaft bent or sprung.
   d) Wheel loose on axle shaft.
   e) Wheel hub does not fit shaft taper.
4. Unnecessary use of brakes.
5. Sustained high speed driving (especially on curves).
6. Tire tread not concentric with axle shaft center.
7. Wheel, hub, drum, and tire assembly out of balance.