

Off-Highway Tires: Colossal Performer

Paul Bunyan wrought mighty acts with the help of Babe, his whopping blue ox. Pecos Bill took a stick and dug the Rio Grande. John Henry—out to beat the steam drill—drove steel 'till his hammer caught afire.' And many are the incredible doings of Joe Magyarc. The legendary facts of such as these in American folklore are no more spectacular than the actual deeds of real men today.

A few years ago, what could have seemed so impossible as a monster which scrapes up and hauls away 5,000 tons of dirt in a day? Or a 120,000-pound "crasher" which clears an acre of dense woods in 20 minutes?

Monsters With A Purpose

The mythical human giants and modern-day earthmovers are both products of imagination—the difference being that today's engineers have an eye to the future so they create "monsters" with a purpose.

Heavy-equipment manufacturers can endow their creations with almost limitless size and speed. That's where Firestone comes in. It becomes the job of development engineers to keep pace. Firestone men design and build the largest tires in the world, and this is only the beginning.

In the late 1940s all giant earthmover tires were capable of full-load operation at top speeds of five miles an hour. Today, larger tires carry much greater loads at speeds nearing 60, and this upward trend in both speed and weight is continuing.

Spectacular improvements in off-road tires are due largely to Firestone's research policy of considering each construction job as a separate problem, and designing or recommending a specific tire for the job.

Long Time The Leader

Firestone has long been the leader in producing special off-road tires for unusual jobs. The experience has given the company's products excellent acceptance in both original-equipment and replacement markets



Super Rock Grip Wide Base Ground Grip Wide Base



Rock Grip Excavator Super Rock Grip Deep Tread



Super Ground Grip Ground Grip

for all phases of construction work.

With the large expenses involved in big construction projects, the important thing to any contractor is to have minimum "downtime" in which a piece of machinery is out of commission because of breakdown. Many contractors figure downtime costs at a minimum of \$50 an hour per unit.

Firestone representatives try to see that such losses are not due to tire failure. The company has earned a large share of the heavy-construction market by having teams of preventive-maintenance men on the job at big projects to see that off-road tires are cared for properly.

Trucks and personnel for field maintenance, and service men run regular cold-tire pressure checks in the field, checks for punctures, rim damage on tubeless tires, valve failure, breaks and separation. When contractors use Firestone tires according to recommendations, they get good service.

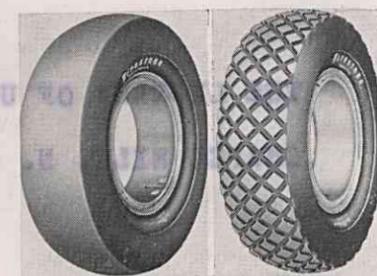
For every operation, company engineers establish certain maximum bases on load and speed at which tires are expected to run. In making recommendations, they must consider: Tread design; compounding; and cord-body strength, determined by the surface over which the tire must run.

Stockpile Against Downtime

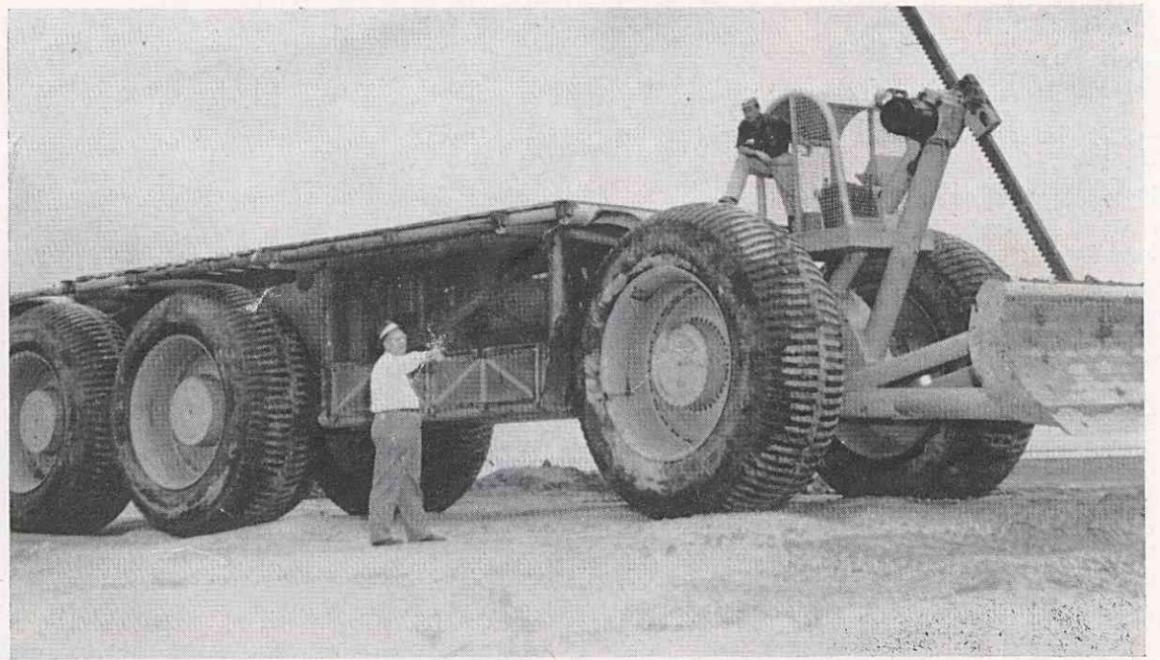
After the type and size of tire required for a certain job and unit have been determined, service men keep a stockpile of replacement tires on the site, the number governed by expected tire life based on the engineers' estimates of: Job conditions, speed, overload conditions, wheel positions of tires, maintenance record of tires already in use, and amount of existing wear left on them at beginning of operation.

