

THE STORY OF THE TIRE

By W. T. FARWELL, JR.

How the Modern Automobile Tire Has Evolved by Successive Connected Stages from the Solid Shoe of the Old "Bone-shaker"

WHEN, in the early nineties, the automobile industry came into being, the makers found the pneumatic bicycle tire already developed and only needing enlarging and strengthening to fit the requirements of the new vehicle. The bicycle gave us both the solid and pneumatic rubber tire. In the days of the high wheel, which was shod with small solid rubber tires, the riders apparently did not feel much vibration, because the large size of the driving wheel, fifty to sixty inches in diameter, enabled it to roll easily over small inequalities in the road; and as there was a certain amount of spring in the wheel which eliminated much of the vibration.

However, with the coming of the small-wheeled modern bicycle in 1886, which threw cycling open to both sexes and all classes, this question of vibration immediately became of the greatest importance and was the direct cause of the introduction of the pneumatic rubber tire in its modern, practical form. In the year 1846, R. W. Thompson, a Scotchman, patented the first pneumatic tire. This was a crude contrivance with a leather cover bolted on to the wooden rim of the wheel, but it is interesting to note that Thompson's patent included the rubber inner tube as used in the modern tire. These tires were used on a few carriages and were also fitted to the wheels of one of the steam coaches then running on the highways of England and Scotland; but Thompson's invention never met with "much support, proving neither a practical nor a commercial success.

Many years later, about 1871,
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Thompson became interested in road steamer construction. He built several heavy three-wheeled machines of the traction type, on which he fitted solid rubber tires five inches thick and ten inches wide. These were the pioneer heavy truck tires. The introduction of the two-wheeled velocipede or "bone-shaker," the father of the bicycle, which made its first appearance in Paris in 1864 or 1865, started a demand for some means to minimize the excessive vibration to which the rider was subjected. The velocipede had flat iron tires and hickory wheels—the front or driving wheel somewhat larger than the hind one—and a frame of solid iron surmounted by an iron saddle on a long bow spring.

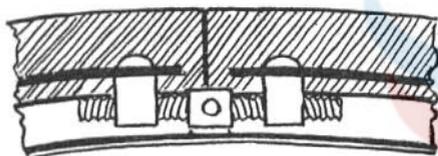
The rider found the machine in very truth a "bone-shaker," and but for the coming of the solid rubber tire the career of the bicycle might have been cut off in its infancy. These first tires were mere flat strips of rubber nailed on to the wooden rim of the wheel. This improvement was made in 1868 and was suggested by one C. K. Bradford, an American.

A radical change in bicycle and tire construction came in with the "Phantom" bicycle, which was exhibited in London in 1869. Wood was abandoned and wire-spoked suspension wheels were introduced. Thick, solid rubber tires were vulcanized on a steel ribbon not quite meeting at the ends of the rubber, and two nuts were fixed to the steel ribbon near the joint of the tire, which were drawn together and held to the rim with a right- and left-handed screw. This was the first mechanically fastened solid tire.

During the twenty years which saw

the rise and fall of the old "ordinary" or high bicycle and the birth of the "safety," solid tires—usually cemented on—continued in use, and it was not until 1888 that John B. Dunlop, a Belfast (Ireland) veterinary, invented the first practical pneumatic tire, which gave new life to the bicycle and has smoothed the way for the luxurious modern motor-car.

Mr. Dunlop made his first pair of tires for his young son, who had complained of the excessive vibration while riding his small bicycle over the stone pavements of Belfast. His first rim was a circular piece of wood from a round

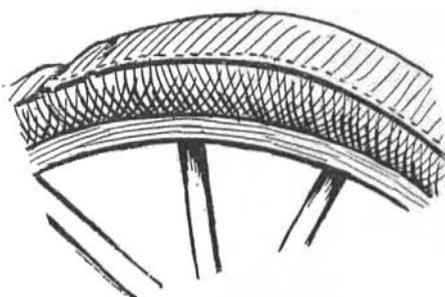


"PHANTOM" MECHANICALLY FASTENED
SOLID TIRE, 1869

cheese box; the air tube was made of sheet rubber joined up with solution; around the tube was wrapped a canvas bag, the sides of which overlapped and were "solutioned" around the rim. Over all was fitted a strip of rubber, serving as a cover and taking the wear of the road.

