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# THE WEAR AND CARE OF AUTOMOBILE TIRES

BY

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**WITHDRAWN**

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## TIRES COST MONEY

**T**HE item of tire expense is undoubtedly one of the largest expenses of upkeep which the motorist has to meet. Last year motorists in Iowa spent in round numbers \$12,500,000 for tires and only about \$6,000,000 for gasoline and oil. Fully thirty per cent of this tire expense could have been saved if the tires had been given intelligent care.

In this bulletin the aim has been to point out and illustrate the most common abuses and how they may be avoided. **IT SHOULD BE EMPHASIZED THAT THE ILLUSTRATIONS SHOW THE RESULTS OF ABUSE AND NOT OF LEGITIMATE WEAR.**

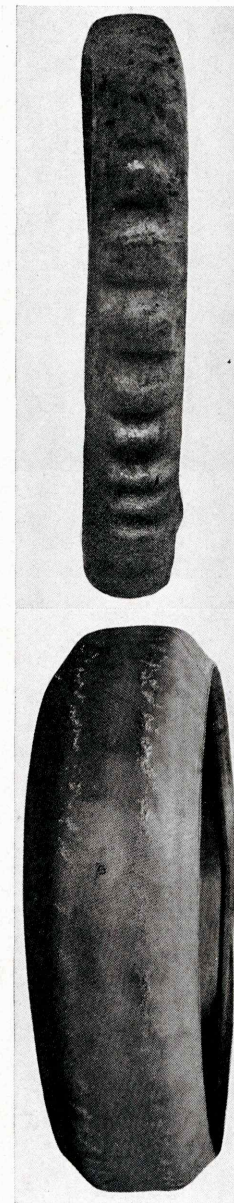
Thanks are due to the Goodrich Tire Company, the Goodyear Tire and Rubber Company and to the Firestone Tire Company for the loan of photographs, from which many of the illustrations were made.

Other bulletins in the series, which may be had by writing the department, are:

Motor Trouble Chart.

A Cost Keeping System for the Automobile.

Some Points on Carburetion.



Loosened tread from under-inflation.  
Broken and worn fabric from underinflation

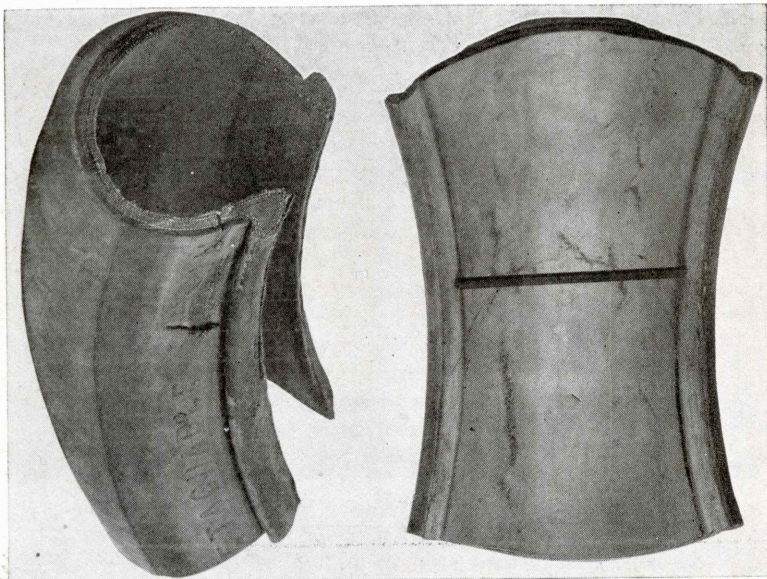
### UNDER-INFLATION

Seventy-five per cent of all tires are damaged by being run under-inflated. Tires should always be kept pumped to the proper pressure. Twenty pounds per square inch for each inch of tire diameter is a safe rule if the manufacturer's recommendation does not appear on the casing. Many motorists may think they can judge the pressure from the amount of flattening where the tire makes contact with the road. The safe way to determine the pressure inside a tire is not to feel, to kick, or to look at the outside, but to use a pressure gauge. A reliable gauge is one of the best investments about a car and it must be used frequently.