Firestone's specialized knowledge has produced many sizes and designs of off-road tires. The largest production models are included in the "earthmover" class.

There are two basic types of earthmover tires: Rock designs and tractor designs. The rock types are for operation on harsh, abrasive terrain; the tractor type, for loose dirt and mud. Many contractors use rock-type tires all the time because they function adequately on loose



Plain Tread Roller Compactor



UPROOTER—This 60-ton LeTourneau Tree Crasher uproots large trees and heavy underbrush with the aid of Firestone 48-68 tires. The tires, 10 feet high and 4 feet wide, may be deflated to only five pounds pressure.



soil, and expenses of alternating on different jobs are eliminated.

Change in earthmover tires came when earthmoving equipment went to self-powered units from drawn units pulled by continuous-tread tractors. Tires must now provide pulling traction as well as lateral stability. They also need to take higher loads and more speed.

Engineers' Big Problem

Heat is the chief problem with which the engineer is confronted. Deep-tread tires are made for rough terrain, but they also run too hot to be used for long, fast hauling. For long-distance, high-speed earthmoving over smooth ground, tires with thinner treads are made-to-order for greater heat dissipation. For best cooling, the treads are grooved where temperatures run hottest. For earthmoving jobs, wide-base treads are more in demand today because of their higher flotation and better traction.

The same qualities which make for cooler running also make for fewer hours of wear, so a compromise must be made. Main changes from conventional design required for production of a cooler-running tire include: Use of cooler-running tread compounds, reduction of tread thickness, modified tread design, and use of a larger tire for a comparable load to reduce heat-producing overload.

Among earthmover tires the most popular models are the Super Rock Grip Wide-Base and the Super Ground Grip Wide-Base. The Rock Grip is intended for use on extra heavy, powerful self-propelled scrapers, wagons and bottom dump units in work on rough, rocky and abrasive terrain. It is compounded of Firestone's super-tough Rubber-X, and has a nylon cord body, tread bars extended into the sidewalls for added protection against cuts and snags, and a larger cross section for greater flotation.

For Units On Loose Soil

The Super Ground Grip is for lighter types of self-propelled scrapers, wagons and bottom dump units in general earthmoving on loose soil. There is also a regular Ground Grip model. Both ground-grip types

have the same major construction features as the Super Rock Grip, except for the different treads to match soil conditions. All have extra-wide, rugged tread designs for top tire life and traction.

Akin to the earthmoving tires are the mining types, especially designed for operations on steep grades and very rough ground. Most important among these are the Rock Grip Excavator and the Super Rock Grip Deep Tread. The Excavator is designed for scrapers, bottom and rear dump units, and wagons. It is nylon-corded, has extra body strength, and features double-thick sidewalls and heavy scuff-ribs, with a chevron tread design for positive traction with minimum vibration.

The Deep Tread has a 50 per cent deeper tread design than the Excavator, and because of the increased running temperature of heavy tread, is recommended only for short hauling at speeds under 25 mph. It is made chiefly for rear-dump units.

The Deep Tread is the lowest cost-per-hour design in the industry, if used at the specified maximums under tough-earth conditions.

Some For Building Roads

Roadbuilding tires are different from earthmover types because roadbuilding calls for running on soft dirt and paved roads, although the greater part of such work requires good traction on loose soil and mud with heavy equipment. Most often used are the Super Ground Grip and the Ground Grip models. Super Ground Grips are entirely new, with a curved-bar tread design that gives top traction with improved cleaning, as well as smooth operation at all speeds. The Ground Grip has straight bars, and is used mostly for pulling power.

Roadbuilding tires are not much larger than regular large-truck equipment and are best used on graders, industrial tractors and similar heavy machinery.

Unusual tires used in some roadbuilding operations are the Plain Tread Roller and the Compactor. These feature the same



A 41,000-mile network of multi-lane, controlled-access highways will be completed by 1972. The project completed, it will link every major metropolitan center in the nation. Already, nearly 12,000 miles of highway built under the Interstate road program are open. Playing a big part in earthmoving and roadbuilding will be giant off-highway tires by Firestone. This article, one of a series, is the story of these tires, to help you "Know Your Products".

high-quality construction features as all Firestones, but are designed for grade-compacting, in which they perform much the same function as the old-fashioned steam rollers.

Both the Compactor and the Plain Tread are run at a maximum speed of only five miles per hour, and are used on self-propelled compactors and rollers in gang-loaded, staggered axle positions, so that no ground area is missed.

Whoppers Built On Contract

Firestone builds some giant tires on contract. Largest in the world are the size 48-68s in use on Army Transportation Corps' LeTourneau Overland Cargo Carrier, known as the "Snow Train." This monster has 13 self-propelled cars and is made to cross the ice, snow, mud and marsh of Arctic wastes in Alaska, and to operate on the Greenland icecap.

The Snow Train tire is almost 10 feet high and 4 feet wide. Each one carries up to 15,000 pounds at only 10 pounds pressure per square inch, and has 10-ply nylon construction for maximum flexibility. Tread depth is only little more than a conventional small truck or automobile tire, yet the assembled tire weighs 1,441 pounds. The Snow Train Tire achieves top flotation with more than 10.4 square feet of tread against the ground at all times.

More heavily-built, if smaller, is the 36.00-41, developed for the Army's amphibious "Barc", built to unload offshore ships and haul the cargo inland. This tire is 9½ feet high and 3 feet wide and weighs 3,318 pounds. It carries 80,000 pounds of load at 70 pounds inflation, and contains enough rubber to manufacture more than 150 popular-size auto tires.

People who have read about Paul Bunyan will recall that a woman once told the hulking logger: What you don't finish will be done with machines. That's just what is happening today—and Firestone tires are playing a big part in it.