This primitive tire was inflated with a football pump, and although it was neither of comely appearance nor finished with mechanical accuracy, it enabled the inventor's son to ride easily over the cobblestones and to outdistance boys of twice his strength who used the solid tires then in vogue.

In June, 1888, Dunlop patented his invention and soon enlisted the support of a firm of Belfast cycle agents—Edlin & Sinclair—who assisted him in his further experiments and made machines suitable for the new tires.

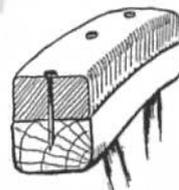


PORTION OF ORIGINAL TIRE INVENTED
BY THOMPSON IN 1846

Although primarily intended to abolish vibration, it was soon discovered that the pneumatic tire materially increased speed and racing men began to evince an interest in it. It struck its first heavy blow, however, at the Belfast College Sports in May, 1889. The biggest man in Belfast, the captain of his club, was "Bill" Hume, and Dunlop induced him, after much persuasion, to mount a pneumatic-tire bicycle in the college races. When Hume came to the mark he was greeted with derision and all kinds of witty remarks were aimed at both himself and the tires. However, he finished sixty yards ahead of the fastest men in Belfast!

Soon after this a team of Irish racing men invaded England with the new tire and swept everything before them. From that time on the success of the pneumatic grew and every cycle maker with any inventive talent immediately set out to perfect a tire of his own in order to get around the Dunlop device, for by this time Henry DuCros, a Dublin merchant, had secured control of the tire and had organized a company to promote it. He eventually organized a ten-million-dollar controlling company which established Dunlop agencies all over the world.

The first detachable pneumatic tire to be offered to the public was the Clincher, invented by W. E. Bartlett, an American resident in Scotland. Mr.



FIRST SOLID TIRE,
1868, USED ON
"BONE-SHAKER"



ORIGINAL DUNLOP, 1888

Bartlett patented his invention in October, 1890. It consisted of a steel rim with slightly upturned edges, an arch of canvas-lined rubber as a cover and an inner tube of rubber and canvas—the canvas to prevent the tube distending more than was necessary to press the edges of the cover against the rim and so hold the tire in position by pressure. A little later the Dunlop Company brought out their wired-on double-tube detachable tire, which was also held on by pressure against the rim. These tires are still made in nearly their original form, and have always held a leading position in England.



DUNLOP WIRED-ON TIRE, 1891

The Boothroyd (1890) was the first single-tube tire to be produced in England. Its radical points of difference from the Dunlop, no less than its undoubted excellence, procured for it a certain amount of popularity. Almost at the same time experiments were conducted in the United States by P. W. Tillinghast, of Providence, R. I.,

who invented types of single tube and puncture tread tires.

When in 1891 the Pope Manufacturing Company looked around for a pneumatic tire for their Columbia bicycle and selected the single-tube type, Boothroyd and not Tillinghast was in their minds. The tire they produced in 1892 was generally known as a Boothroyd. It appeared, however, that Tillinghast had made application for a patent on his single-tube tire as early as November, 1890. His application being several times rejected, he finally obtained a patent on May 23, 1893. In supporting his claims Tillinghast proved that he had invented his tire in the summer of 1890. Consequently his tire antedated the Boothroyd by a small margin.

Col. Albert A. Pope, with his usual foresight, acquired the Tillinghast patents and brought out the Columbia single tube, now the well-known Hartford tire. He organized the Hartford Rubber Works, which, in addition to the Columbia tire, manufactured the Dunlop under license from the Dunlop Company, and also the Turner solid tire.



SOLID TIRE AND HOLLOW RIM USED ON THE OLD HIGH BICYCLE

It seems that the first air tire patent in this country was granted to one Thomas, but was not made use of until 1892, when the Geo. R. Bidwell Cycle Company brought out the Bidwell-Thomas tire. It was of the old wrapped Dunlop variety and did not last long.