The illustration on page 5 shows what happens when an under-inflated tire is run over a small obstruction. The excessive deformation of the side wall of the casing results in the generation of a large amount of heat, both from bending and from friction between the inner tube and the wall. In time, the layers of fabric will break or separate and blow-outs result.

### TIRE PRESSURE IN HOT WEATHER

There is a popular belief that less pressure should be carried in tires in summer than in winter. This is entirely wrong as the heat from the road, together with the heat generated within the casing when soft, tends to destroy the tire more rapidly than it would if fully inflated. The blow-out of a tire on a hot day when it is properly inflated results not from an increase in pressure, but generally from damaged fabric, which has been caused by injury, or more often by being run under-inflated at some earlier time.



A break in the side wall of the casing and chafed and broken fabric, both from underinflation. —Courtesy Firestone.

Loosening of the tread is often the result of running a tire without sufficient pressure. When the tread has become loosened, as shown in the illustration on page 3 the fabric has generally been so badly damaged also that it is too late for any satisfactory repair.

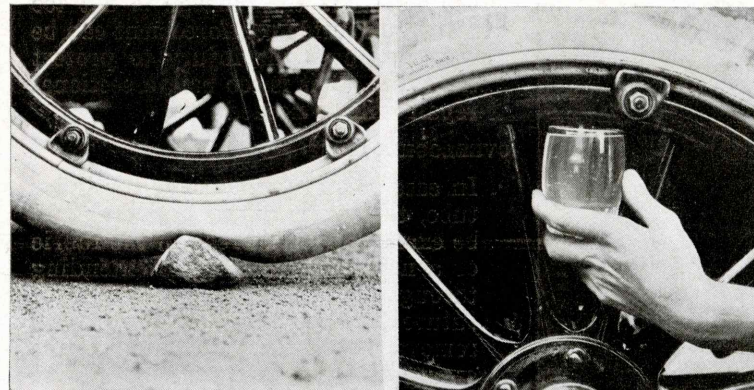
A slight leakage in the valve will result in a gradual loss of pressure in the tire. Often a great deal of damage has been done before the driver notices any flattening. A very satisfactory way of testing a valve is indicated in the illustration on page 5.

#### RIM CUTTING

The figure on page 6 shows an example of rim cutting, which is another result of under-inflation or sometimes of ill fitting rims. The excessive bending of the side wall over the sharp edge of the rim causes separation and breakage of the fabric. Bent or rusted rims should be cared for immediately. After the rust has been removed with emery cloth or sandpaper, a coating of varnish or rim enamel should be applied.

#### OVERLOADING

Overloading results in breaking down or separation in the side walls, loosening of the tread, breaking of the inner plies of fabric and in rim cutting. Most manufacturers specify the



Running over an obstruction.

Testing a valve

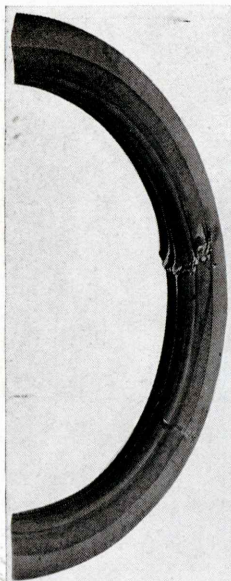
safe load for different sizes of their tires and can supply oversize tires to fit regular size rims. Whenever a car carries a larger weight than it is intended to, whether it be extra equipment or two or three more passengers, the tires are so badly overloaded that their life will be very much shortened. The safest thing to do, if heavier loads are to be carried, is to equip the rear wheels, at least, with oversize tires.

#### RUNNING FLAT

In case of a puncture, the car should not be driven even a few hundred feet before the casing is removed. No tire can be run flat without serious damage to the side walls even if rim cutting does not result. The terrific hammering, pounding and grinding will ruin the casings and often cut the tube almost into shreds. It is far better to remove the tire and proceed slowly on the rim than to drive it flat.

#### BRUISED FABRIC

If a tire runs at a fair speed across a raised railroad track, or an obstruction in the road as large as a man's fist, if it strikes against a sharp corner or a curb while the car is being turned around in the street, or if it is struck a heavy blow with a sledge hammer, there will probably be no marks on the outside. On the inside, however, the layers of fabric are bruised, strained and often torn. The final blow-out may not come for several weeks, and it is nearly always beyond the understanding of the motorist and he nearly always lays it unjustly to faulty tire construction instead of accident or abuse. Often one or two of the inner layers of fabric are torn and at every revolution of the wheel the break opens and closes like the jaws of a pair of nippers and gradually pinches a hole through



the tube. If the damage is not too severe, an inside reinforcement can be cemented over the injury to protect the tube. If it is too bad, a sectional repair will be needed.

#### OVERLOOKED TACK

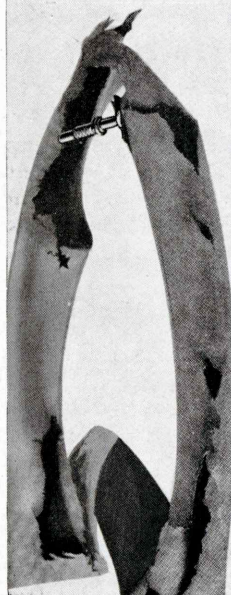
In case of any puncture of the inner tube, the inside of the casing should be examined for a break in the fabric or a nail or piece of glass extending through, which may be a source of future trouble. A driver will often remove a tack from the tread of the casing and put in a new inner tube only to have it go down immediately, punctured by a nail which cannot be seen on the outside but is projecting on the inside of the casing.

#### IMPROPER BRAKING

The brake should not be so applied as to lock the wheels and slide them on the pavement. The illustration on page 9 shows a new casing absolutely ruined by the driver locking the brakes while traveling at a fair rate of speed. The surface of the road has ground through the tread and into the fabric. Tests have proved that a car can be stopped more quickly with a brake pressure, which is just a little less than that required to lock the wheels. Often one brake is improperly adjusted or is in such condition that one wheel is locked while the other is scarcely held. This condition is liable to cause skidding when brakes are set on wet or slippery pavement.

#### SAVAGE CLUTCH

When the clutch is not engaged smoothly enough, there is a sudden excessive straining on the rear tires, often causing them to spin on the pavement. When a tire is slipping instead of rolling a sharp object will make a bad cut in the tread.



Bead broken by running flat.  
—Courtesy Goodrich.  
A tube cut to shreds by running flat.



A clean break in the fabric resulting from hitting an obstruction with tire underinflated.  
—Courtesy Goodrich.

Rim cut from underinflation

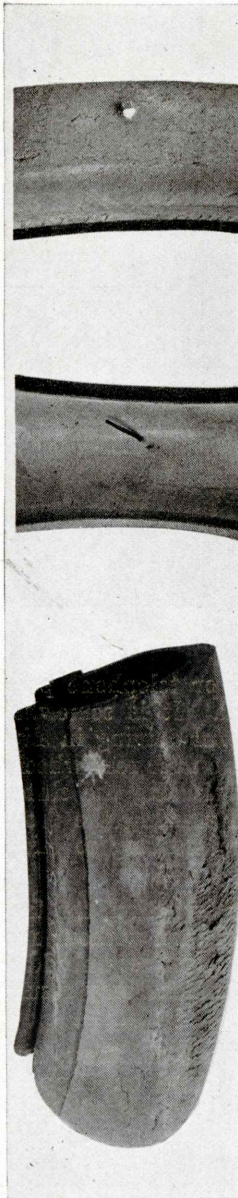
#### SKIDDING

Skidding is sometimes stopped by a curb or telephone pole, which happens to be conveniently located. It is somewhat better for the driver to prevent it by careful driving in slippery places and by the use of non-skid tires on the rear wheels. Skidding can generally be controlled by releasing the clutch (or closing the throttle clear down) and turning the front wheels in the direction the rear ones are starting to slide, much as a bicyclist balances himself.

If the tire skids into a rut or against an obstruction, the fabric is liable to be bruised and damaged, although without any marks on the outside. If it slides over a sharp object imbedded in the surface of the road, a bad cut in the tread may result.