In 1892 the Gomuly & Jeffery Company, who then made the Rambler bicycles and who now produce the Rambler automobile, introduced the G. & J. corrugated clincher tire. Then came Palmer's single-tube, the first of the diagonally wrapped thread type, which reduced the weight and made a faster and more resilient tire. It was, and is still, a popular tire with American racing cyclists.

The Morgan & Wright double tube,

with a laced-up opening in the casing, through which the inner tube was withdrawn for repairing punctures, was also one of the most successful bicycle tires brought out at that time.

It will be remembered that although the air tire had been introduced in the United States in 1890, it was for some time received cautiously and was much questioned. We had at first many varieties of the cushion tire, which was practically a solid tire with a hollow



ORIGINAL
CLINCHER, 1890,
INVENTED BY
W. E. BARTLETT

core. The cushion tire proved to have much less resiliency than the pneumatic; but cost less and was more reliable than the early air tire. At this time the fitting of pneumatic tires to a bicycle entailed an extra cost of twenty-five up to fifty dollars.

The following prophetic editorial note, which appeared in the June, 1892, number of THE OUTING MAGAZINE, expressed the general sentiment of the cyclists:

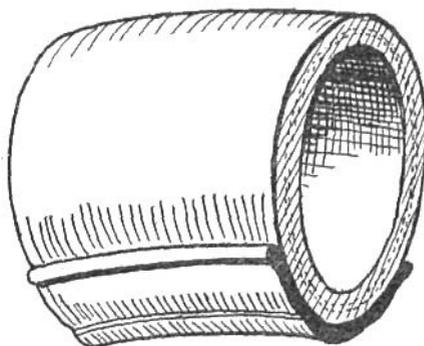
"By and by a solid-tired safety will be a curiosity, and later on still the pneumatic will probably shove every other kind of tire to the wall. Of course, the year 1892 is to be a test as to the permanent success of the pneumatic tire. On the general result the



HARTFORD SINGLE
TUBE

question 'to be or not to be' will be settled. As in all cases of this kind it will be the survival of the fittest; but as my faith in the ultimate success of the compressed air principles is of the strongest kind I have not much fear for the result."

For several years preceding the introduction of the pneumatic tire Daimler had been experimenting with his internal combustion engine and had built a few successful machines which were the



COLUMBIA, 1891, THE FIRST AMERICAN
SINGLE TUBE BICYCLE TIRE

forerunners of the Panhard car. Daimler and Benz in Germany, Peugeot, De Dion, and others in France, and Seldon, Duryea, Winton and Haynes in the United States, were all working on the motor-vehicle idea and were building more or less successful machines. The motorcycle was also in the early stages of its development; in fact, Daimler's first machine was a wooden bicycle with a single-cylinder engine mounted between the wheels and driving the rear wheel by means of a belt as in the modern motorcycle.

In this country steam and electric vehicles were further advanced and better understood than the gasoline. At one of the earliest race meetings, held at Providence, R. I., in 1896, the electric made faster time than the gasoline cars.

As was the case with the bicycle makers, the first motor-car builders were chary of the pneumatic and experimented with many varieties of solid and cushion tires, none of which proving satisfactory, they turned to the pneumatic, adopting the single-tube bicycle tire. Although these tires proved fairly satisfactory for the light, low-powered machines of the day, they would not stand up under the later heavier and faster cars. The tires were then made heavier and larger; but the manufacturers soon found that to keep pace with

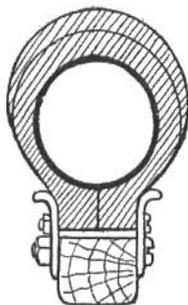


DUNLOP DETACH-
ABLE, 1900

the ever-increasing size, weight and speed of the automobile they must produce a tire built to withstand the vastly greater stresses put upon it.