#### TIGHT CHAINS

Chains are used very extensively to prevent skidding, and afford additional traction in heavy roads and on slippery pavements. The figures on page 10 show the result of chains fitted too tightly. They should be just loose enough so they can creep and their wear be distributed over the entire tread. They should be used only when necessary and removed as soon as possible. On hard pavements each cross link dents into the tire and continued use will often result in loosening of the tread.



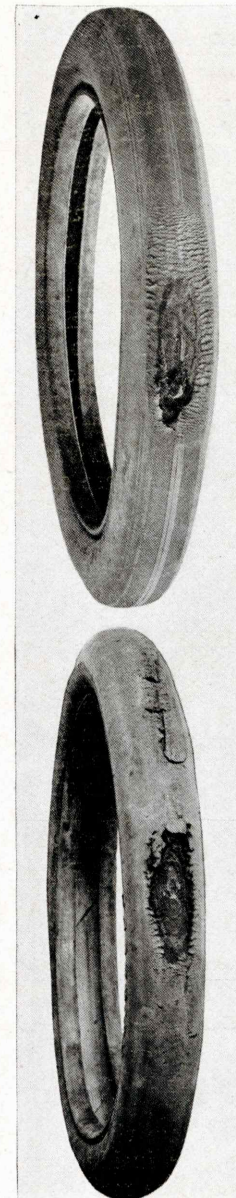
Outside shows a tack head,  
inside shows overlooked nail.  
Improper braking  
—Courtesy Firestone.

#### NON-SKID CASINGS

The merit of non-skid casings is often discussed by motorists. There is no doubt that the rubber projections penetrate a slimy coating of mud and secure a grip on hard city pavements, or good macadam or gravel roads, and add materially to the safety of driving. They are especially beneficial on the rear wheels. In dirt or clay roads, which become nearly bottomless strips of mud during wet weather, the wheels sink to such a depth that the rear wheels spin without driving the car. Any solid objects in this mud, especially those put in front of the wheels to assist in moving the car when it is "stuck," will do infinitely more damage to many types of non-skid tires than they would do to smooth treads, because of their tendency to catch on the rubber projections and tear them or sections of the tread loose. In the same way chains are more injurious to non-skid than to smooth tread casings. The chief object of the non-skid tire is to increase the safety of driving, affording additional traction on slippery pavements, particularly on the rear wheels. Under favorable conditions, they succeed in accomplishing this and at the same time give enough greater mileage than smooth tread ones to warrant the slightly greater first cost.

#### OUT OF ALIGNMENT

The illustration, page 11, shows the result of running a car less than a hundred miles on a new casing with the front wheels of the car out of alignment. The first evidence is a roughness of the tread on both front tires just as if someone had removed the rubber with a file. Soon the rubber is completely ground off and the fabric torn and destroyed. Alignment



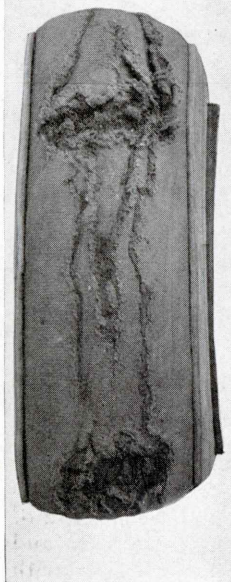
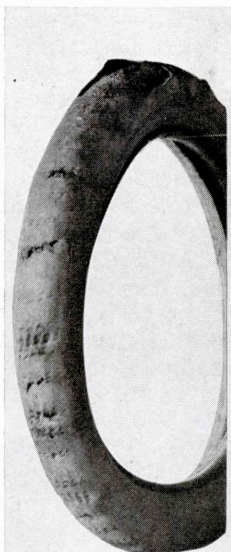
The results of improper  
braking or of skidding.  
—Courtesy Goodrich.

#### CUTS BY FENDERS

Often marks will be found on a casing caused by its rubbing against some projecting metal part when the car is being turned around or from striking against a fender brace when the wheels pass over an obstruction in the road. The middle figure on page 12 shows how the rubber has been completely removed from the casing where it rubbed while the car was being turned. Some cars have adjustable stops on the steering mechanism to prevent this.

#### RUTS

The illustration on page 13 illustrates the effect of driving in deep ruts. The side wall of the casing must be made thin to permit bending as it passes over obstructions in the road. Since it is unprotected by a thick coating of rubber, it is very quickly torn and destroyed by coming in contact with the sides of dry or frozen ruts. Driving on street car tracks results in concentrating the wear at one point on



Tight chains

Effect on the fabric—tight chains.

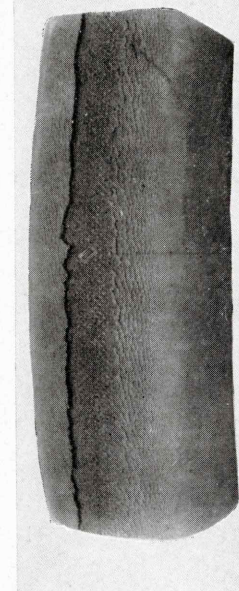
the tread and often in starting separation between it and the fabric.

#### INTERCHANGING CASINGS

Since the casings on the right hand side of the car are oftener exposed to injury from being driven off of the road or against a curb, some advantage may be obtained from interchanging them with those on the left side. Many motorists prefer to keep the better tires on the rear wheels as they are subject usually not only to more than half the weight, but also to the driving strain. It is not to be recommended to drive on dangerous roads with poor casings on the front wheels on account of liability of the driver's losing control of the car in case of a blow-out.

#### INSIDE PROTECTORS

Protectors, consisting of several layers of fabric, are often applied to the inside of the casing to prevent punctures and blow-outs. If it were better to have tires made with a larger number of layers of fabric, the manufacturers would be making them that way. Protectors should never be fitted in a good new casing but may be used to advantage in one where the inner layers of fabric have been damaged and the tire would be otherwise practically useless. These protectors slide against the inside wall of the casing and generate a large amount of heat, which results in early failure, page 14. When a protector is fitted in a new casing, it is not uncommon for it to give out before it has given half the mileage it should, and often in a very few miles running, the excessive heat will melt the patches from the inner tube. Either outside or inside protectors or covers reduce the resiliency of the casing to a marked degree and tend both to generate an extra amount of heat, and to prevent its escaping.



What running a wheel out of alignment does.

—Courtesy Goodyear and Firestone

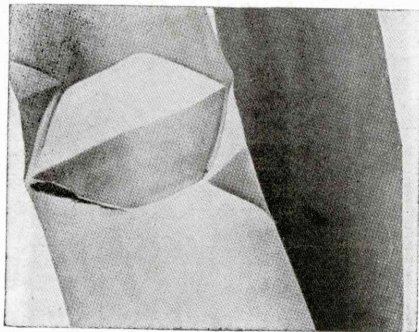
Expecting a good new tire to give its full mileage with a protector, is about like expecting a man to do a hard day's work in the summer time wearing an overcoat. The claim that an outside cover will prolong the life of the casing indefinitely is about as reasonable as to expect a pair of shoes to last forever if protected by a pair of rubber overshoes. An inside sleeve or protector, or an outside blow-out patch is of undoubted merit for use in connection with an otherwise worthless casing or for an emergency repair.

#### LEATHER TREADS

Casing on which the tread is made out of several layers of chrome tanned leather in which hardened steel rivets have been inserted, are very extensively used in Europe, but have not met with much favor in this country. Since the leather is vulcanized to the canvas and merely replaces the rubber tread, these tires should show no more tendency to overheat than the ordinary type. When the tread is detachable and fitted over an ordinary casing, the heat generated by creeping and by friction between it and the side walls results in an excessively high temperature and shortened life of the casing and tube. The use of heavy protectors might be compared to the wearing of arctic overshoes over new shoes in the summertime to save the shoes.