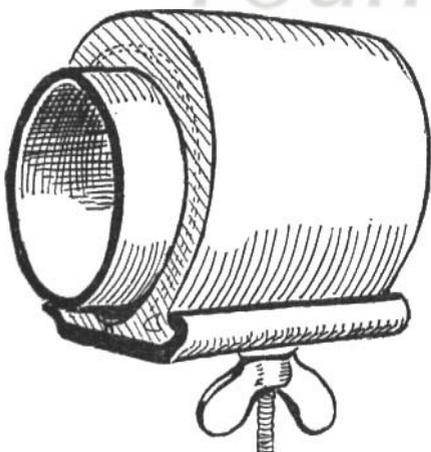
The makers now turned back to the original Dunlop and Clincher detachable tires as more suited to their needs and began to develop a distinct type of automobile tire. The wired-on or Dunlop tire, which has developed into the straight side tire of the present day, was enlarged and strengthened and put upon

the market by its makers, the Hartford Rubber Company. At about the same time the B. F. Goodrich Company brought out their Goodrich clincher, which was the first American tire of this type to be made for automobile service.

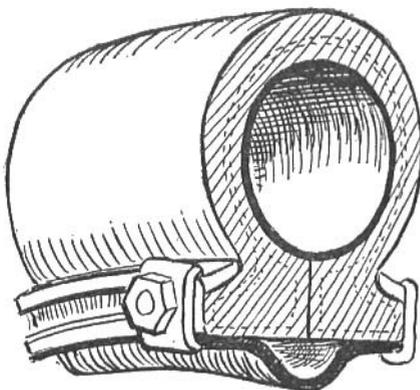


GOODYEAR DETACHABLE TIRE, 1902. GERM OF DEMOUNTABLE RIM IDEA

At the first Automobile Show, which was held in connection with the annual Cycle Show, Madison Square Garden, in January, 1899, three makers exhibited five electric and two gasoline vehicles, and the Diamond Rubber Company made the only showing of pneumatic and solid automobile tires. In November, 1900,



GOODRICH FIRST DETACHABLE CLINCHER AUTOMOBILE TIRE IN AMERICA, 1900



FISK DETACHABLE AUTOMOBILE TIRE, 1903, FIRST MECHANICALLY DETACHABLE TIRE IN AMERICA

the first exclusive Automobile Show was held in the "Garden." Thirty-three automobile makers showed their wares and the number of tire exhibitors had jumped to eight, nearly all showing single-tube pneumatic and solid tires.

During the next two years most of the tire manufacturers dropped the single-tube and were making double-tube detachable tires only.

The records of the Patent Office at that time indicated that many minds were busy in the perfecting of mechanically attached tires.

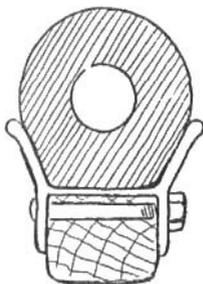
The Fisk quick detachable tire of 1903 was the first of this type. It introduced the removable side rings, locking the edge of the tire to the rim. Many varieties of the mechanically attached tire were soon brought out and of late years the quick demountable rim has been rapidly developed.

Some time in the early stages of automobile construction the motorist discovered the side slip or "skidding" bugbear, which led some makers to adopt bicycle tires having anti-skid studs or corrugations on their treads, but they were not suitable for the greater weight and speed of the automobile.

The makers, after working some years to minimize this evil, have evolved many very efficient types of non-skid treads. The recent rapid development of the commercial car and the motorcycle has made new demands on the ingenuity of the tire makers. The aeroplane also

must be rubber shod, which calls for a tire of special construction.

Even with all these uses of the rubber tire in mind the actual figures indicating the magnitude of this young industry are no less than astounding. Of the 40,000 tons of raw rubber imported yearly by the United States fully one-half is used in tire construction, according to a reliable authority. For the year 1911 the gross value of the finished



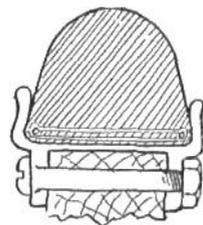
CUSHION
AUTOMOBILE

product—all the tires made in one year in this country—was, in round figures, \$10,000,000, while the capital tied up

in concerns engaged in the manufacture of rubber tires is estimated conservatively at \$400,000,000. And this, be it remembered, is an industry which is practically not over a decade in age and which has experienced by far the greater part of its growth in the latter half of that short period! No wonder that the great rubber companies, fearful of the exhaustion of the natural rubber supply of the earth, are setting their chemists to find some synthetic method of producing this tremendously important modern commodity.

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TYPE OF SOLID
AUTOMOBILE
TIRE

LA84

TM

Foundation