#### NEGLECTING CUTS

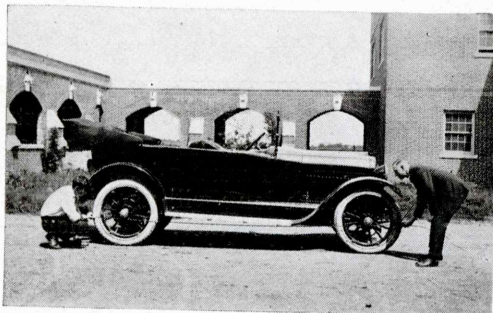
The cut on page 15 illustrates some of the results of neglecting small cuts in the tread of the casing. A cut  $\frac{1}{4}$  inch long will permit sand and moisture to enter. The moisture will rot out the fabric and sand will work in between the tread and the canvas and cause separation and often large sand boils. When a sand boil is discovered,



The result of having folds or wrinkles in the tube when placing it inside the casing.



The result of rubbing against a projecting metal part or striking against a fender.



The alignment of wheels—see page nine.



Running in ruts destroys the side wall of the casing.  
—Courtesy Goodrich and Firestone

it should be opened at once and, unless the casing is nearly ready for the scrap heap, the loosened portion of the tread should be removed and a vulcanized repair made. It is an excellent practice to go over the casing very often and remove any foreign material which has become imbedded and seal up any small cuts with some of the preparations which are on the market for the purpose. If the injuries are too large, they can be repaired successfully only by being vulcanized, but a certain amount of experience is generally necessary to satisfactory results.

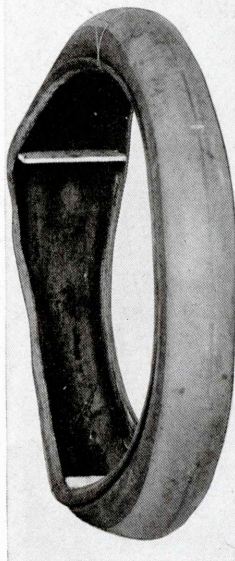
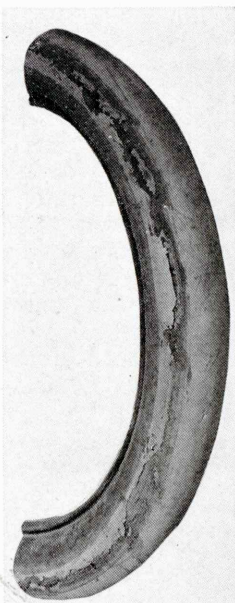
#### OIL

Oil is one of the worst enemies of tires because it soaks into the rubber. This makes it so soft that it cannot resist the wear of the road, and causes separation between the layers of fabric. Many tires are seriously injured by being allowed to stand in puddles of oil which has dripped from the power plant of the car. Whenever a casing becomes covered with oil, either from the floor or from the grease which works out from the rear brake drum, it should be immediately washed with gasoline.

Whenever possible freshly oiled roads should be avoided. A few miles on a dusty road will generally remove most of the oil which has been picked up in a freshly oiled strip. If any oil remains, it should be removed immediately with gasoline. The use of one of the many tire paints on the market may afford some protection from oil.

#### LIGHT AND HEAT

Very strong light or excessive heat will cause serious damage to tires. It is poor policy to allow a car to stand out day after day in the hot sun as tires may suffer nearly as much in-



Running in car tracks  
Protectors injure the fabric.  
—Courtesy Goodrich.

jury as would result from driving. A new casing which has stood for several months in a display window or has been carried as a spare on the running board is often so badly dried out and overcured that it will not give half the mileage it should. Sometimes cracks will open up along the side wall before it has been driven a thousand miles. The spare casing should, if possible, be protected from strong light and moisture by a suitable covering. When extra casings are kept on hand they should be stored in a room at a temperature of about 50 degrees where they will not suffer from either excessive light or from dampness.

#### STORING CAR

If a car is to be out of service for several months during the winter, it is advisable to jack up the wheels and let most of the air pressure out of the tires. Just enough should remain to prevent the inner tubes from flattening, as they might crack when pumped up again in the spring. If the car is to stand some time on pumped up tires, it is advisable to move it occasionally so that they will not become flattened from always resting on the same place. It is better, however, when the car is to be out of service for the winter to remove all of the tires and wash the casings thoroughly with soap and water. Any foreign objects should be picked out of the treads and any small cuts sealed with a preparation for the purpose, or vulcanized. They should then be wrapped and stored in a cool dry place. The rims should be straightened if they are bent at all, cleaned and varnished. If spare inner tubes are to be out of service for several months while the car is laid up, it is better that they be inflated enough to round them out



Neglected small cuts grow into big ones or result in loosening tread from fabric.  
—Courtesy Goodyear and Firestone

well and hung up rather than left folded, because of danger of their cracking along the edges.

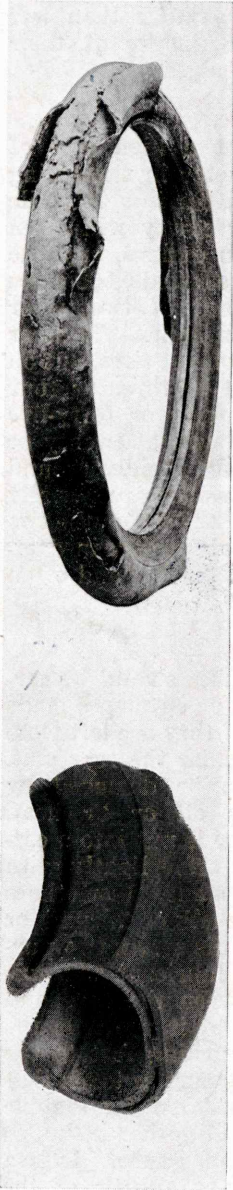
#### FAST DRIVING

Driving the car at a high rate of speed is a great factor in shortening the life of tires. A car in a 500 mile race on a brick speedway will often use up eight or ten casings, any one of which would have lasted 5,000 miles if run at the speed of twenty or twenty-five miles an hour. The wear and tear, not only on the tires, but on the whole car, will be three or four times as much at forty or forty-five miles an hour as it will at twenty or twenty-five. Driving rapidly around corners results in throwing practically the entire weight of the car on the two outside wheels. This results in damaged fabric, in rim cutting and often in blow-outs.

#### SPARE TUBES

The small inner tubes should be carried in small sacks or envelopes made for the purpose. If they are left loose in a tool box or under the rear seat, they are liable to be damaged by heavy objects, by oil or by heat. When an inner tube is put into a casing, it should be dusted lightly with powdered soap stone (sometimes known as French chalk or talcum) or powdered mica. This serves two purposes; it acts as a lubricant and prevents friction between the tube and the casing wall, and it prevents the inner tube from sticking fast to the inside. Great care must be taken that the excess of powdered soap stone is removed or it will gather in lumps and damage the inner tube. It is a good practice to put a little of the powdered chalk with the inner tube in the sack it is carried in. When an inner tube has been tested for leakage





Oil softens rubber and results in separation from fabric.

—Courtesy Goodyear and Firestone

by being dipped in water it must be perfectly dry before being put in the casing. If a tire change must be made in rain or snow, or under such conditions that replacing the tube in a wet casing is unavoidable, it should be removed at the earliest opportunity and dried properly.

#### FOLDS OR WRINKLES

Special care should be taken to avoid folds or wrinkles (page 12), when a tube is placed in the casing.

Many inner tubes are damaged by being overheated when a puncture is being vulcanized. If the motorist uses his own vulcanizer, he should be especially careful. If the heat is too intense or is applied for too long a time, the inner tube will be burned and very soon will become brittle or crack open. Often the only way of repairing a burned tube is to put in a section and this is rather expensive.

#### OIL IN PUMP

Inner tubes are frequently damaged by oil which enters from the tire pump, especially if it is a power pump operated by the engine. It is a good idea, from time to time, to drive such a pump at a fairly high speed and let the air from the hose blow against a sheet of paper to find whether it is delivering oil. If it is, its use should be discontinued until after it has been given suitable cleaning or repairing.

Satisfactory service can be gotten from good tires which are large enough for the loads they are expected to carry if they are given thoughtful intelligent care. Frequent use of the tire tester and regular inspection of the casings to guard against neglect of injuries will enable the motorist materially to reduce his tire expense, and, what may be of much greater importance, will increase the enjoyment of motoring.